Healthcare Life-Science in Abu Dhabi

2023

Partner's G Management Consultancies

We welcome you to delve into the intricate tapestry of Abu Dhabi's Healthcare Life-Science ecosystem. This publication aims to provide a comprehensive understanding of the thriving landscape in Abu Dhabi, shedding light on the key players, notable growth, and flagship projects such as the Emirati Genome and Pharmaceutical initiatives. Through a meticulous exploration and interviews with most prominent representatives of Abu Dhabi's Healthcare Life-Science system, we seek to showcase the emirate's remarkable progress and its status as a beacon of promise within the global healthcare arena.

PGC is a regional source of health intelligence and analytics that decision-makers can rely on. The company's activity is mainly dedicated to offering deep technological and market insights, company scouting. PGC is created by the community of healthcare professionals with various research, marketing and business development backgrounds.

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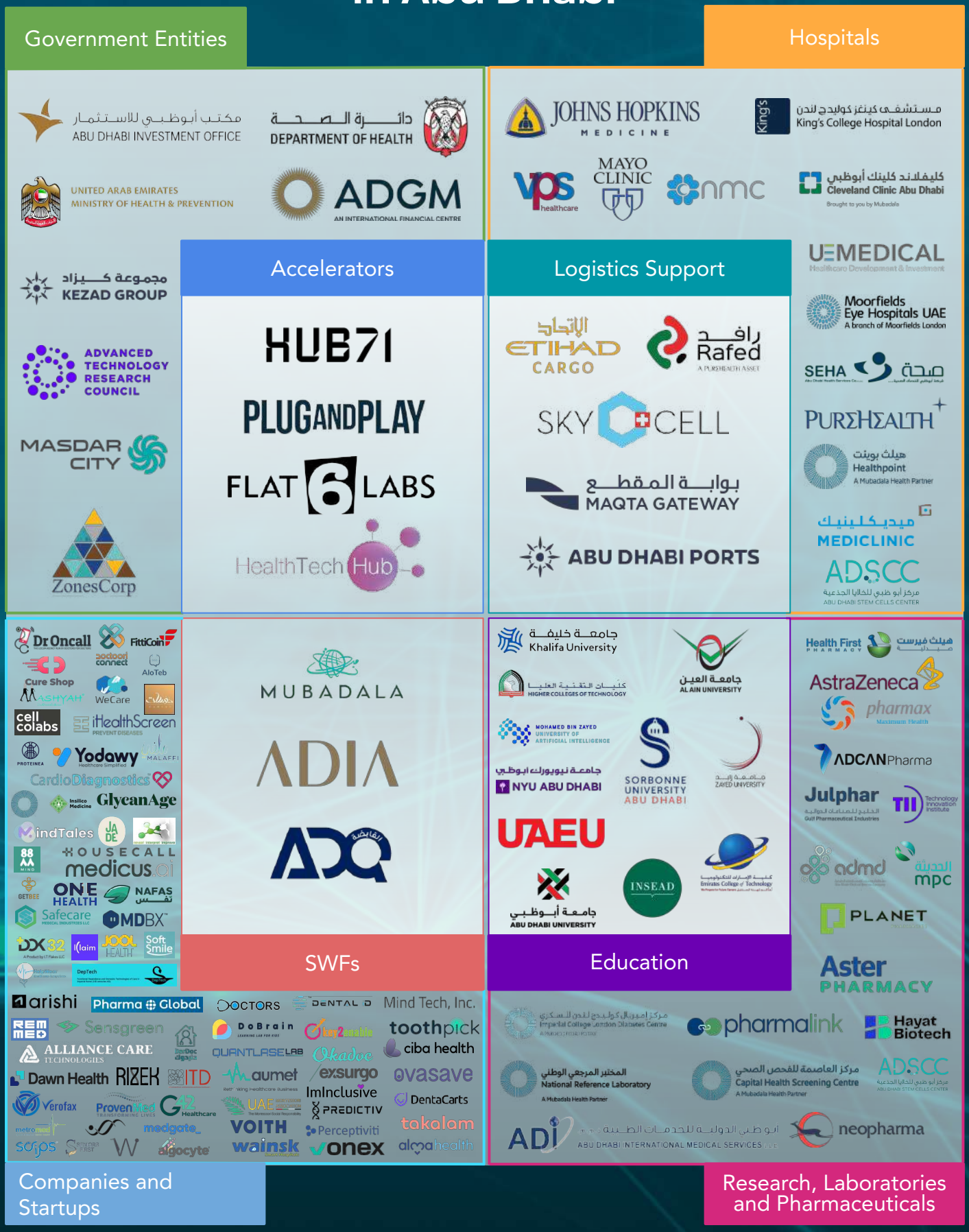


Healthcare Life-Science Companies and Startups in Abu Dhabi

Wellbeing and Wellness

Cure Shop

NAFAS نفس

Yodawy Healthcare Simplified

FittiCoin

scips

DoBrain LEARNING LAB FOR KIDS

ASHYAH

TeleHealth

wainsk Smart Hospitals

doctoori connect

DOCTORS

iHealthScreen PREVENT DISEASES

medgate_

Dr Oncall

MALAFFI

HOUSECALL

MindTales

WeCare

Distribution & Suppliers

ONE HEALTH

metromed

vonex

Safecare MEDICAL INDUSTRIES LLC

Verofax

Pharma Global

Personalized Medicine

GlycanAge

medicus.ai

algocyte

PREDICTIV

Digital Health

Mind Tech, Inc.

JOOL HEALTH

CardioDiagnostics

Sensgreen

Dawn Health

ALLIANCE CARE TECHNOLOGIES

arishi

ITD

GETBEE

ciba health

HelpWear

Okadoc

DX32 A Product by LT Flakes LLC

MDBX

ovasave

aumet Rethinking Healthcare Business

almahealth

RIZEK

reveal interpret improve

AgeTech

UAE MONTESSORI ASSOCIATION The Montessori Social Responsibility

VOITH

SENIORS FIRST

FinTech

Perceptiviti

iClaim

BioTech

cell colabs

PROTEINEA

DepTech

Insilico Medicine

InclusiveTech

ProvenMed TRANSFORMING LIVES

JADE

key2enable

W

ImInclusive

Dental

DentaCarts

DENTAL iD

Soft Smile

toothpick

Health Product

AloTeb

REMED

exsurgo

Mental Health

88 MIND

takalam

Research

G42 Healthcare

QUANTLASE LAB

Abu Dhabi Life-Science Ecosystem Partners

H.E. Mansoor Ibrahim Al Mansoori
Chairman of Department of Health
Abu Dhabi

As we collectively work together to address global healthcare challenges, Abu Dhabi continues to prioritise life science and research, harness innovation and foster collaboration for the benefit of the global community. Reinforcing its position as a leading healthcare destination, the Emirate is forging a path towards healthier communities around the world.

وزارة الصحة ووقاية المجتمع
MINISTRY OF HEALTH & PREVENTION

MoHAP entrusted with overseeing the implementation of healthcare policies across various sectors.

دائرة الصحة
DEPARTMENT OF HEALTH

DoH plays a pivotal role in shaping the regulatory framework for healthcare entities, enforcing high standards of care.

UNITED ARAB EMIRATES
MINISTRY OF INDUSTRY
& ADVANCED TECHNOLOGY

MoIAT established to formulate policies and programs to foster industrial development.

مكتب أبوظبي للاستثمار
ABU DHABI INVESTMENT OFFICE

ADIO launched to assist investors and enterprises in establishing, expanding, and nurturing their operations.

دائرة التنمية الاقتصادية
DEPARTMENT OF ECONOMIC DEVELOPMENT

DED formulates policies by leveraging the most recent research and statistical data from various indicators.

ADVANCED TECHNOLOGY RESEARCH COUNCIL

ATRC plays a crucial role in driving advanced research and development in the field of technology.

ADQ

ADQ operates to drive and expedite the transformation of the Emirate into a knowledge-based economy.

MUBADALA

As a sovereign wealth fund, Mubadala plays a significant role in managing and diversifying the investments.

United Arab Emirates at a Glance

Most of the UAE's population resides in Abu Dhabi and Dubai, the two biggest cities of the UAE.

The value of FDI to the UAE in 2022 amounted to USD 20.667 billion.

UAE is the best country in the Arab World by The Human Development Report by UNDP

UAE is ranked 1st in Middle East and North Africa region for FDI inflows

UAE makes top 35 globally according to World Bank GDP rating 2021.

UAE is ranked 13th in World Digital Competitiveness Ranking 2022.

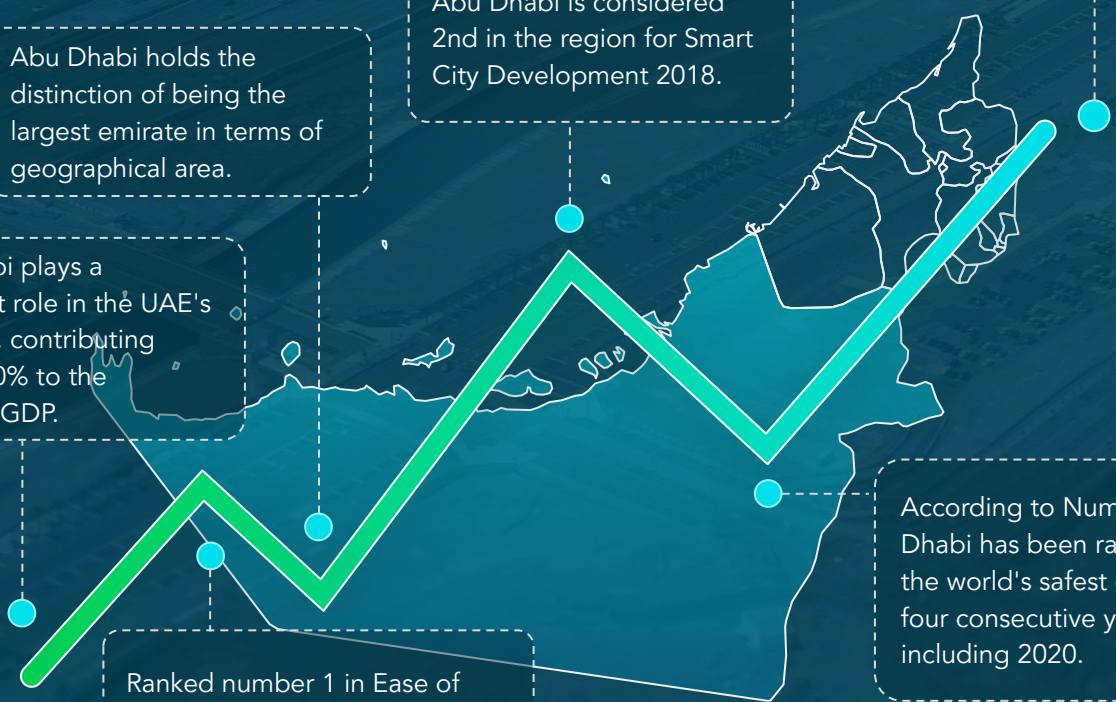
Abu Dhabi is the largest emirate by geography - 87 percent of UAE

Abu Dhabi is ranked 2nd in Quality living City Ranking 2019 by Mercer in the region.

Abu Dhabi is considered 2nd in the region for Smart City Development 2018.

Abu Dhabi holds the distinction of being the largest emirate in terms of geographical area.

Abu Dhabi plays a significant role in the UAE's economy, contributing around 60% to the country's GDP.



According to Numbeo, Abu Dhabi has been ranked as the world's safest city for four consecutive years, including 2020.

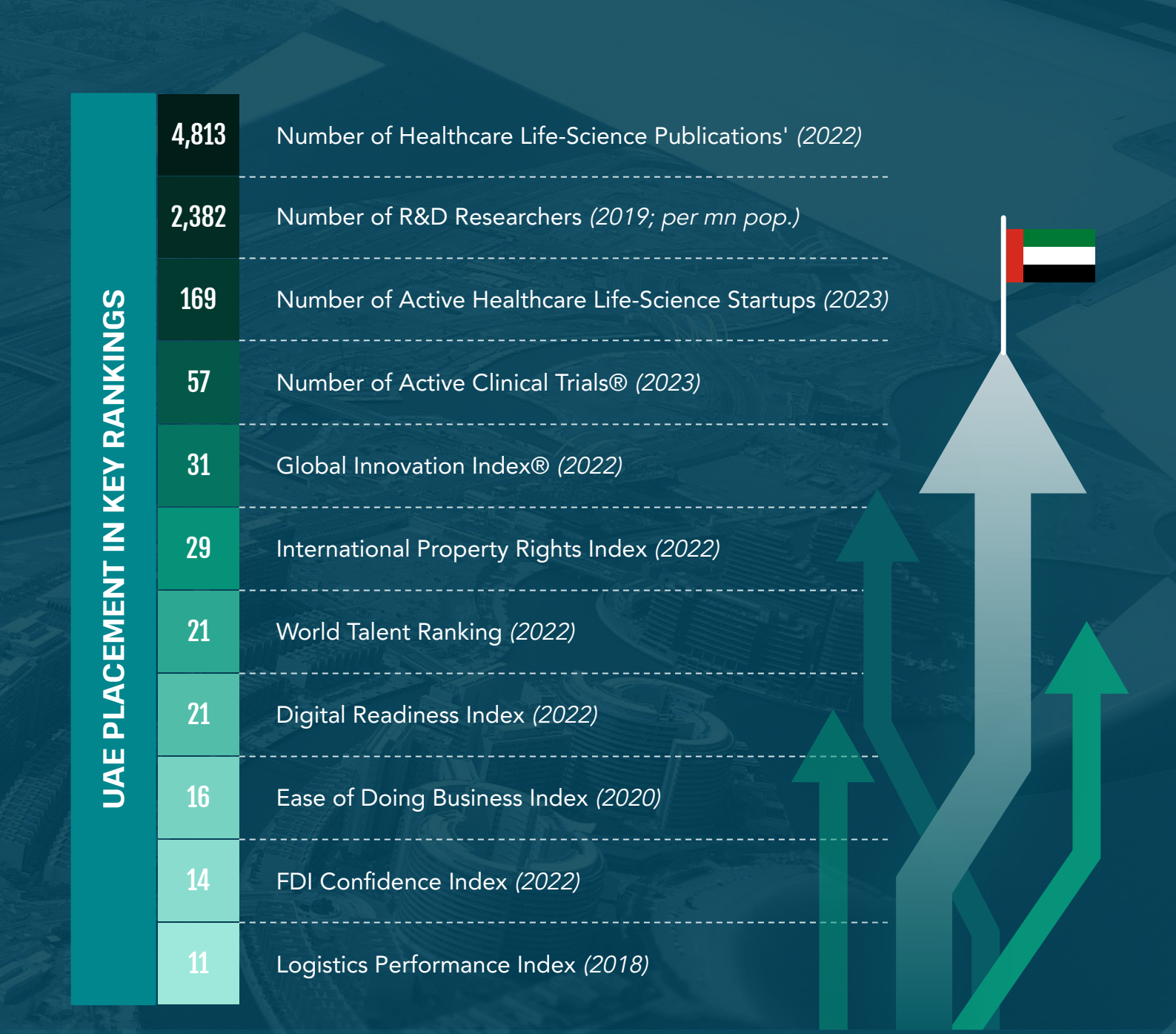
Ranked number 1 in Ease of Doing Business in the region.

Abdulla Abdul Aziz Al Shamsi
Acting Director General, Abu Dhabi Investment Office (ADIO)

Since launching the new PPP law in 2019, Abu Dhabi has established a proven track record of building efficient and effective commercial partnerships that deliver sustainable, long-term value for all parties.

UAE PLACEMENT IN KEY RANKINGS

4,813	Number of Healthcare Life-Science Publications' *(2022)*
2,382	Number of R&D Researchers *(2019; per mn pop.)*
169	Number of Active Healthcare Life-Science Startups *(2023)*
57	Number of Active Clinical Trials® *(2023)*
31	Global Innovation Index® *(2022)*
29	International Property Rights Index *(2022)*
21	World Talent Ranking *(2022)*
21	Digital Readiness Index *(2022)*
16	Ease of Doing Business Index *(2020)*
14	FDI Confidence Index *(2022)*
11	Logistics Performance Index *(2018)*



UAE Strategies, Plans and Visions for Health

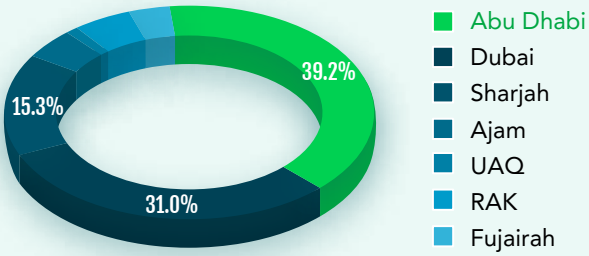
Abu Dhabi Healthcare Strategic Plan	The Emirati Genome Programme	National Program for Donation and Transplantation of Human Organs and Tissue - 'Hayat'
Dubai Emergency Medical Services Strategy	National Nutrition Strategy 2030	National Strategy for Nursing and Midwifery - Roadmap for 2025

Abu Dhabi Healthcare Life-Science Sector

Abu Dhabi has the biggest number of medical doctors in the region

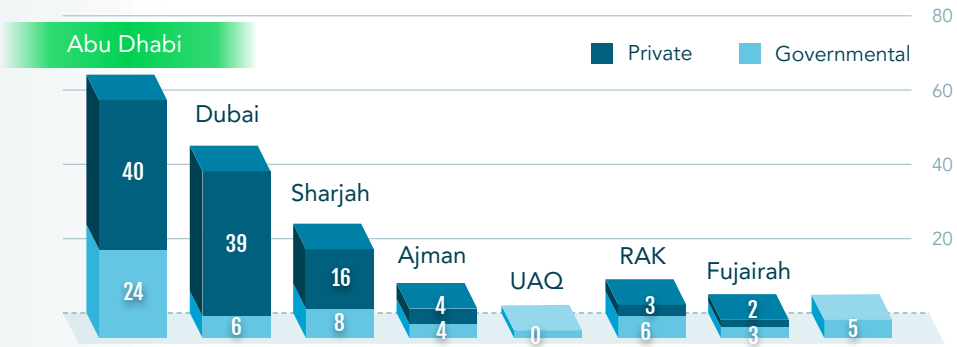
4,292	Consultants
3,380	Specialists
2,745	Practitioners

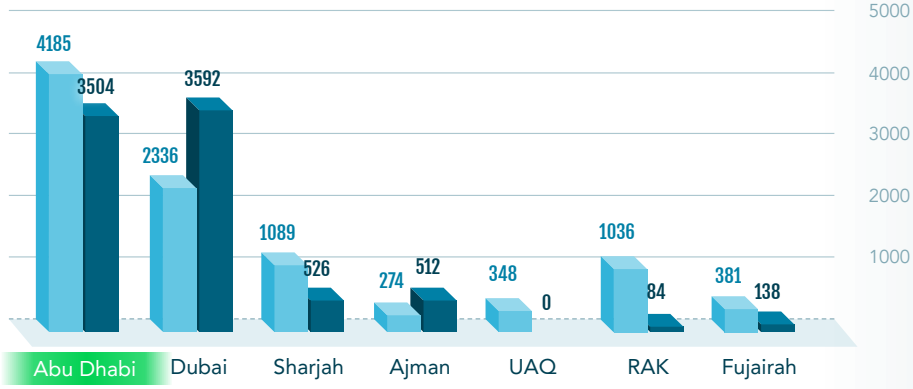
Total Number of Outpatient Visitors in hospitals by Emirates in 2020 [1]



COVID-19 highlighted the importance of ensuring an adequate supply of healthcare goods and services necessary for combating the pandemic. As a consequence of the pandemic, consumers have become acquainted with telemedicine and e-health services. There is a growing demand for generic medicines, with per capita spending among the highest in the Middle East.

Number of Hospitals by Sector and Emirate in 2020 [2]





Number of Hospital Beds by Sector and Emirate in 2020 [3]

It is estimated that by 2050, the global population aged 60 years and older will double, surpassing 2 billion individuals. This demographic shift emphasizes the need for healthcare services and solutions to cater to the aging population. Furthermore, The digital health market is projected to experience a compound annual growth rate (CAGR) of approximately 25 percent between 2019 and 2025, resulting in a market value close to 660 billion dollars by 2025, highlighting the immense growth potential within this industry.

Abu Dhabi is driven by global trends and serves as a strategic hub that serves as a vital link between Asia and Europe.

More than 25 healthcare life-science related educational programs

36 primary care centers and 10 prevention screening centers

Advanced e-health systems that possess extensive patient data

More than 403,000 genome samples sequenced

14 manufacturing facilities

More than 327 Clinical Trials

More than 155 innovative medicine produced locally

Regulatory environment

Decree 321 of 2020 was introduced to safeguard innovation.

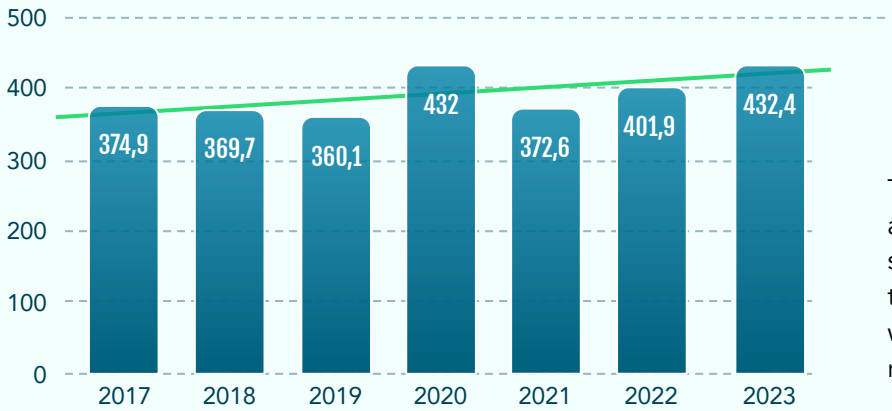
Decree 18 for 2018 established a fast track registration process.

Federal Law No. 11 of 2021 harmonizes UAE patent law with international standards.

Abu Dhabi Healthcare Life-Science Market Overview

The market size of Abu Dhabi was estimated using data from the UAE figures. The percentage of Abu Dhabi's market size in relation to the total UAE market was calculated by comparing the total number of inpatient and outpatient visits in Abu Dhabi to the overall UAE figures, which accounted for 38.96% according to the UAE Statistical Annual Report 2020.

Abu Dhabi Estimated Medical Device Market Size in Millions USD [4]

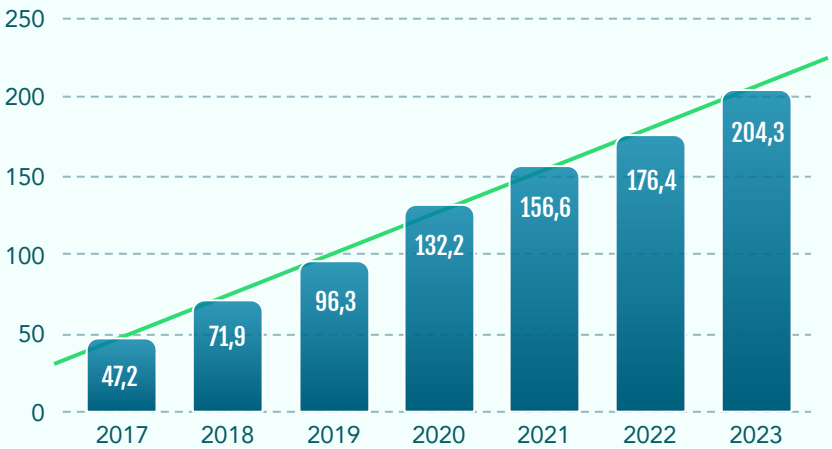


CAGR 2017-2023

2.4% Abu Dhabi

The UAE medical devices market has seen a CAGR expansion of 2.4% during the same period. The digital health market in the UAE has witnessed remarkable growth, with a CAGR expansion of 27.7% in revenue between 2017 and 2023.

Abu Dhabi Estimated Digital Health Market Size in Millions USD [5]

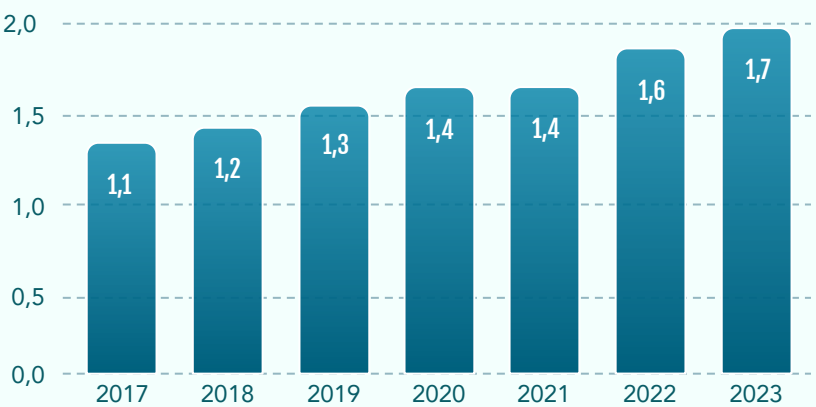


CAGR 2017-2023

27.7% Abu Dhabi

However, despite this growth, the size and scalability of the UAE's healthcare Life-Science markets are still limited in comparison to leading healthcare Life-Science hubs. The UAE's heavy dependence on imported drugs indicates that achieving self-sufficiency in this sector is a long-term goal.

Abu Dhabi Pharmaceutical & Biotech Market Size in Billions USD [6]



CAGR 2017-2023

7,4% Abu Dhabi

Ecosystem in a Nutshell

Basic Research → Translational Research → Clinical Development → Manufacturing → Supply Chain → Healthcare Delivery

Abu Dhabi's healthcare Life-Science sector benefits from a diverse network of ecosystem partners, contributing to its overall footprint. However, the varying levels of activity and investment across different stages of the value chain can impact the sector's overall progression and productivity.

Dr. Thomas Launey
VP Molecular Biotec and Genomics
Biotechnology Research Center

Technology Innovation Institute has a policy to involve international advisors to provide feedback and independent evaluation and advices on use cases. They may also help to identify additional key partners with unique innovative technologies. Both nationally and internationally, we fully understand the benefits of a strong network.

Favorable Environment

Ghadan 21 accelerator programme, UAE Strategy for Artificial Intelligence, Hub71, Block 7 Innovation Hub, Masdar City

Talent Resources

A multinational workforce with an impressive literacy rate of 93.4%

Sovereign wealth funds (SWFs), ADQ, Mubadala Ventures, ADIO's Incentive Programme, etc.

Funding Resources

0% income tax rate, and a two-year fee waiver for new licenses, no restrictions on the repatriation of capital

Entrepreneurial Environment

EMIRATI GENOME
FUTURE OF OUR GENERATIONS

The Emirati Genome Programme is a nationwide initiative that seeks to leverage genomic data for the enhancement of the Emirati population's health. This project encompasses scientific research and study to profile and analyze the gene sequencing of UAE Nationals, with the goal of advancing the prevention and treatment of chronic diseases.

Government Strategies

Abu Dhabi Strategies

Abu Dhabi Economic Vision 2030

Abu Dhabi رؤية 2030 Vision

Foundation Strategy for Health

دائرة الصحة DEPARTMENT OF HEALTH

Abu Dhabi Industrial Strategy

ABU DHABI INDUSTRIAL STRATEGY

UAE Strategies

UAE Genome Strategy

EMIRATI GENOME
FUTURE OF OUR GENERATIONS

UAE Industrial Strategy 2031

اصنع في الإمارات MAKE IT IN THE EMIRATES

UAE Strategy for Advanced Innovations

UNITED ARAB EMIRATES

Abu Dhabi recognizes the need for strategies to achieve its long-term goals and ensure sustainable growth and development to advance the Life-Science Healthcare Ecosystem.

Aspirations

Advanced Healthcare Solutions

Abu Dhabi aims to integrate cutting-edge therapies and technologies into its healthcare system. By focusing on research and development of new medical technologies, the goal is to provide more personalized healthcare and enhance overall healthcare outcomes.

Global Competitiveness

Abu Dhabi seeks to establish itself as a global player in the healthcare life-science industry. By leveraging international partnerships and agreements and capitalizing on the global value chain, Abu Dhabi aims to position itself prominently on the global healthcare map.

Economic Diversification and Impact

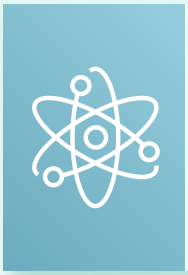
Abu Dhabi aims to diversify its economy by advancing the knowledge-based economy. This includes promoting innovation, entrepreneurship, and attracting foreign investment in the healthcare life-science sector. The objective is to maximize the socio-economic impact of these industries and contribute to overall economic growth.

Sustainability and Resilience

Abu Dhabi recognizes the importance of sustainability and resilience in the healthcare sector. By integrating new therapies and technologies, as well as focusing on research and development of medical advancements, the aim is to improve healthcare delivery, enhance personalized care, and strengthen the overall resilience of the healthcare system.

Abu Dhabi Life-Science Healthcare Future

What Success Looks Like For Abu Dhabi



Exceptional talent and scientific capabilities in the region

Utilizing a network of world-renowned experts, researchers, and innovators, and providing a high-quality living environment.

Innovation-driven clinical trials and R&D regulatory system

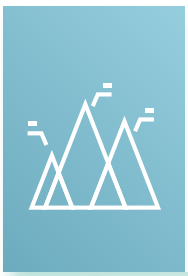
Implementing agile, proactive, and targeted regulations that empower stakeholders across the "quadruple helix" to push the boundaries of scientific advancement.

Well-structured funding framework and incentive programs

Offering comprehensive and focused schemes that support clinical and scientific innovations.

State-of-the-art of healthcare life-science data infrastructure

Leveraging cutting-edge data platforms and healthcare facilities to foster collaboration, innovation, and efficient healthcare delivery.



Access to a large and expanding regional and global market

Benefiting from a strategic location and international reputation as a vital gateway to the Middle East and North Africa region and global markets.

Strengths

Infrastructure System:

Strong logistic infrastructure (Etihad Cargo), modernized facilities, and ample resources. A strong emphasis on digital transformation (Malaffi). 14 manufacturing facilities.

Research & Development:

A growing clinical trials presence, with 57 active interventional trials conducted in 2022. An effort to expand the number of research centers, ex. the Abu Dhabi Stem Cell Center.

Innovation Culture:

Supportive community, strong mentorship programs, and a diverse talent pool. 86 emerging healthcare life-science startups. Active support from accelerators and incubators such as Hub71 and Plug&Play.

Funding & Financing:

Significant financial resources allocated through government-backed funds. Increasing FDI inflows, reaching USD 20.7 billion in 2021. Investment funds (ADQ and Mubadala) focused on expanding their involvement in the healthcare Life-Science sector.

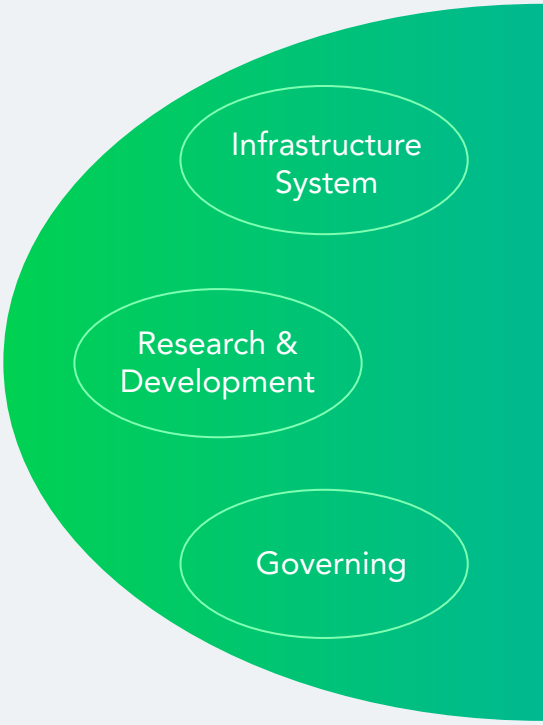
Human Capital:

A large pool of highly skilled workers. An appealing destination for talent, ranked 21st globally in terms of talent attractiveness. Increasing efforts to upskill talent by establishing university-led research centers.

Regulatory, IP & Governance:

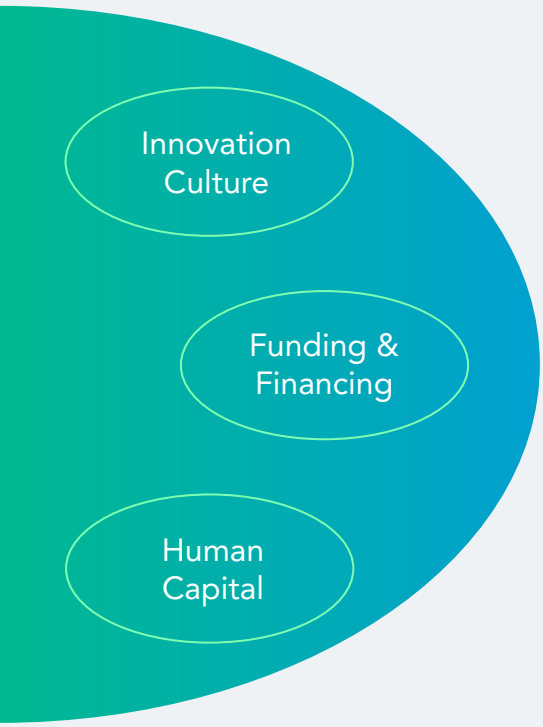
Clear and consistent, favorable policies (absence of corporate tax) that foster business growth and development in health industry. Regulatory framework around clinical trials, registration of pharmaceutical drugs and medical devices.

Main Areas for Healthcare Life-Science Sector Development



A thriving ecosystem that fosters growth and innovation.

Main Areas for Healthcare Life-Science Sector Development



Addressing these challenges will further strengthen the ecosystem.

Opportunities

Infrastructure System:

To improve the physical storage infrastructure and logistics, as well as developing co-location opportunities that enhance collaboration among different stakeholders.

Research & Development:

To increase the limited volume and quality of healthcare life science publications (around 4,800) as well as approved patent applications.

Innovation Culture:

To enhance the transparency of regulatory prerequisites and address the scarcity of flagship enterprises to attract skilled professionals and stimulate entrepreneurial activity. Additionally, to increase the emphasis on entrepreneurial educational programs.

Funding & Financing:

To enhance access to capital for early-stage startups, diversify funding options, and increase the presence of dedicated life science funds, it is important to eliminate gaps in the diversification of funding sources.

Human Capital:

To increase the number of incentive schemes for research and mandates for clinicians, as well as the number of research experts in the sector. Additionally, aim to decrease the turnover of medical talents, which aligns with the global trends of talent shortages in the healthcare industry.

Regulatory, IP & Governance:

To foster transparency and accountability, as well as increase the level of coordination between MOHAP and DOH, to enhance IP and patent protection laws.

Healthcare Life-Science Accelerators in the UAE

500 Startups is a renowned venture capital firm and startup accelerator program that focuses on nurturing early-stage technology companies and supporting entrepreneurial ecosystems. It is a partnership between 500 Startups, a global venture capital seed fund and the Abu Dhabi Investment Office.

500

techstars

TechStars is a global startup accelerator and investment firm. TechStars Abu Dhabi serves as a launchpad for early-stage technology startups, providing them with a structured program to accelerate their growth and increase their chances of success.

Hub71 is a technology ecosystem that empowers to establish resilient tech companies. It offers opportunities to access markets, a robust capital network, an array of partners, and a community with top-tier talent.

HUB71

PLUG AND PLAY
ABU DHABI GLOBAL MARKET

Plug and Play is an innovation platform and startup accelerator that aims to connect entrepreneurs, investors, and corporate partners. It serves as a catalyst for the growth and development of startups by providing them with the necessary resources, mentorship, and networking opportunities.

HealthTech Hub represents an innovation ecosystem dedicated to accelerating the growth of health technology startups. Its mission is to focus on delivering IT solutions that enable interaction and interoperability between stakeholders.

HealthTech Hub

FLAT 6 LABS

Flat6Labs serves as a global center for digital innovation, providing comprehensive support to both local and international entrepreneurs in establishing and expanding their digital ventures in Abu Dhabi and beyond.

Healthcare Life-Science Conferences in the UAE

The Arab Health Conference is a prominent annual healthcare event that brings together healthcare professionals, industry experts, and leading companies from around the world. It serves as a platform for knowledge sharing, networking, and showcasing the latest advancements in the field of healthcare.

Arab Health

GITEX GLOBAL

The Gitex Global Conference is a renowned annual technology event that brings together industry leaders, innovators, and enthusiasts from around the world. Gitex stands for Gulf Information Technology Exhibition, and it takes place in Dubai, United Arab Emirates.

The Medlab Middle East is a renowned event and conference focused on laboratory management and diagnostics. It serves as a platform for showcasing products across diverse industries and provides valuable educational resources and networking opportunities with global experts.

Medlab Middle East
By Informa Markets

FLYPHARMA MIDDLE EAST ABU DHABI

FlyPharma Conferences cater to innovative individuals and companies seeking to enhance the capabilities of their pharmaceutical supply chains. These conferences provide an engaging platform to explore present and future challenges in the pharma and cargo supply chain domain.

Abu Dhabi Global Healthcare Week (ADGHW) offers an unparalleled platform to envision the future of global healthcare. This prestigious event gathers leading disruptors, influencers, experts, and practitioners who are driving positive transformations in healthcare delivery and accessibility.

Abu Dhabi Global Healthcare Week

Patient Experience & Innovation Summit

The Patient Experience and Innovation Summit in Abu Dhabi is an event for healthcare professionals, patients, and industry pioneers to explore how to enhance patient and caregiver experience. It aims to improve the quality of care while showcasing the latest innovations, technologies, and strategies within the healthcare ecosystem.

UAE Government Strategies for Healthcare Life-Science Industry

Integrating modern technologies into the healthcare sector holds immense potential for improving patient care, enhancing diagnoses, and driving innovation. Recognizing the significance of innovation in healthcare, the United Arab Emirates government has implemented strategic initiatives to leverage this transformative technology. This article explores the UAE government's strategies for AI in healthcare, highlighting their importance, impact, and potential for the future.

The healthcare Life-Science sector in Abu Dhabi, the capital of the United Arab Emirates, shows significant potential for growth and capitalizing on key market opportunities. With global and local trends such as aging populations and the increasing burden of chronic diseases, the demand within the healthcare industry is set to rise. This article delves into an assessment of Abu Dhabi's current healthcare Life-Science sector, highlighting the market drivers, market size, and ecosystem mapping, while also examining the challenges faced by the region.

An examination of UAE's healthcare Life-Science industry reveals the significant potential to take advantage of key market possibilities.

Market Forces

The rise of aging populations worldwide is projected to double the global population aged 60 years and older to over 2 billion by 2050, creating a substantial demand for healthcare services.

THE GROWING BURDEN OF CHRONIC DISEASES AND NON-COMMUNICABLE DISEASES (NCDs) CONTRIBUTES TO OVER

75% OF THE DISEASE BURDEN IN THE UAE

These factors present significant opportunities for the healthcare industry in the country. Additionally, the UAE's diverse and strong international alliances serve as a competitive advantage for expanding the healthcare Life-Science industry.

Industry Scope

The healthcare Life-Science sector in the UAE has witnessed substantial growth across key segments, aligning with global trends.

2017 BETWEEN 2023

- **THE PHARMACEUTICAL MARKET,** including biotech, has experienced a commendable Compound Annual Growth Rate (CAGR) of 7.4%
- **THE MEDICAL DEVICES MARKET** has seen a CAGR expansion of 2.4%
- **THE DIGITAL HEALTH MARKET** in the UAE has experienced remarkable growth, with a CAGR expansion of 27.7%

However, despite this progress, the size and scalability of the UAE's healthcare Life-Science markets remain limited compared to leading global hubs. The country's heavy reliance on imported drugs also highlights the need to strive for self-sufficiency in the sector.

Establishing Environment

UAE boasts a diverse network of ecosystem partners that drive the healthcare Life-Science sector. However, the varying levels of activity and investment across each stage of the value chain may impact the overall progression and productivity of the sector. in Abu Dhabi's healthcare Life-Science ecosystem there are:

active clinical trials in 2023, showcasing the region's commitment to research and development	57
higher education programs related to healthcare Life-Sciences	25+
manufacturing facilities	14
Departments of Health (DoH) Memorandum of Understanding (MoUs) with international pharmaceutical companies	8
Contract Research Organization (CRO)	1

Nevertheless, Abu Dhabi, as well as whole state, may face a competitive disadvantage due to lower activity observed in translational research and clinical development compared to more robust healthcare Life-Science ecosystems.

The Potential of Key Areas

Infrastructure System

- Strategically located space for co-location (e.g. biotech and biopharma industrial parks) to foster collaboration
- Supporting technology and digital infrastructure
- Quality of healthcare delivery provision (e.g. hospitals with high patient volumes for clinical trials)
- Connectivity, logistics (e.g. cold chain) to allow presence of Life-Science companies
- Presence and capacity of pharmaceutical manufacturers

Human Capital

- Volume and quality of homegrown students and research talent
- Quality of academic institutions and dedicated healthcare Life-Science programs
- Ability to attract and retain highly skilled workforce

Research & Development

- Access to sophisticated labs and research centers
- Volume and quality of research capabilities (e.g. publications, IP and Patent applications) and ability to commercialize platforms and modalities
- Increasing funding opportunities and grants specifically tailored for healthcare Life-Science research can attract competitive research proposals and support a broader range of research initiatives.
- Upholding high ethical standards and ensuring compliance with research regulations and protocols

Pioneering Innovation for a Healthier Future

Strategies & Policies

2015, the "Year of Innovation in the UAE," marks a significant milestone in the UAE's journey towards progress, economic diversification, and post-oil prosperity. The Science, Technology, and Innovation (STI) policy of that year reflects the UAE's commitment to becoming a global leader by leveraging advanced talent, resources, legislation, and infrastructure. The policy was to propel the UAE towards achieving its Vision 2021 goals and fostering a culture of innovation. Through its implementation, the government pursued to position the UAE among the world's most innovative nations.

As we move further in the next decade, in 2017, UAE's commitment to innovation- driven healthcare transformation was embodied through the "UAE National Strategy for Artificial Intelligence 2031". The UAE boasts a dynamic and rapidly evolving healthcare sector that is vital to the nation's development. While the government does not own the healthcare industry, it actively collaborates with key stakeholders through the "quadruple helix" model (government, academia, industry, and society) to address challenges and seize the best opportunities. With a focus on enhancing healthcare outcomes and driving innovation, the UAE has positioned itself as a hub for medical excellence.

in Healthcare Life-Science Sector

Regulatory, IP & Governance

- Transparent and clear regulatory framework (e.g. regulations around registration process, clinical trials)
- Legal governing body that protects innovation and incentivizes industry players (e.g. strong IP laws/patent protection)
- Clear roles and responsibilities of federal and local governing bodies
- Favorable policies (e.g. tax incentives, labor laws) to incentivize R&D and manufacturing

Innovation Culture

- Volume and quality of healthcare Life-Science startups that are at the forefront of innovation
- Access to startup accelerators and incubators to support startups

Funding & Financing

- Ability to attract foreign direct investment
- Private and public sector investments to create entrepreneurial culture and fund ventures – access to capital across all stages
- Public financing (e.g. subsidies or incentives) to enable long-term growth of the ecosystem
- Not-for-profit funding to incite research and remove bottlenecks for academic researchers (e.g. targeted research grants)

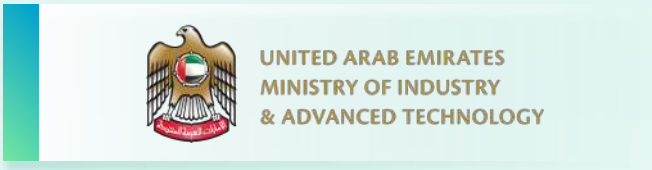
OECD.AI UAE NATIONAL STRATEGY FOR AI

At the same time, The UAE administration recognizes the importance of regulating AI in healthcare to ensure responsible and ethical practices. Guidelines and policies are in place to govern the use of AI, safeguard patient data privacy, and address security concerns. The government works closely with regulatory bodies such as the Department of Health (DoH) to establish standards and frameworks that govern the collection, storage, and utilization of healthcare data. These measures instill trust and confidence in patients, healthcare providers, and AI developers, facilitating AI technologies' secure and ethical implementation.

The UAE government has spearheaded various initiatives to promote AI adoption in healthcare. The Office of the Minister of State for Artificial Intelligence (AI Office) acts as a catalyst, forging partnerships with international bodies, educational institutions, and global AI firms. The AI Office facilitates collaborations, particularly in education and governance, and supports other ministries in utilizing world-leading AI technologies in their projects and policies. These initiatives aim to foster innovation, attract talent, and leverage AI's potential across the healthcare sector.

UAE Healthcare Life-Science ecosystem: Key Partners & Beyond

Abu Dhabi's healthcare Life-Science sector is experiencing rapid growth and development, thanks to the efforts of key ecosystem partners. These partners play crucial roles in shaping the industry, focusing on mandates that drive initiatives and contribute to overall progress.



The Ministry of Health and Prevention (MoHAP) regulates and oversees the pharmaceutical and medical devices industry in the UAE. They ensure safety, efficacy, and quality standards, promote research and development, and accredit healthcare facilities. MoHAP's notable initiatives include the National Genome Program and the digital healthcare platform Riayati.

The Ministry of Industry and Advanced Technology (MoIAT) supports startups and SMEs, providing funding, mentorship, and access to networks and resources. They foster partnerships, collaborations, and innovation while developing laws and policies for a world-class industrial development framework. Their campaign, "Make it Emirates," aims to establish the UAE as a global manufacturing hub, including the pharmaceutical sector.

The Abu Dhabi Executive Office (ADEO) empowers stakeholders and promotes economic diversification through knowledge-based initiatives. ADEO endorses, advises, and supervises the development of Emirate-wide strategies. They oversee the Emirati Genome Programme and drive the implementation of healthcare-related agendas.

The Department of Economic Development (DED) regulates the business sector and develops economic initiatives for a diversified and sustainable economy. They focus on developing local industrial capabilities in the pharmaceutical and health industries. DED has launched the Abu Dhabi Industrial Strategy, targeting pharmaceuticals, and plans to attract skilled talent through the Talent Majlis.

The Advanced Technology Research Council (ATRC) establishes a vibrant R&D ecosystem to support the UAE's transformation into a knowledge-based economy.

They define Abu Dhabi's research strategy, consolidate investments, and drive agile policies. ATRC oversees the Biotechnology Research Center and manages grant funding programs for health innovators.

The Abu Dhabi Investment Office (ADIO) attracts private sector investments and delivers world-class infrastructure projects. ADIO's involvement in the healthcare Life-Science sector aims to create jobs and attract innovative companies. They have launched the Innovation Programme and established partnerships to bring advanced technologies to healthcare.

Mubadala, through its UAE Investments and Direct Investments branches, plays a significant role in the healthcare Life-Science ecosystem. They strengthen UAE-led assets, support R&D, and invest globally in healthcare innovation. Mubadala has partnerships for building a biopharma manufacturing campus and diversifying into the Life-Science space.

ADQ aims to support Abu Dhabi's healthcare and healthcare Life-Science sector. They consolidate healthcare operations, develop a branded generics platform, and establish digital tools. ADQ plans to launch the Q Biologix facility, expand injectables and biologics capacity, and drive adoption of a business-to-business approach.

These ecosystem partners contribute to Abu Dhabi's healthcare Life-Science sector through regulatory oversight, industrial development, research and innovation, investment facilitation, and infrastructure development. With their ongoing support and future plans, Abu Dhabi is well-positioned to become a leading hub for healthcare Life-Science in the region and beyond.

UAE Healthcare Life-Science ecosystem: Key Partners & Beyond

Precision Medicine

The UAE's healthcare system can collaborate with leading AI research institutions and pharmaceutical companies to develop personalized treatment plans based on patients' genomic data. By analyzing individual genetic profiles, AI algorithms can identify specific biomarkers and genetic variations that influence disease susceptibility, drug responses, and treatment outcomes. This approach allows healthcare providers to deliver tailored and more effective therapies, particularly for diseases prevalent in the region.

Diagnostics

Collaborations between UAE hospitals and AI technology firms can lead to breakthroughs in diagnostic accuracy and efficiency. For instance, by training AI algorithms using vast amounts of medical imaging data, such as X-rays or MRIs, healthcare providers can benefit from AI-powered tools that assist in the detection and classification of diseases. This technology can help identify early signs of conditions like cancer, cardiovascular diseases, or infectious diseases, enabling prompt interventions and improved patient outcomes.

Clinical Trial Optimization [HSA1]

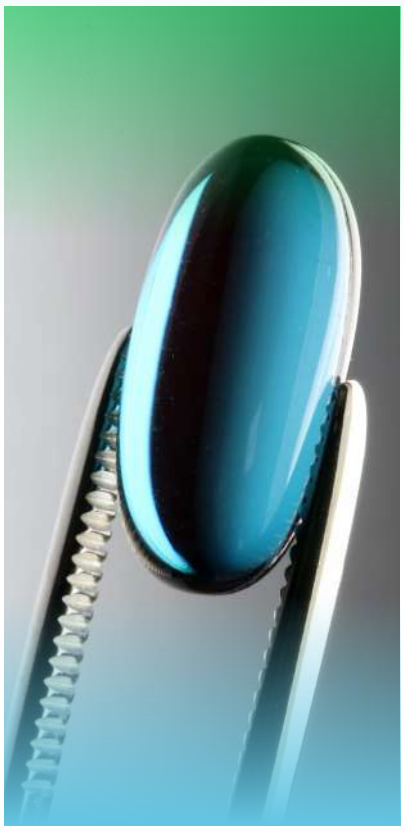
Clinical trials are a critical component of Life-Sciences research. The UAE Government can collaborate between local Healthcare providers and academic institutions to utilize AI by optimizing clinical trial processes through identifying suitable patient populations, predicting patient responses, and enhancing trial design and monitoring. AI algorithms can analyze diverse datasets, including patient records, genetic information, and real-world evidence, to optimize trial protocols, improve patient recruitment, and streamline data analysis.

Remote Patient Monitoring

The UAE government can explore partnerships between healthcare providers and technology companies to develop AI-driven remote monitoring solutions. These systems utilize wearable devices and sensors to continuously collect patient data, such as vital signs, activity levels, and sleep patterns. AI algorithms can then analyze this data in real-time, detecting anomalies or patterns indicative of health deterioration. Early identification of changes in patients' health conditions allows for timely interventions and proactive healthcare management, leading to reduced hospital readmissions and improved overall patient care.

Drug Discovery

The UAE government can foster collaborations between local academic institutions, pharmaceutical companies, and AI startups to accelerate the drug discovery process. AI algorithms can analyze vast amounts of biological and chemical data, facilitating the identification of potential drug candidates and predicting their efficacy and safety profiles. By leveraging AI in drug discovery, the UAE can enhance its research and development capabilities, attract investments from pharmaceutical companies, and contribute to the development of novel therapies for various diseases.



Success Stories and Impact

The UAE's focus on modernization in healthcare has already yielded remarkable success stories. For example, the Artificial Intelligence Office has funded research projects, such as developing an AI algorithm for detecting Tuberculosis through X-ray data analysis. These initiatives showcase the UAE's commitment to leveraging AI for early disease detection, which can lead to more accurate diagnoses and timely interventions.

Additionally, collaborations with renowned medical facilities like the Cleveland Clinic, Mayo Clinic, and Johns Hopkins Medicine have attracted leading experts and researchers to the UAE, fostering knowledge exchange and driving innovation in the healthcare sector.

The impact of the UAE government's strategies for cutting-edge tech in healthcare is far-reaching. By incorporating advanced, healthcare developments, industry outcomes are improved, leading to enhanced patient care and reduced healthcare costs. Autonomous tech-powered solutions enable healthcare providers to make more accurate diagnoses, tailor treatment plans, and optimize healthcare operations. Combining genomics and AI in healthcare, as an instance, offers opportunities for targeted therapies, personalized medicine, and advancements in understanding genetic-related diseases.

Furthermore, the UAE's focus on attracting and retaining healthcare Life-Science talents and investments drives economic diversification and national resilience. The government's support for R&D activities and the availability of financing options and incentives encourage innovation and entrepreneurship within the healthcare sector. As a result, the UAE is positioning itself as a global hub for advanced therapies, attracting companies and researchers interested in harnessing the potential of technology for healthcare advancements.

1 Emirati Genome Programme

The Emirati Genome Programme, launched by Abu Dhabi's healthcare regulator, the Department of Health (DoH), showcases the UAE's focus on genomics and its potential to improve health and well-being. This national project utilizes large-scale genomic data to empower healthcare practitioners with high-quality information for personalized treatments. By integrating AI into the healthcare system, the UAE aims to enhance prevention, diagnostics, and treatment outcomes. This case study demonstrates the UAE's efforts in establishing a world-class health data platform and fostering research and innovation in genomics.

2 Innovation and Investment Incentives

Collaborations between UAE hospitals and AI technology firms can lead to breakthroughs in diagnostic accuracy and efficiency. For instance, by training AI algorithms using vast amounts of medical imaging data, such as X-rays or MRIs, healthcare providers can benefit from AI-powered tools that assist in the detection and classification of diseases. This technology can help identify early signs of conditions like cancer, cardiovascular diseases, or infectious diseases, enabling prompt interventions and improved patient outcomes.

U.AE
Emirati Genome Programme

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Abu Dhabi Investment Office

Challenges and Future Outlook

Implementing newest tech in healthcare comes with challenges that the UAE government is actively addressing. Ensuring widespread adoption, overcoming technical and infrastructure limitations, and addressing concerns around these matters, especially AI's impact on healthcare professionals are among the challenges being tackled. However, the future outlook for innovative tech in the UAE's healthcare sector is promising. The government's commitment to fostering innovation, attracting investments, and nurturing a talented workforce positions the UAE as a global leader in tech-driven healthcare. Emerging technologies like AI-powered diagnostics, telemedicine, and robotic surgery hold immense potential for transforming healthcare delivery and improving patient outcomes.

As we look ahead, the UAE's government strategies for advanced technologies in healthcare are poised to shape the future of healthcare in the country. The continued integration of AI technologies, expansion of digital ecosystems, and investment in specialized infrastructure will strengthen the UAE's position as a global leader in healthcare innovation. With a focus on collaboration, knowledge sharing, and the cultivation of local talent, the UAE is well-positioned to drive advancements in AI-driven healthcare solutions and contribute to developing a knowledge-based economy.

1 AI Accelerators and Collaborative Partnerships

To drive AI innovation in healthcare, the UAE government has established AI accelerators and fostered partnerships with leading global organizations. The Office of the Minister of State for Artificial Intelligence (AI Office) plays a vital role in brokering partnerships, particularly in education and governance. This collaborative approach enables knowledge sharing, technology transfer, and the development of AI-ready talent. Notable partnerships with world-renowned medical facilities, such as the Cleveland Clinic, Mayo Clinic, and Johns Hopkins Medicine, illustrate the UAE's commitment to attracting and retaining healthcare Life-Science talents.

2 Cutting-Edge Infrastructure

Abu Dhabi's commitment to infrastructure development and connectivity contributes significantly to its status as a Life-Science hub. The Khalifa Industrial Zone Abu Dhabi (KIZAD) exemplifies the UAE's dedication to providing cutting-edge infrastructure for research, development, and manufacturing. KIZAD offers comprehensive support, short turnaround times, and state-of-the-art facilities for businesses in the Life-Sciences sector. For instance, the establishment of a purpose-built R&D hub for Life-Sciences, biotechnology, and vaccine production within KIZAD highlights the UAE's commitment to fostering innovation and addressing global healthcare challenges.

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KIZAD

Interview with Department of Health - Abu Dhabi

The Department of Health (DoH) in Abu Dhabi is the regulatory authority responsible for overseeing and enhancing the healthcare sector. It plays a crucial role in shaping the healthcare system, ensuring the delivery of high-quality and accessible healthcare services to the residents. The DoH establishes and enforces healthcare policies, standards, and regulations to promote patient safety, quality of care, and professional practice. It collaborates with healthcare providers, both public and private, to monitor compliance with regulations and enforce standards in areas such as licensing, accreditation, and clinical governance.

Department of Health
www.doh.gov.ae

H.E. Dr. Noura Khamis Al Ghaithi

Undersecretary of Department of Health

Dr. Asma Al Mannaei

Executive Director, Research and Innovation Center of Department of Health

H.E. Dr. Ahmed Al Khazraji

Executive Director of Strategy and Policy Sector of Department of Health

H.E. Dr. Noura Khamis Al Ghaithi

Undersecretary of Department of Health – Abu Dhabi

How has the pharmaceutical industry developed in Abu Dhabi, and what initiatives has DoH implemented to foster its growth?

DR. AL GHAITHI: The pharmaceutical industry in Abu Dhabi has experienced significant development over the years, driven by various DoH initiatives. The DoH has taken proactive measures to attract pharmaceutical companies, encourage investments, and promote research and development in the sector.

One of DoH's key roles is the establishment of regulatory frameworks and guidelines to ensure the quality, safety, and efficacy of pharmaceutical products in Abu Dhabi. These regulations create a favourable environment for both local and international pharmaceutical manufacturers to operate and provide assurance to consumers. To support the growth of the pharmaceutical industry, the DoH has also implemented initiatives to enhance local manufacturing capabilities. This includes providing incentives and support for the establishment of manufacturing facilities, promoting technology transfer, and encouraging collaboration between local manufacturers and research institutions. These efforts aim to reduce the emirate's reliance on imports and boost the production of high-quality medicines locally.
Additionally, the Department has invested in research and development initiatives to drive innovation in the pharmaceutical sector. This involves collaborating with academic institutions, research centres, and industry stakeholders to foster a culture of innovation and support the development of new drugs, therapies, and medical technologies. Such initiatives not only contribute to the growth of the pharmaceutical industry but also have the potential to improve healthcare outcomes and patient care. Overall, through regulatory frameworks, support for local manufacturing, and investment in research and development, the DoH has played a crucial role in the development of the pharmaceutical industry in Abu Dhabi, paving the way for sustainable growth and advancement in the sector.

Can you provide some insights into the presence of 14 biopharma and medtech manufacturers in Abu Dhabi and how they have influenced the local healthcare ecosystem?

DR. AL GHAITHI: Our wider healthcare ecosystem is composed of several entities that help us in achieving our goals, and having a healthy community, prepared for emergencies, and equipped with cutting-edge technologies and services. Supported by our robust infrastructure, our state-of-the-art equipment, and our skilled healthcare workforce, we seek to provide patients with the highest quality of care, for members of our community, and for those visiting from abroad. Abu Dhabi's healthcare sector stands out for its exceptional resources, housing six globally reccognised healthcare institutions and hosting 14 biopharmaceutical and medical technology manufacturers. Notably, Abu Dhabi offers specialised programs that guarantee top-tier medical services and ensure prompt and exceptional care for visitors upon their arrival in the emirate. The comprehensive healthcare ecosystem in Abu Dhabi covers the entire value chain, facilitating collaboration, synergy, and smooth coordination among various entities. This environment fosters innovation and enables the pursuit of healthcare excellence.

Overall, having local manufacturers in Abu Dhabi has several benefits for the emirate as it offers several advantages for the emirate. These advantages encompass decreased dependence on imports, enhanced oversight of medicine quality, bolstered support for the local economy, and heightened research and development endeavours.

By embracing digital solutions, personalised medicine, research, and infrastructure improvements, Abu Dhabi aims to provide high-quality, patient-centred care while enhancing healthcare access and outcomes.

What are the future plans and goals of the DoH Abu Dhabi in terms of further advancing the healthcare and Life-Science sector?

DR. AL GHAITHI: The Department of Health - Abu Dhabi (DoH) has a number of future plans and goals in terms of further advancing the healthcare and Life-Science sector in the emirate. These include:

DoH aims to develop a world-class healthcare system that is accessible, affordable, and of the highest quality. This includes investing in new hospitals and clinics, training more healthcare professionals, and developing new technologies and treatments.
We seek to promote research and development in the healthcare and Life-Science sector. This includes funding research projects, providing grants to researchers, and creating a supportive environment for innovation.

DoH aims to attract global talent to the healthcare and Life-Science sector in Abu Dhabi. This includes providing competitive salaries and benefits, offering opportunities for professional development, and creating a welcoming environment for international professionals.

Furthermore, we aim to build a sustainable healthcare sector that is resilient to shocks and stresses. This includes investing in preventive care, promoting healthy lifestyles, and developing a robust healthcare workforce.
Finally, we are committed to working with the private sector and other stakeholders to achieve these goals. The emirate is well-positioned to become a global leader in the healthcare and Life-Science sector.

Dr. Asma Al Mannaei

Executive Director – Research and Innovation Center - Department of Health – Abu Dhabi

Why is Abu Dhabi considered one of the most supportive healthcare ecosystems for innovators and startups?

DR. AL MANNAEI: The Department of Health - Abu Dhabi has launched several initiatives and programs to support healthcare startups. One of these initiatives is the establishment of the Research and Innovation Center, which aims to support healthcare startups in Abu Dhabi and foster an innovative environment. The Department of Health connects the healthcare challenges in the emirate with the solutions provided by healthcare startups, offering support and guidance to ensure innovative outputs of high quality, efficiency, and sustainability. We collaborate with our ecosystem partners to provide everything that healthcare startups in Abu Dhabi need. Additionally, the Department of Health has launched the Research and Innovation Grant in Healthcare to enrich medical research and innovation fields in Abu Dhabi.

Are there any active healthcare & life-science startups in Abu Dhabi?

DR. AL MANNAEI: There are startups focused on leveraging healthcare data available through the "Malaffi" platform to develop artificial intelligence solutions and utilize it in diagnosing different diseases such as cancer and diabetes. Other start-ups are focusing on facilitating access to healthcare services by building digital platforms targeting mental health and home care, thus enhancing the quality of healthcare services provided in the emirate.

Does the Department of Health - Abu Dhabi support healthcare & life-science startups?

DR. AL MANNAEI: Supporting startups is crucial because they are a source of new and innovative ideas that can transform the way we work and live.

Supporting startups also has economic significance as they. Create new jobs, generate income, and make investments in Abu Dhabi. In terms of healthcare, startups have the ability to improve access to and quality of healthcare. For example, digital health startups can provide technological solutions that enhance healthcare, such as health applications, wearable devices, and artificial intelligence in medicine. Overall, startups can bring significant changes to healthcare sector through technological innovations.

Healthcare startups in Abu Dhabi have provided over 300 jobs and raised more than 370 million AED in investments by the end of 2022, contributing to the Gross Domestic Product (GDP) of the healthcare sector.

Does Research and Innovation Center have any plans to support startups in the Emirate?

DR. AL MANNAEI: We aim to provide everything that healthcare startups need in the healthcare sector, including policy development and standards that ensure innovative service delivery based on best healthcare practices. We are working on an integrated strategy for comprehensive Life-Sciences development for the research and innovation spectrum. We have engaged global companies to connect the healthcare startup ecosystem in Abu Dhabi with international startups network. We aim to enable startups to achieve global leadership in providing innovative solutions to healthcare challenges from Abu Dhabi to the world.

What distinguishes Abu Dhabi in terms of supporting and attracting startups is the integrated ecosystem of various strategic companies in Abu Dhabi?

DR. AL MANNAEI: We believe in the importance of building a knowledge-based economy, and the innovation ecosystem in Abu Dhabi facilitates accelerating the commercial growth of startups that provide high-quality and cost-efficient solutions. Abu Dhabi provides a favorable environment for the growth of startups.

Does Abu Dhabi stand out by having a comprehensive system of various strategic companies in Abu Dhabi that support startups?

We believe in the importance of building a knowledge-based economy and creating a distinctive startup ecosystem in Abu Dhabi that accelerates the commercial growth of startups providing high-quality and cost-efficient solutions. We aim to increase the number of startups in Abu Dhabi and work towards their success, making Abu Dhabi an attractive environment for startup growth.

What benefits do healthcare and life science startups receive in Abu Dhabi?

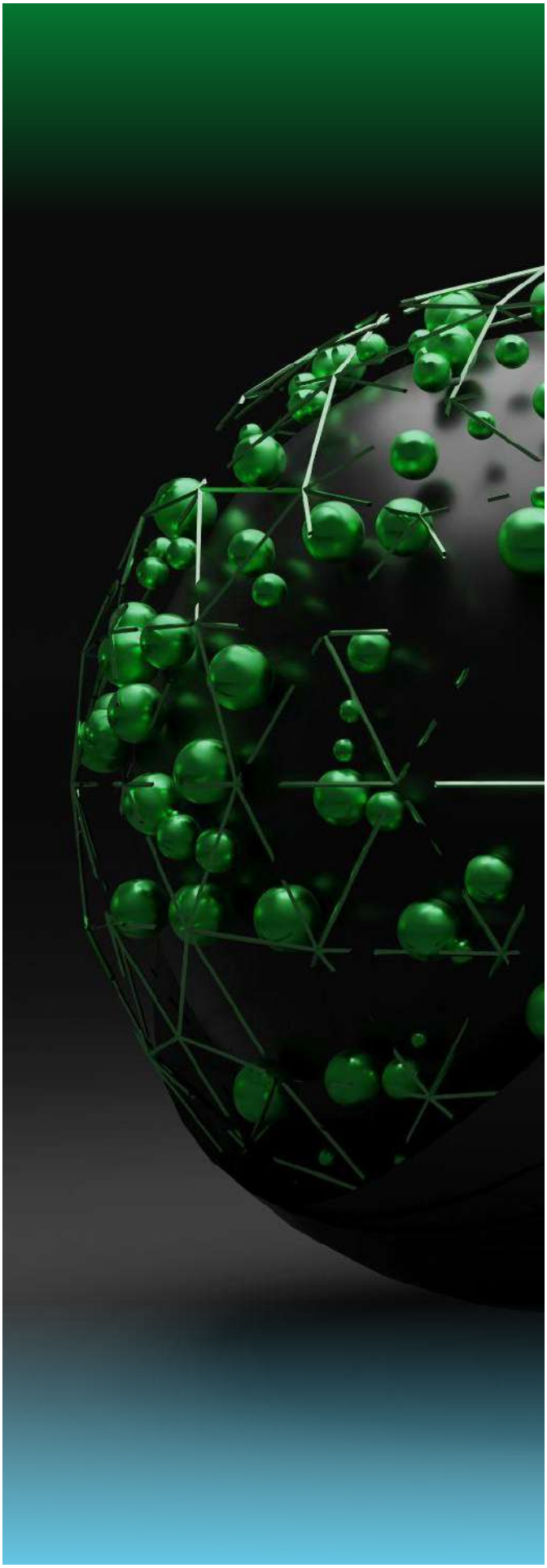
DR. AL MANNAEI: The Research and Innovation Center provides services similar to those offered by incubators for startups, such as guidance, advice, flexible regulatory frameworks supporting innovation, shared workspace, professional networking, strong relationships, and other administrative services like reviewing and registering medical equipment, expediting their provision to the healthcare sector in Abu Dhabi. Furthermore, we can provide organized access to the data available in the centralized electronic medical record system (Malaffi), as well as genomic data from the UAE.

Has the digital revolution and artificial intelligence had a significantly positive impact on healthcare innovation?

DR. AL MANNAEI: They have improved efficiency, productivity, and innovation in products and services, reduced costs, and enabled reaching larger user populations. Additionally, analyzing available data using artificial intelligence to discover patterns and trends leads to data-driven decision-making.
In Abu Dhabi, we still need startups that leverage medical data, including the UAE Genome Project to enhance medical research in the field of genomics and achieve progress in precision medicine. Precision medicine aims to tailor healthcare services based on an individual's genetic and environmental factors, as well as their lifestyle.

In addition to the aforementioned questions, you have provided support to over eighty active healthcare and life science startups in the healthcare sector through the Research and Innovation Center. What is the main reason behind this?

DR. AL MANNAEI: These startups have provided over 600 jobs and raised more than 550 million AED so far. We continuously search for and evaluate healthcare startups, and the number of reviewed healthcare companies has exceeded 400 startups.



H.E. Dr. Ahmed Al Khazraji

Executive Director of Strategy and Policy Sector - Department of Health – Abu Dhabi

What policies does Abu Dhabi have in place to attract healthcare and life science activities? How do these policies promote investment and innovation in the sector?

DR. AL KHAZRAJI: The Department of Health - Abu Dhabi has launched several initiatives and programs to support healthcare startups. One of these initiatives is the establishment of the Research and Innovation Center, which aims to support healthcare startups in Abu Dhabi and foster an innovative environment. The Department of Health connects the healthcare challenges in the emirate with the solutions provided by healthcare startups, offering support and guidance to ensure innovative outputs of high quality, efficiency, and sustainability. We collaborate with our ecosystem partners to provide everything that healthcare startups in Abu Dhabi need. Additionally, the Department of Health has launched the Research and Innovation Grant in Healthcare to enrich medical research and innovation fields in Abu Dhabi.

In your opinion, how would advancing & strengthening the life science sector in Abu Dhabi contribute to achieving better healthcare outcomes and improved population health?

DR. AL KHAZRAJI: I believe a strong life sciences sector would certainly support better healthcare outcomes and improved population health, in several ways. Increased research and development in life sciences can lead to improved diagnostics, treatments, and disease management. We can catch diseases much earlier, increasing the likelihood of improved outcomes.

Additionally, it would attract globally-renowned healthcare organizations that bring expertise and access to advanced care that would improve healthcare quality and outcomes.

Moreover, a strong sector would represent strong public-private collaborations that would serve to improve the efficiency and efficacy of the overall health system serving the health and healthcare needs of citizens and residents.

Abu Dhabi has been ranked 21st globally in talent attractiveness. What makes it an attractive destination for healthcare and life science professionals?

DR. AL KHAZRAJI: Several factors support Abu Dhabi's current global ranking in talent attractiveness, and it's only going to get better in the coming years. There is an abundance of world-class infrastructure, highlighted by examples such as Masdar City, Khalifa University, and Cleveland Clinic Abu Dhabi. Tax-free salaries, generous benefits, and career growth opportunities, together are not found in many other places in the world. A wide diversity of other talent, and enjoyable lifestyles also appeal to foreign talent. Further to these, the Department of Health strongly fosters talent development and retention. It offers scholarships, leadership programs, continuing professional education, and specialist residency programs.

These attractiveness elements are by design – by attracting and retaining strong talent Abu Dhabi is much better primed to achieve its clearly-defined strategic priorities, and position itself as a globally-leading hub for healthcare and life sciences.

Strong sector would represent strong public-private collaborations that would serve to improve the efficiency and efficacy of the overall health system serving the health and healthcare needs of citizens and residents.

How has the digital transformation impacted the healthcare sector in Abu Dhabi, and what steps has the Department of Health (DoH) taken to drive this transformation?

DR. AL KHAZRAJI: At the Department of Health – Abu Dhabi, we acknowledge that the future of healthcare lies in digital solutions and advanced technologies. That's why we're constantly investing in developing state-of-the-art healthcare infrastructure. It boasts modern hospitals, specialised medical centres, research institutions, and advanced laboratories equipped with cutting-edge technology and facilities. By embracing digital solutions, personalised medicine, research, and infrastructure improvements, Abu Dhabi aims to provide high-quality, patient-centred care while enhancing healthcare access and outcomes.

Abu Dhabi is taking proactive measures to encourage the advancement of research and innovation in the field of healthcare. This includes promoting collaboration between healthcare providers, research institutions, and technology companies. By allocating resources towards state-of-the-art technologies like artificial intelligence (AI), machine learning (ML), and big data analytics, healthcare organisations can extract valuable insights from extensive datasets, enhance diagnostic capabilities, and uncover novel treatment possibilities. Moreover, the focus on research and innovation serves to attract skilled professionals and establish Abu Dhabi as a global destination for healthcare.

One of our significant efforts in digitising the healthcare sector is Malaffi, the region's first Health Information Exchange platform, which safely and securely connects public and private healthcare providers in the Emirate of Abu Dhabi. With 100% of the Emirate's hospitals on the platform and more than 2,670 signed facilities, Malaffi plays a pivotal role in improving healthcare quality and patient outcomes in Abu Dhabi.

Interview with Abdulla Abdul Aziz Al Shamsi

Acting Director General, Abu Dhabi Investment Office (ADIO)

The Abu Dhabi Investment Office (ADIO) was established with the aim of facilitating and nurturing the growth of businesses and attracting investments of all scales to the Emirate of Abu Dhabi.

As the central hub for investment support in Abu Dhabi, ADIO plays a crucial role in fostering the expansion and diversification of the emirate's private sector. The office is entrusted with the responsibility of executing a comprehensive strategy to enhance foreign direct investment in Abu Dhabi by providing valuable assistance to investors and companies seeking to establish or expand their presence in the emirate.

Abu Dhabi Investment Office
www.investinabudhabi.ae

Abdulla Abdul Aziz Al Shamsi

Acting Director General, Abu Dhabi Investment Office (ADIO).

Can you elaborate on ADIO's role in facilitating private sector investment, partnerships, and the delivery of world-class infrastructure projects in Abu Dhabi?

MR. AL SHAMSI: ADIO is the entry point for investors in Abu Dhabi. Our role is to support and guide companies to set them up for success and help them grow in Abu Dhabi. We help businesses understand the market opportunity by highlighting areas for growth, sparking connections with relevant entities and crafting long-term collaborations. We provide access to Abu Dhabi's innovation ecosystem, public landbank and major infrastructure projects. Our role as the central authority for facilitating, developing and procuring infrastructure projects through Abu Dhabi's public-private partnership framework has seen us work with entities like ADEK, DMT and Khalifa University. We also recently launched the Zayed City Schools PPP project and the Street Lighting LED PPP programme, for instance, promoting private sector involvement in education and energy-efficient infrastructure respectively. ADIO's efforts have helped drive sustainable economic growth and improve the quality of life in Abu Dhabi

How does ADIO's focus on infrastructure projects, particularly in the healthcare and biopharma sectors, contribute to job creation and sustainable economic growth in Abu Dhabi?

MR. AL SHAMSI: Healthcare and biopharma are a priority for development because of the potential to stimulate job creation and foster sustainable economic growth in Abu Dhabi while addressing critical healthcare challenges and nurturing innovation that will benefit the world. We have established several prestigious alliances to bring advanced healthcare technologies, best practices and world-class standards to the Abu Dhabi community.

ADIO's Innovation Programme, which focuses on supporting companies in innovation-focused sectors, has attracted numerous outstanding companies in the biopharma and healthcare space to Abu Dhabi. ADIO supported Innovaccer, for instance, a health cloud company working to improve the accessibility, affordability and quality of healthcare in the Middle East, to establish an R&D hub and a commercial function as part of its Abu Dhabi headquarters. Another example is Insilico Medicine, a market leader in pharma technology that utilises AI for rapid drug discovery, synthesis and testing. In collaboration with ADIO, Insilico Medicine is establishing its regional HQ in Abu Dhabi focused on R&D for its AI platform.

Looking ahead, investment opportunities continue to emerge due to the robust growth potential of the healthcare sector in Abu Dhabi.

What are the main objectives of ADIO's AED 2 billion Innovation Programme, and how does it provide incentives to businesses, specifically in the healthcare and pharmaceutical industries?

MR. AL SHAMSI: The Innovation Programme is a testament to Abu Dhabi's dedication to nurturing innovation and driving economic transformation. Its success has helped to establish Abu Dhabi as the regions HQ of HQs while driving the development of a diversified economy. The AED 2 billion ($545 million) programme provides incentives to businesses, including the healthcare and pharmaceutical industries. It supports innovative companies, fosters growth, and expands intellectual property. The programme invites tech-focused companies to Abu Dhabi to create solutions with regional and global impact. ADIO's commitment to innovation is demonstrated by the ongoing allocation of incentives to support the progress of these companies and their contributions to a rapidly expanding ecosystem.

Can you provide examples of the types of incentives offered through ADIO's Innovation Programme and how they benefit businesses in the healthcare and pharma sectors?

MR. AL SHAMSI: ADIO is structured around investors to provide a range of growth-enabling support to start, scale and succeed in Abu Dhabi. Rebates and grants are available to support investment in innovation while equally importantly we will help companies

understand the market and facilitate connections with relevant entities to craft long-term collaborations. This is a powerful proposition to support ambitious businesses and bold ideas achieve sustainable success in Abu Dhabi.

How does ADIO's collaboration with Innovaccer, the Health Cloud company, contribute to improving accessibility, affordability, and quality of healthcare in the Middle East?

MR. AL SHAMSI: ADIO prioritises working with transformative companies that drive positive change within their sectors. Innovaccer's Abu Dhabi headquarters have the potential to accelerate the pace of healthcare innovation. The company's health cloud platform facilitates connectivity and data activation across multiple healthcare services, enabling seamless integration of healthcare data, resulting in improved accessibility to medical information and streamlined healthcare delivery processes.

Through ADIO's Incentive Programme, private sector entities are offered a range of incentives and support.

Can you explain the significance of the Integrated Data Intelligence Ltd (IDI) developed in collaboration between ADIO and OurCrowd? How does it support the expansion of innovative startups in the healthcare sector?

MR. AL SHAMSI: ADIO has supported the expansion of OurCrowd's existing Abu Dhabi operations, including the development of Integrated Data Intelligence Ltd (IDI), a technical excellence hub in Abu Dhabi. IDI focuses on commercialising Artificial Intelligence (AI) for businesses, supporting the expansion of innovative startups in the healthcare sector. With financial and non-financial incentives provided by ADIO's Innovation Programme, IDI develops AI solutions that enable businesses to adopt and leverage advanced technologies easily. This association strengthens Abu Dhabi's commitment to fostering the growth of innovative businesses and contributing to the knowledge economy. The expansion of OurCrowd's operations in Abu Dhabi further enhances the availability of AI solutions and technology in the region.

How does ADIO encourage and facilitate private sector involvement in the Public-Private Partnership (PPP) Program?

MR. AL SHAMSI: Public-Private Partnerships create long-term commercial opportunities for investors while improving the delivery and quality of public infrastructure.
Since launching the new PPP law in 2019, Abu Dhabi has established a proven track record of building efficient and effective commercial partnerships that deliver sustainable, long-term value for all parties. We actively publicise all new PPP tenders to potential bidders and invite the private sector to collaborate with the Abu Dhabi government to deliver strategic infrastructure.

How does ADIO's Incentive Program complement the PPP Program in encouraging private sector engagement and investment in Abu Dhabi's healthcare projects?

MR. AL SHAMSI: ADIO's success is driven by the experience and outcomes of the investors we work with, so everything we offer is designed to support Abu Dhabi's position as one of the world's most sustainable destinations for people and businesses. They encourage collaboration between businesses and the government, foster innovation, and drive sustainable economic growth in the healthcare sector. Through our programmes, ADIO aims to support private sector entities in delivering world-class healthcare infrastructure and services that benefit the community and contribute to Abu Dhabi's overall development.

Can you provide examples of the types of incentives and support offered through ADIO's Incentive Program to attract private sector involvement?

MR. AL SHAMSI: Through ADIO's Incentive Programme, private sector entities are offered a range of incentives and support. These include globally competitive financial and non-financial. Additionally, the programme offers support in areas such as mar-

Source: Abu Dhabi Investment Office | Linkedin

ket access, business development, talent acquisition, and research and development collaboration. These incentives and support mechanisms aim to create an attractive investment environment, foster innovation, and encourage private sector entities to contribute to Abu Dhabi's economic growth and development.

How does ADIO ensure that private sector investments in healthcare projects align with the economic growth and development goals of Abu Dhabi?

MR. AL SHAMSI: ADIO thoroughly evaluates and screens investment proposals, considering their alignment with Abu Dhabi's strategic priorities and economic diversification objectives. ADIO collaborates with relevant government entities to ensure coordination and alignment with overall development plans.

What steps does ADIO take to evaluate and select private sector partners for infrastructure projects in order to ensure world-class standards and successful project delivery?

MR. AL SHAMSI: ADIO has helped develop a robust governance structure and stage-gate approval process consistent with global best practice. Our PPP team is tasked with managing the process across the the entire value chain, starting from project origination, structuring transactions, preparing and managing the tender process, and closing contracts. ADIO's Partnership Projects Guidebook provides developers, investors and financiers with a single, trusted source of information when assessing, bidding and executing projects. It covers procurement procedures, as well as best practice approaches to promote effective partnerships between government and private sector stakeholders.

Can you discuss the long-term vision and goals of ADIO in terms of private sector involvement and the delivery of world-class infrastructure projects in Abu Dhabi's healthcare and biopharma sectors?

MR. AL SHAMSI: Healthcare innovation is something that touches us all, and we are very proud that R&D that emerges from Abu Dhabi will be applied to help countless people in the UAE and around the world. Abu Dhabi's innovation ecosystem and healthcare infrastructure provides an ideal foundation for healthcare and HealthTech companies to expand their operations and conduct R&D. Innovative companies benefit from the emirate's extensive R&D support network, access to capital and talent, some of the world's largest SWFs, a time zone that favourably overlaps with global markets, and a wider region filled with potential. Healthcare and biopharma companies will find that Abu Dhabi and ADIO move at their pace and can make incredible things happen to accelerate their growth and expansion.

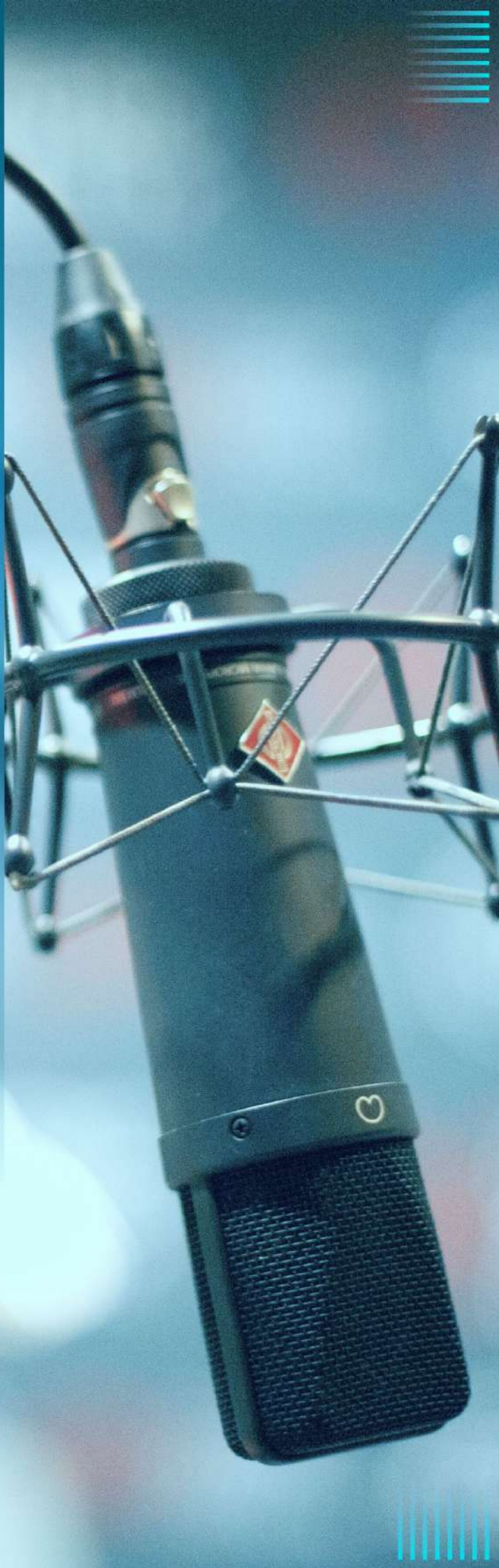
Interview with Louiza Chitour

PhD, Health Director, GCC - Plug and Play Abu Dhabi

Plug and Play Tech Center, also known as "Plug and Play," is a global platform for innovation. Its mission is to connect early-stage investors, startups, and major corporations worldwide.

The primary focus of Plug and Play is to successfully run corporate innovation programs and accelerator programs for startups across a wide range of industries. It operates as a vibrant ecosystem that has brought together over 35,000 startups, 500+ global corporations, venture capital firms, universities, and government agencies over the past 16 years.

Plug and Play Abu Dhabi
plugandplaytechcenter.com/abu-dhabi/



Louiza Chitour

PhD, Health Director, GCC-Plug and Play Abu Dhabi

Can you provide an overview of Plug and Play Abu Dhabi's role in sourcing and scaling cutting-edge healthcare innovations through the Health Plug and Play MENA program?

DR. CHITOUR: We have been fortunate to partner with the Department of Health of Abu Dhabi since 2019 and together we launched the first-ever dedicated accelerator program focused on supporting the most cutting-edge innovation startups in the health sector. Our goal is to help these startups deploy their solutions in Abu Dhabi and scale across the MENA region. With our extensive database of +50,000 startups and a network of over 180 VC firms globally, we can identify the most promising startups worldwide and provide them with a soft landing opportunity in the MENA region, using Abu Dhabi as their launchpad. Through strong partnerships with key stakeholders in the health ecosystem, we offer customized support to each startup, facilitating partnerships and co-creating solutions that address critical pain points for payers, providers, and industry players.

How many health-tech startups are currently part of the Plug and Play ecosystem in Abu Dhabi? What are some notable success stories or achievements of these startups?

DR. CHITOUR: We have accelerated over 40 healthcare startups across various cohorts since the inception of our accelerator programs. We are particularly proud of the success stories achieved by some of these startups. For example, Predictiv, a US-based digital twin startup, relocated to Abu Dhabi and is now contributing to advancing research in precision medicine and bringing preventative health solutions to patients. Another success story is an Emirati female startup founder who has bridged the gap in mental health and brought new solutions to this underserved sector. We not only had her in our accelerators but also invested in her early on through our VC arm.

Can you explain the specific support and benefits that Plug and Play Abu Dhabi's accelerator program offers to healthcare startups? How does it differ from other programs?

DR. CHITOUR: Plug and Play differentiates itself by being the most startup-friendly accelerator worldwide, as we do not take equity in the startups that enter our program. Furthermore, we customize our programs to focus on the specific needs of each cohort of startups. In addition to workshops on startup essentials like GTM and Product-Market Fit, we go beyond by actively supporting startups in identifying the right partners to validate their research and commercialize their technology.

What is the level of collaboration between Plug and Play Abu Dhabi and the Department of Health (DoH) in supporting healthcare startups? How does this collaboration enhance the startup ecosystem?

DR. CHITOUR: Being a close partner of the health regulator, the Department of Health (DoH), gives startups an early understanding of the regulatory framework they need to operate within. They are amazed by the support provided by the department, which enables them to bring their solutions to market faster. The DoH has a dedicated team that performs HealthTech Assessments to ensure the technology is safe for patients and can be used appropriately. This collaboration removes a critical barrier of entry for digital health startups, especially in the early stages, and reassures health stakeholders that the technology is safe to consider as a solution for their patients.

How does Plug and Play Abu Dhabi facilitate networking opportunities for healthcare startups? Can you provide examples of how these connections have helped startups in their growth and development?

DR. CHITOUR: Plug and Play organizes an average of 2500 events per year globally, which startups entering our program in Abu Dhabi can access either virtually or physically. Additionally, Plug and Play Abu Dhabi organizes innovation-focused events on a monthly/quarterly basis in collaboration with conferences and health partners. These events provide startups with opportunities to pitch, speak, or attend, allowing them to make valuable connections.

In what ways does Plug and Play Abu Dhabi connect healthcare startups with potential investors? How does this support startups in securing funding and scaling their businesses?

DR. CHITOUR: Plug and Play is one of the most active early-stage investors in the world, with an average of 250 investments per year across sectors. We leverage our extensive network of VC partners, family offices, and angel investors, providing startups with access to funding opportunities. This can be done through virtual pitch sessions or through various events such as Demo Day, Expo days, or dedicated Investor Days that are part of our accelerator programs.

How does Plug and Play Abu Dhabi foster collaboration and knowledge-sharing among the startups in its ecosystem? Are there any specific events or initiatives that encourage collaboration?

DR. CHITOUR: We maintain a close relationship with our cohort startups, following their progress and providing support even after the program ends. It is important for us to keep them involved so they can share their learnings and experiences with new startups joining our programs. We encourage collaboration through knowledge and experience exchange between founders. Specific events and initiatives are organized to facilitate this collaboration within the Plug and Play Abu Dhabi ecosystem.

DoH has a dedicated team that performs HealthTech Assessments to ensure the technology is safe for patients and can be used appropriately.

Can you describe the selection process for startups to join Plug and Play Abu Dhabi's accelerator program? What criteria are considered, and what advantages do selected startups gain?

DR. CHITOUR: Our selection process involves active outreach to relevant startups based on the challenges we are working on with our government and corporate partners. We scout the market and identify suitable startups at a regional or global level for a specific challenge. We also run programs with open calls for specific challenges, reviewing and pre-selecting the most fitting solutions. Startups that already have a product or service and have gained early traction are most suitable for our programs. Selected startups gain the advantage of accessing key players in the industry through our network, which can otherwise be time-consuming or difficult to achieve independently.

What resources and mentorship opportunities are available to healthcare startups participating in Plug and Play Abu Dhabi's accelerator program?

DR. CHITOUR: We have an extensive network of mentors and subject matter experts in areas such as fundraising, GTM, POC/pilots, and growth. In addition, our in-house team in Plug and Play Abu Dhabi consists of entrepreneurs, venture builders, angel investors, and industry experts who bring their experience to benefit the startups.

What is Plug and Play Abu Dhabi's approach to nurturing and supporting the growth of healthtech startups beyond the accelerator program? How does the organization ensure long-term success for these startups?

DR. CHITOUR: Building a closely knit community of alumni startups, including cohort startups and portfolio startups, is crucial for us to continue providing value to new startups joining our programs. We aim to ensure long-term success by enabling startups to leverage Abu Dhabi as their launchpad to grow and scale across the MENA region. We invite startups to different events we organize and some founders even volunteer to become mentors, contributing to the growth of the tech ecosystem.

How does Plug and Play Abu Dhabi stay up-to-date with the latest trends and advancements in the healthcare industry? How does this knowledge benefit the startups in their journey?

DR. CHITOUR: As we run industry-focused programs and have a dedicated VC arm, we gather insights on the latest emerging tech trends on a daily basis. Our accelerator programs, in partnership with key stakeholders in specific industries, provide us with access to unparalleled insights on the direction of those sectors.

Source: Department of Health Abu Dhabi | Linkedin

Can you share any examples of strategic partnerships or collaborations between Plug and Play Abu Dhabi and other organizations within the healthcare ecosystem? How have these partnerships contributed to the success of healthcare startups?

DR. CHITOUR: One notable example is a proof of concept that a hospital in Abu Dhabi had with a US-based startup called Kinnos. The Department of Health of Abu Dhabi played a key role in defining the regulatory framework for testing this technology, providing crucial support to the hospital. This experience allowed the hospital staff to envision a framework for collaborating with startups, benefiting future startups. The US startup gained firsthand experience of the UAE market's needs and gained clarity on how to scale their technology in the UAE and the wider region.

What are some of the key challenges that healthcare startups commonly face, and how does Plug and Play Abu Dhabi assist them in overcoming these challenges?

DR. CHITOUR: Healthcare startups commonly face challenges in accessing and understanding the healthcare ecosystem, especially at an early stage. Plug and Play Abu Dhabi addresses this by partnering with the Department of Health, providing startups with insights and access to key players in the industry. Another common challenge is accessing funding, as the healthcare industry can be complex and resistant to collaborating with startups. We engage early with stakeholders to educate them on the value of open innovation and how to best collaborate with startups in a controlled manner. This ongoing effort creates a safe forum for tackling these challenges transparently and productively.

What are the future plans and aspirations of Plug and Play Abu Dhabi in terms of supporting healthcare startups and contributing to the growth of the healthtech ecosystem in the region?

DR. CHITOUR: As Abu Dhabi evolves into a vibrant Life-Science ecosystem, our ambition is to continue supporting healthcare and Life-Science players in collaborating with innovative entrepreneurs approaching health from different angles. We aim to expand our dedicated health-focused programs to address a larger number of stakeholders, including venture capital firms, family offices, medical device companies, big tech, and academia. By bringing these stakeholders together, we aim to remove frictions and barriers that hinder innovation from reaching patients. We also plan to collaborate closely with universities and research institutions in the region, creating bridges with our global network of university partners. This will prepare and equip the next generation of UAE healthcare entrepreneurs with the necessary knowledge and tools for success.

Pharma Industry in Abu Dhabi

The pharmaceutical industry in Abu Dhabi, United Arab Emirates, has experienced remarkable growth and transformation in recent years. With a vision to become a regional hub for pharmaceutical manufacturing and innovation, Abu Dhabi has made significant strides in local production, market value, and export capabilities. This article explores the landscape of the UAE's pharma industry, emphasizing the expansion of local manufacturing, the market value, and the government's efforts to reshape the pharmaceutical supply chains.

Over the past decade, the number of pharmaceutical factories in the UAE has seen a substantial increase. In 2010, there were only four factories, but by 2021, that number had soared to 23. Out of these, 14 factories are dedicated to medicine production, while seven focus on medical devices. Additionally, two factories produce disinfectant solutions. With this remarkable expansion, the UAE now boasts over 2,500 locally produced medicines.

The Pharma Industry in the UAE: Localization and Development

The UAE`s pharma landscape

Local manufacturing & production growth

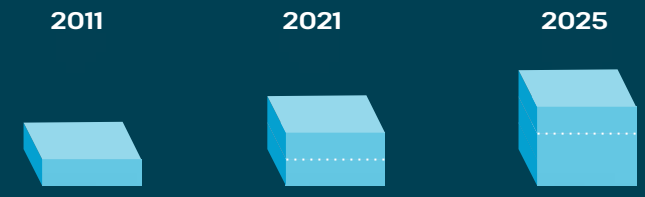
14
produce medicine

7
produce medical devices

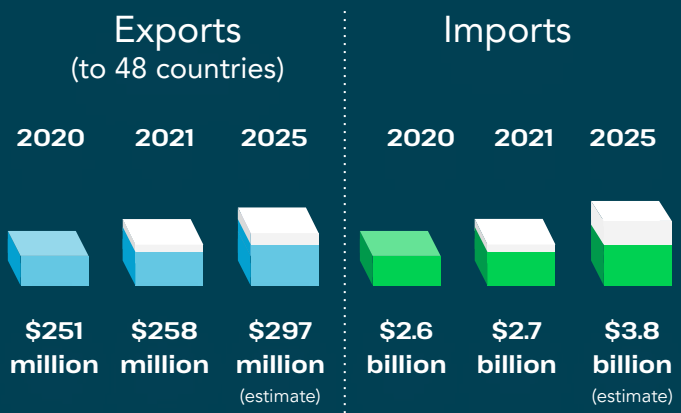
2
produce disinfectant solutions

- The number of factories in the UAE has expanded rapidly, from **4 in 2010 to 23 in 2021**
- With this expansion, there are now more than **2,500** medicines produced in the UAE

Local market value [7]



UAE pharmaceutical market [8]



The local manufacturing and production growth have not only bolstered the UAE's pharmaceutical capabilities but have also contributed to the country's economy. The market value of the pharmaceutical industry in the UAE has witnessed steady growth over the years. In 2011, the market value stood at 1.5 billion USD, which increased to 3.7 billion USD by 2021. Experts estimate that by 2025, the market value will reach 4.7 billion USD, demonstrating the industry's potential for further growth and economic contribution.

One of the key objectives of the UAE's pharmaceutical industry is to reduce dependence on imports and create a robust local value chain. By decreasing reliance on foreign imports and eliminating single-source dependencies, the UAE aims to reshape pharmaceutical supply chains in the region. The government recognized the importance of the pharmaceutical sector in its diversification plans more than a decade ago and has since implemented initiatives to localize the industry.

With the government's commitment to lowering medicine prices and ensuring affordable access, the UAE's pharmaceutical industry is poised for continued growth and contribution to the nation's diversification plans. By focusing on investment in Life-Sciences infrastructure, fostering collaborations between the public and private sectors, and creating an attractive pharmaceutical and Life-Sciences ecosystem, Abu Dhabi can become a hub for multinational companies to develop and manufacture innovative medicines.

Abu Dhabi's geographical location makes it an ideal gateway for the local, regional, and global pharmaceutical industries.

With over 3.6 billion people within a 10-hour flight radius, the city serves as a convenient hub for reaching a vast consumer base.

This strategic advantage enables efficient distribution and access to markets across the globe, enhancing Abu Dhabi's attractiveness as a pharmaceutical center.

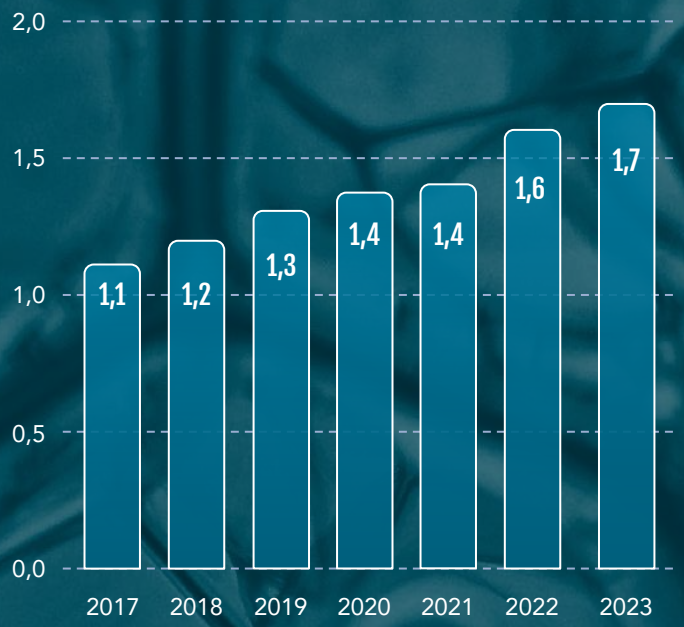
Abu Dhabi has successfully attracted numerous international pharmaceutical companies to establish and expand their presence in the UAE. Currently, eleven pharmaceutical multinationals, including renowned names like Johnson & Johnson, AstraZeneca, Novartis, Roche, Pfizer, GSK, and Sanofi, operate in the region. This influx of global players demonstrates the city's appeal as a preferred destination for pharmaceutical investment and highlights its potential as a regional hub for the industry.

The UAE boasts a modernized pharmaceutical regulatory framework known for its agility and efficiency. The regulatory processes are designed to fast-track production, with a turnaround time of 24 to 48 hours from the initial application. This streamlined approach accelerates market entry for pharmaceutical companies, enabling them to swiftly launch their products in Abu Dhabi and the wider Region.

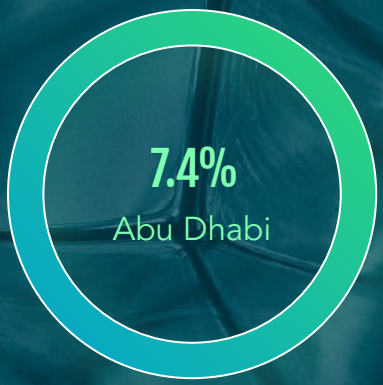
Top-11 pharmaceutical multinationals located in Abu Dhabi:

Johnson & Johnson, Roche, AstraZeneca, Pfizer, Novartis, GSK, Resilience Biotechnologies Inc, abbvie, Sanofi, acino, MSD

Abu Dhabi Estimated Pharmaceutical & Biotech Market Size in Billions USD [6]



CAGR 2017-2023



The UAE pharmaceutical market, including biotech, has expanded at a compound annual growth rate (CAGR) of 7.4% between 2017 and 2023. Despite considerable growth observed in the UAE's pharmaceutical trade, its healthcare Life-Science market remains heavily reliant on imported drugs.

The UAE's pharmaceutical market has successfully expanded its export capabilities, reaching 48 countries around the world.

UAE`s pharmaceutical exports

2020	2021	2025 (forecast)
251 million USD	258 million USD	297 million USD

This growth in exports reflects the increasing recognition of the UAE as a reliable source of quality pharmaceutical products.

While the UAE's pharmaceutical exports have been rising steadily, imports remain a significant component of the market. In 2020, the UAE imported pharmaceutical products worth 2.6 billion USD, which increased to 2.7 billion USD in 2021. Projections indicate that by 2025, imports may reach a value of 3.8 billion USD. Reducing import dependence and focusing on local manufacturing can help the UAE achieve greater self-sufficiency and strengthen its pharmaceutical industry. A crucial aspect of the UAE's pharmaceutical industry is the initiative to reduce medicine prices, making them more affordable for the population. The UAE's Ministry of Health and Prevention (MoHAP) is committed to implementing the 'Reduction in Medicine Prices' initiative until drug pricing in the UAE becomes the lowest in the Gulf Cooperation Council (GCC). Through various measures and initiatives, the UAE has made significant progress in easing the financial burden on patients and ensuring access to affordable modern drugs. Despite these price reductions, the UAE's pharmaceutical market has continued to grow steadily, indicating its resilience and potential for further development.

Several legislative measures have been implemented to support this objective:

Law No. 8 of 2019

on Medical Products, Pharmacy Profession, and Pharmaceutical Establishments establishes a supreme committee for clinical study ethics, enforces tighter price controls on medical products, and introduces increased sanctions.

Ministerial Decree 321 of 2020

sets an eight-year data exclusivity period from the approval of marketing, enabling generic drug companies to apply for approval within the last two years of this period.

Federal Decree Law No. 26 of 2020

effective from January 2, 2021, eliminates the requirement for 51% share capital owned by majority UAE national shareholders or a company wholly owned by UAE nationals.

The Ministerial Resolution

on Tracking Pharmaceutical Products Resolution mandates businesses to log local and imported product information in the UAE's advanced track-and-trace platform, ensuring transparency and traceability throughout the supply chain.

To expedite the approval process

for innovative and rare medicines, the Ministry of Health and Prevention (MoHAP) has advised international pharmaceutical companies to seek marketing approval in the UAE before obtaining permission in the country of manufacture.

Federal Law No. 11 of 2021

aligns UAE patent law with international standards, introducing a 12-month grace period for disclosing inventions before filing and implementing accelerated processes for urgent patent applications.

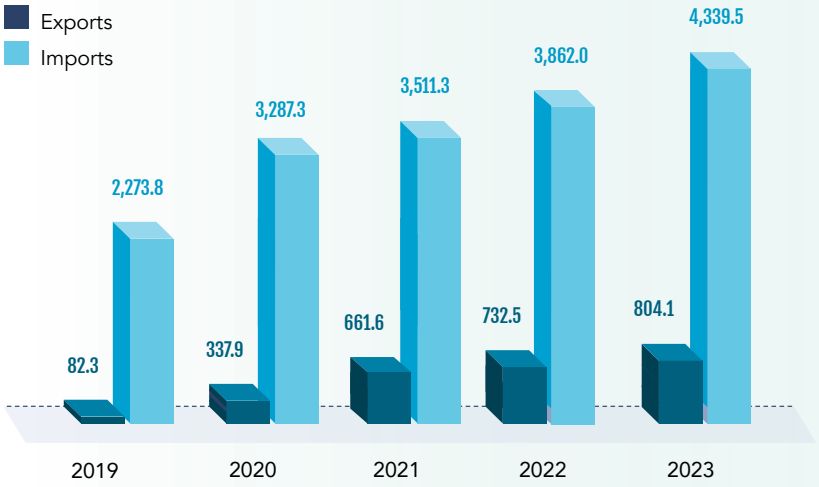
Abu Dhabi's thriving pharmaceutical industry is poised for further growth, thanks to its strategic advantages and the government's commitment to creating an attractive ecosystem for pharmaceutical investment.

Basic Industries Project`s medical manufacturing investing areas

- Eye cosmetics
- Inhalants
- Sterile pharmaceuticals
- Single-use clothing and blankets
- Medical safety glasses, face shields and medical gloves
- Ventilator and suction equipment
- Tubes and endoscopes
- Biometric devices and equipment
- Preservative medical refrigerators
- Laboratory and examination equipment
- Surgical equipment and tools
- Suction devices

The UAE`s Pharmaceutical Trade Analysis

UAE Pharmaceutical Trade (USD $mn) [9]



CAGR 2019-2023

23% UAE

One of the key drivers behind Abu Dhabi's growth in the pharmaceutical sector is the emphasis on localized manufacturing. By incentivizing drug partnerships and encouraging manufacturers to establish local operations, the UAE is bolstering its regional drug manufacturing capabilities and enhancing access to innovative medicines.

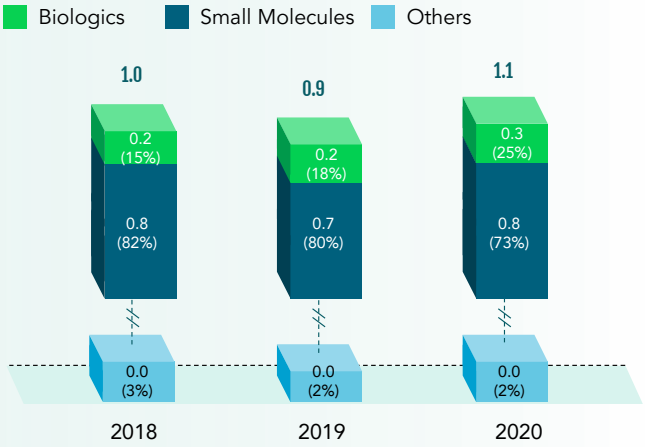
CAGR 2017-2023

33% Biologics

15% Small Molecules

In line with the global trend of cost containment and increasing local demand, generics are expected to outperform patented drugs. In 2020, UAE generic drug sales reached AED 2.5 billion, highlighting the growing popularity of generics in the market.

Value of Abu Dhabi`s Pharmaceutical Trade (USD $mn) [10]



H.E. Dr. Noura Khamis Al Ghaithi
Undersecretary of Department of Health – Abu Dhabi

Abu Dhabi's healthcare sector stands out for its exceptional resources, housing six globally recognised healthcare institutions and hosting 14 biopharmaceutical and medical technology manufacturers.

To ensure continued success and growth in the pharmaceutical industry, several cornerstones need to be addressed.

First and foremost, driving collaboration among stakeholders is crucial. Leveraging bilateral relationships and establishing cooperation between the public and private sectors, as well as academia, is essential for robust public health programs and research. Additionally, attracting foreign direct investment (FDI) is vital to meet rising local demand and foster innovation. To foster innovation and accelerate research and development (R&D), Abu Dhabi is committed to establishing a robust Life-Sciences R&D ecosystem. As a knowledge-based economy, the UAE recognizes the importance of progressive technologies such as gene and cell therapies, genome editing, and other critical therapeutic areas.

Abu Dhabi's KIZAD's Life-Sciences Park serves as a purpose-built R&D hub for Life-Sciences, biotechnology, and vaccine production. The park is already home to several leading companies, and ongoing construction of a new plant will enable the production of up to 200 million Hayat-Vax doses per year.

Hayat Biotech

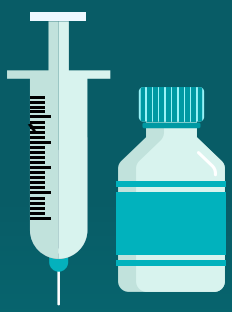
Total land area	Product types	Production capacity
55,000 m^2	Biologics and biosimilars (vaccines)	Up to 20 million doses

Technological advancements offer the UAE the potential to reduce its reliance on importing medical equipment and products. For instance, 3D printing is being explored in UAE universities, showcasing its potential to produce cost-effective and customized medical solutions. Innovations like a 3D-printed lower limb prosthetic, developed by students from Khalifa University, demonstrate the country's commitment to cutting-edge technologies.

The Abu Dhabi Department of Health (DoH) plays a vital role in unlocking access to innovative medicines. Through strategic partnerships and joint ventures, the DoH aims to accelerate the availability of cutting-edge treatments. For instance, DoH collaborated with Roche to make Casitivimab and Imdevimab medications available across Abu Dhabi for the treatment of mild to moderate COVID-19 symptoms. Similarly, a collaboration between DoH and GlaxoSmithKline (GSK) secured the COVID-19 treatment medication Sotrovimab through Rafed, making Abu Dhabi the first city in the world to receive the drug outside of clinical trials. Furthermore, the DoH has signed a Declaration of Collaboration with various global pharmaceutical companies, such as AstraZeneca and Miltenyi Biotec, to conduct clinical trials and develop real-world evidence for chronic conditions like cancer.

Finally, growing a highly skilled talent pool is crucial for the success of the pharmaceutical industry. The complexity of the sector necessitates a diverse range of skill sets. The DoH recently announced a collaboration with Pfizer to launch a specialized training program, aiming to train up to 150 clinical researchers within two years. While Abu Dhabi's pharmaceutical sector currently covers only 5% of local consumption, there is significant opportunity for growth.

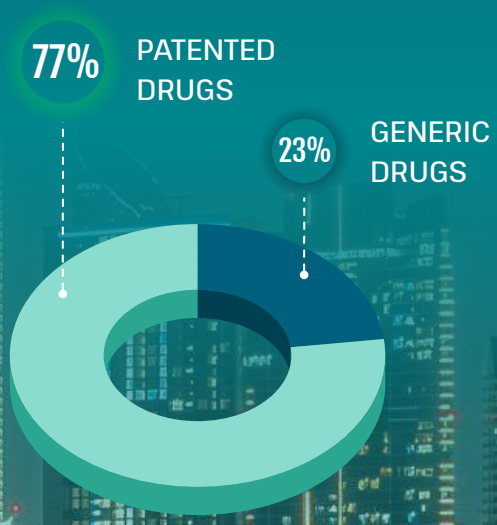
UAE generic drug in 2020



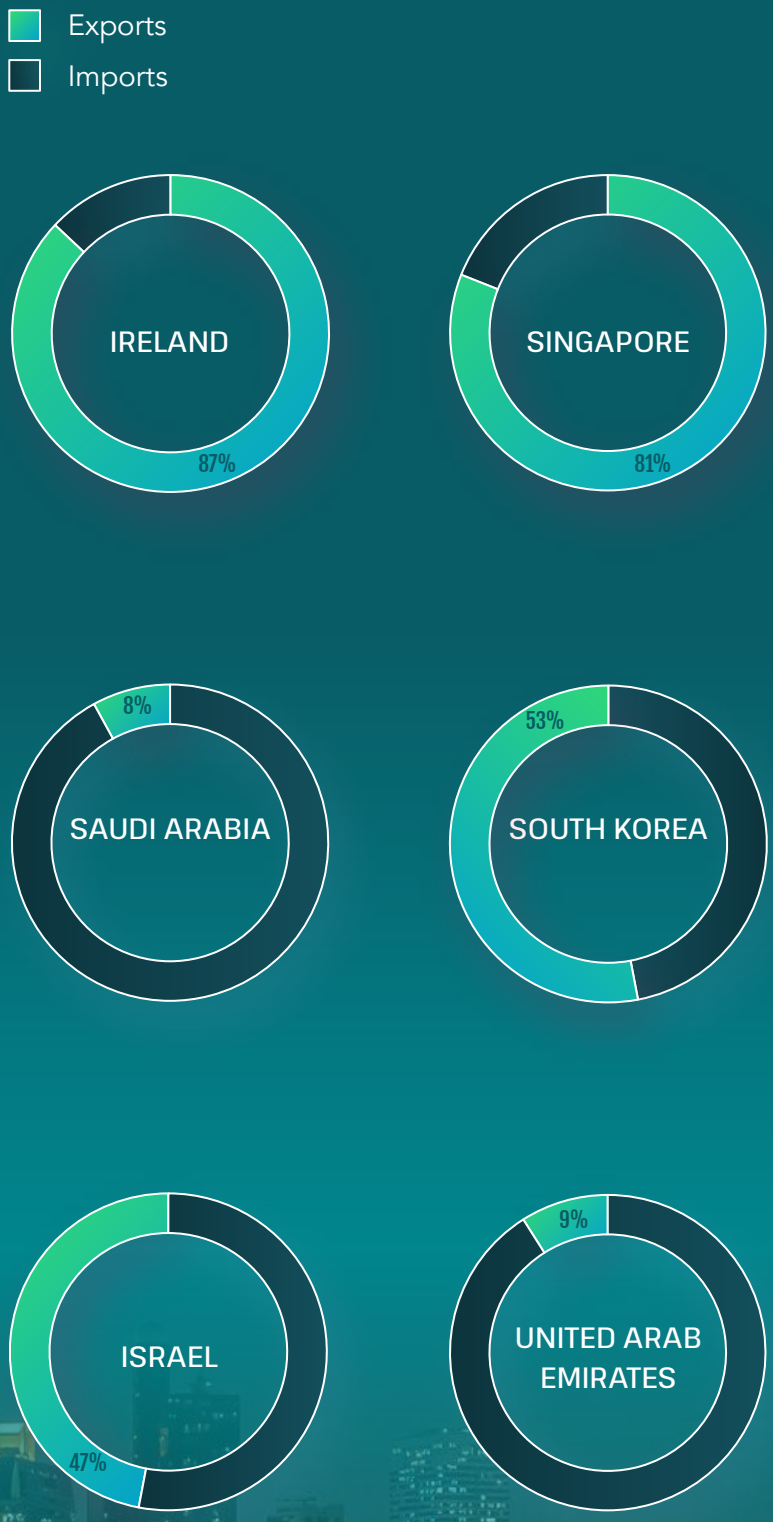
AED 2.5 billion

REPRESENTING 19% OF TOTAL PHARMACEUTICAL MARKET

UAE prescription drug market by 2030



Composition of Pharmaceutical Exports Out of Total Pharmaceutical Trade, 2020 [1]



A deep-dive into the UAE`s pharmaceutical market highlights growing footprint og biologics in line global trends

Top-10 Pharmaceutical Products in the UAE, 2021

Biologics Small Molecules

By Market Size (value of sales)

		Generic name	Indication	Company
1	Ozempic	Semaglutide	Endocrine	novo nordisk
2	Dupixent	Dupilumab	Dermatology	sanofi
3	Humira	Adalimumab	Musculoskeletal	abbvie
4	Veklury	Remdesivir	Pediatric	GILEAD
5	Trullicity	Dulaglutide	Endocrine	Lilly
6	Menopur	Menotropins	Genitourinary	FERRING PHARMACEUTICALS
7	Cosentyx	Secukinumab	Immunomodulator	NOVARTIS
8	Botox	OnabotulinumtoxinA	Musculoskeletal	Allergan
9	Xolair	Omalizumab	Respiratory	NOVARTIS
10	Dysport	AbobotulinumtoxinA	Musculoskeletal	IPSEN Innovation for patient care

By Volumes (number of units)

		Generic name	Indication	Company
1	Lovenox	Enoxaparin sodium	Blood Clot	sanofi
2	Dexa-methasone	N/A	Inflammation & arthritis	MERCK
3	Paracetamol	N/A	Pain relief	N/A
4	NovoRapid	Insulin Aspart	Endocrine	novo nordisk
5	Berifen	Dulaglutide	Osteoarthritis	acino
6	Lantus	Insulin Glargine	Genitourinary	sanofi
7	Trixone	Ceftriaxone	Infections	Julphar Gulf Pharmaceutical Industries
8	Dormicum	Midazolam	Central Nervous System	Roche
9	Mesporin	Ceftriaxone	Infections	mepha
10	Apotel	Hyoscyamine	Pain relief	UNI-PHARMA Pharmaceutical Laboratories S.A.

Conducted Researches in 2022 on Prioritized Diseases

	Total Researches	Completed Researches	Ongoing Researches	Rejected Researches	Research Published Sample
Oncology and Rare Disease	100	31	67	2	The prevalence of High-(Programmed death-ligand 1) PD-L1 Aggressive B-Non Hodgkin Expressing Lymphoma, a tertiary hospital experience form UAE.
Cardiovascular Diseases	135	42	89	4	Prevalence of atrial and ventricular arrhythmias on ambulatory Holter cardiac monitoring in a Middle East Gulf region population.
Metabolic Diseases	57	14	43	-	Bariatric surgery in the treatment of patients with obesity and type 1 diabetes.
Chronic Respiratory Diseases	15	3	12	-	NUCALA Effectiveness Study (NEST) in Emerging Market.
EID & AntiMicrobial Resistance	70	33	37	-	Features and Outcomes of Secondary Sepsis and Urinary Tract Infections in COVID-19 Patients Treated with Stem Cell Jet-Nebulization.
Mental Health	48	11	37	-	Evaluate the Efficacy, Safety, and Tolerability of Flexibly Dosed Esketamine Nasal Spray Compared With Quetiapine Extended-Release in Adult and Elderly Participants With Treatment-Resistant Major Depressive Disorder Who are Continuing a Selective Serotonin Reuptake Inhibitor / Serotonin- Norepinephrine Reuptake Inhibitor.
Woman and Child Health	149	44	104	1	Early fetal development is influenced by gender in frozen embryo transfer cycles.

Interview with Dr. Fahed Al Marzooqi,

COO of M42 | G42 Healthcare

M42 | G42 Healthcare is an innovative healthcare company that leverages the power of AI to revolutionize the healthcare sector in the UAE and globally. Its goal is to establish a world-class healthcare system by implementing holistic and scalable AI solutions, harnessing the power of data, and embracing emerging technologies.

As a forward-thinking health tech company, we are agile and future-oriented, enabling us to challenge and transform the traditional healthcare model. It collaborates with governments, renowned international organizations, scientists, researchers, and the broader medical community who share our values and mission of developing solutions that ensure the long-term well-being of nations worldwide.

M42 | G42 Healthcare
www.g42healthcare.ai

Dr. Fahed Al Marzooqi

COO of
M42 | G42 Healthcare

Can you tell us more about G42 Healthcare's focus on personalized and precision medicine, and how it is integrated into your offerings across the healthcare Life-Science value chain?

DR. AL MARZOOQI: At M42 | G42 Healthcare, we believe personalized and precision medicine to be a key characteristic in shaping the future of healthcare. Through our AI-driven platforms, and by partnering with governments, insurance providers, physicians, clinics, pharmaceuticals, and patients, we plan to bring personalized and precision medicine to the fore.

Much of this lies in our state-of the-art diagnostic capabilities, exploring disease predisposition diagnostics as part of clinical and consumer genomics solutions. We have our Omics Center of Excellence, the region's largest and most advanced omics facility, offering end-to-end multi-omics and biobanking capabilities to help develop personalized treatments. The Center helped us to facilitate the Emirati Genome Program, working with the government, and overseen by the Emirates Genome Council, obtaining data to address the Emirati population's specific needs, providing precision medicine.

Since merging with Mubadala Health in 2022, forming a new powerhouse M42 | G42 Healthcare has been able to intensify its health tech personalization efforts. Working with Abu Dhabi's Department of Health, M42 | G42 Healthcare has launched its first Personalized Precision Medicine Program for oncology. Genetic testing and sequencing technologies can facilitate early detection, ensuring cost efficiencies, and better prevention and treatment.

The Omics Center of Excellence at M42 | G42 Healthcare has been involved in sequencing over 300,000 genomes. How has this initiative contributed to the advancement of personalized medicine?

The Omics Center of Excellence offers 4,000 sqm of sample processing and sequencing labs, with cutting-edge automation, capable of sequencing 500,000 genomes annually.

DR. AL MARZOOQI: The Omics Center of Excellence offers 4,000 sqm of sample processing and sequencing labs, with cutting-edge automation, capable of sequencing 500,000 genomes annually.

One of the ways the Center is contributing to the advancement of personalized medicine is through the Emirati Genome Program, a significant national project that aims to build a comprehensive and sustainable genomic ecosystem.

The initiative, launched by Abu Dhabi's Department of Health, and executed by M42 | G42 Healthcare, uses the latest whole sequencing and artificial intelligence technologies to generate high quality data that enable scientific research and discovery. It aims to accelerate the development of personalized healthcare and precision medicine programs and solutions that address the UAE's public health priorities and effectively help reduce genetic and chronic disease burden.

Recently, the program was taken under its wing by the Emirates Genome Council, with a new awareness campaign launched by the Dubai Health Authority to encourage more Emiratis to take part and contribute to the program.

We are also one of the partners working with the Department of Health to establish the Personalized Precision Medicine Program for oncology in the region. Using cutting-edge, artificial intelligence-based technologies, the new program focuses its first phase on breast cancer patients across the emirate. It will target oncology diseases, building on the latest research and model of care to detect, diagnose and treat breast cancer patients, or reduce the risk or recurrence of the disease.

We also foresee working with pharma on data characterization and extensive research and development to discover insights around novel variants

G42 Healthcare recently formed an integrated entity with Mubadala Health. How do you envision this collaboration fueling medical breakthroughs and data-centric technologies in the healthcare industry?

DR. AL MARZOOQI: M42 is a first-of-its-kind integrated healthcare company that has over 20,000 employees, and more than 450 facilities in 24 countries.

It provides a holistic healthcare experience, with a wide portfolio of assets, including Amana Healthcare, Biogenix Labs, Cleveland Clinic Abu Dhabi, Danat Al Emarat Hospital, Diaverum, HealthPoint Hospital, the HealthPlus Network of Specialty Centers, Moorfields Eye Hospital Centre, National Reference Laboratory, Capital Health Screening Center, Imperial College London Diabetes Center, Insights Research Organization & Solutions (IROS), Omics Center of Excellence, and The National Reference Laboratory, HealthPlus Fertility and Mubadala Health Jumeirah -Dubai.

The coming together of G42 Healthcare and Mubadala Health combines G42 Healthcare's unique medical and data-centric technologies with Mubadala Health's world-class patient services and state-of-the-art facilities.

Operating at the forefront of medical development, M42 is set to transform the way care is delivered, bridging the gap between the latest health tech advancements and the clinical outcomes patients receive, to provide personalized and precise patient care. M42 will look at opportunities for global expansion and partnerships to bring high-quality care to communities around the world.

Most recently, M42 acquired Diaverum – a leading global renal care service provider – expanding its global geographic footprint, enabling it to introduce relevant healthcare services and health tech solutions in new markets while boosting its renal care offering in the GCC.

G42 Healthcare has established a laboratory for protein biomarker testing in collaboration with SomaLogic. How does this laboratory contribute to the development and implementation of personalized medicine approaches?

DR. AL MARZOOQI: M42 | G42 Healthcare's collaboration with SomaLogic, a leader in data-driven proteomics, will benefit the GCC and wider region.

Protein biomarkers provide a dynamic and real-time window into human biology, and are increasingly being used across all stages of the drug development pipeline, helping pharma identify patients likely to respond to treatment, and detecting safety signals in clinical trials.

In line with our vision to build a world-class multi-omics ecosystem for better healthcare outcomes, we have established a proteomics laboratory in Masdar City Abu Dhabi, providing proteomic services to the UAE, Saudi Arabia, GCC and selected broader territories. This laboratory will deliver testing for over 7,000 protein biomarkers in a single run on as little as 55 microlites of plasma or serum samples, using the SomaScan platform. This gives deep molecular insights, offering a brand-new service to Life-Science, clinical research, clinical trials, pharma and healthcare providers in the region as part of a SomaLogic-certified site.

The lab, capable of delivering tens of thousands of analyses per year, is housed within the Omics Centre of Excellence in Masdar City.

There is also provision of testing for clinical environments via the SomaSignal test portfolio. These are advanced proteomics data-driven algorithms that can deliver meaningful clinical observations and prediction of risk across a multitude of conditions, including cardiovascular disease.

Protein biomarkers provide a dynamic and real-time window into human biology, and are increasingly being used across all stages of the drug development pipeline, helping pharma identify patients likely to respond to treatment, and detecting safety signals in clinical trials. With this collaboration, we have strengthened our multi-omics capabilities, accelerating population health programs, and real-world population healthcare delivery on the SomaScan proteomics platform.

All data practices comply with international and local regulations, such as HIPAA, GDPR, and UAE Health Data Law, and there are robust cybersecurity measures, such as encryption, firewalls, intrusion detection and prevention systems, with continuous monitoring to protect patient data from unauthorized access, theft, and breaches.

We're proud to announce that a few days ago, the proteomics lab at Omics Centre of Excellence in Abu Dhabi has been officially certified. The SomaScan Assay Operations Certificate, the first-of-its-kind to be granted in the EMEA region, is a testament to our capability that we can now test for over 7,000 protein biomarkers and deliver up to tens of thousands of analyses per year.

How does M42 | G42 Healthcare ensure the security and privacy of the vast amount of genetic data collected through the Emirate Genome Program?

DR. AL MARZOOQI: M42 | G42 Healthcare takes data security and patient privacy very seriously, with a number of measures in place. All data practices comply with international and local regulations, such as HIPAA, GDPR, and UAE Health Data Law, and there are robust cybersecurity measures, such as encryption, firewalls, intrusion detection and prevention systems, with continuous monitoring to protect patient data from unauthorized access, theft, and breaches. M42 | G42 Healthcare also uses strict access controls, ensuring that only those who need access to the data can view it, with regular training and awareness for staff on data security best practices, raising awareness about the importance of protecting patient data.

Finally, a robust series of back-up and disaster recovery plans are in place to ensure that patient data is recoverable in the event of a disaster or data loss. Our systems are continuously monitored and updated to stay ahead of emerging threats and risks.

The data of participants in the Emirati Genome Program is protected as per the highest local and international standards of safety and security.

What role does M42 | G42 Healthcare play in bridging the gap between genomics research and clinical application?

DR. AL MARZOOQI: We have several initiatives to help bridge the gap between genomics research and clinical application. One is the IROS (Insights Research Organization and Solutions) platform, which harnesses real-world data and AI to support internationally-leading standards of scientific and ethical research, and conduct clinical trials and reporting. This will help to develop new drugs and medications by leveraging state-of-the-art research capabilities and groundbreaking technologies.

IROS is a first-of-its-kind Contract Research Organization (CRO) in the UAE – specializing in healthcare research and solutions covering all therapeutic areas. This information can be used to develop personalized treatment plans for patients and improve clinical outcomes.

We are also one of the partners working with the Department of Health to establish the Personalized Precision Medicine Program for oncology in the region. Using cutting-edge, artificial intelligence-based technologies, the new program focuses its first phase on breast cancer patients across the emirate. It will target oncology diseases, building on the latest research and model of care to detect, diagnose and treat breast cancer patients, or reduce the risk or recurrence of the disease.

The Personalised Precision Medicine Program also leverages technology and data collected from the Emirati Genome Program. Could you provide examples of specific technological advancements or innovations that M42 | G42 Healthcare has developed and deployed in the field of personalized and precision medicine?

Our specific technological advancements and innovations are best demonstrated through our multitude of digital health assets. These sum up our intentions when it comes to the development and deployment in the field of personalized and precision medicine: accelerate time to insights; deliver at scale yet with agility; collaborate securely and seamlessly; combine unsurpassed quality cost-effectively; ensure security and compliance; reduce compute time with significant performance gains; enable national level genome program insights; support all genomic and proteomics data requirements; help streamline proteomics and genomics data management; and improve efficiency.

In practice, that sees us embracing AI to process large data volumes and research, and offer personalized, preventive, predictive solutions across the healthcare spectrum, particularly when it comes to genetic testing. This allows us to facilitate the early diagnosis and treatment of cancer, rare and metabolic diseases, and other genetic conditions. Our advanced genome capabilities and diagnostic services have also made us the partner of choice for the UAE government and pharma entities, working together to conduct premarital screenings, and other prevention programs, as well as the Emirati Genome Program.

For example, we have built an integrated genomic data analysis and visualization platform that will help stakeholders derive insights for use across healthcare entities, pharma and academia. Our teams have developed Healthsight, a proprietary platform which helps in expedited access, exploration and analysis of privacy protected real-world data to allow researchers and pharma companies to gain rapid access to insights and identify volunteers for clinical trials as per specified conditions, therapy areas, regions and run any other queries that can help search, locate and choose volunteers suitable for the trials there by saving time and cost for the pharma entities.

Our various tech platforms are transforming the healthcare ecosystem too. With national health initiatives like Shafafiya and HealthSight, digital technologies can improve compatibility in the claims and remittance information exchange between payers and healthcare providers.

G42 Healthcare's Biogenix Labs announced that is now licensed to use Oxford Nanopore genome sequencing technology. Source: www.zawya.com

And Malaffi is the region's first Health Information Exchange (HIE) platform that safely and securely connects public and private healthcare providers in the emirate of Abu Dhabi. It enables the meaningful, real-time exchange of important patient health information between providers, creating a centralized database of unified patient records. In an effort to strengthen our public health commitments, we have built a state-of-the-art waste water laboratory in UAE that will leverage predictive analysis and real time monitoring to establish a preventive infrastructure for protecting human health. M42 | G42 Healthcare actively manages CTL (Clinical Testing Laboratory) services to ensure accurate and efficient testing, leveraging AI and machine-learning algorithms to enhance processes and decision-making, and derive meaningful insights from vast amounts of patient data. AI is used heavily to analyze wastewater, looking for signs of pollutants, contaminants and diseases that can impact public health, thereby strengthening the surveillance protocols of the country. As we prepare for COP 28, innovation across this space highlights our continued investments and commitments.

M42 | G42 Healthcare invests heavily in research and development in collaboration with leading academic institutions and industry partners.

How does M42 | G42 Healthcare contribute to the education and training of healthcare professionals in the field of personalized and precision medicine?

DR. AL MARZOOQI: The education and training of healthcare professionals is important when it comes to advanced technology, and its applications in personalized and precision medicine. We offer a variety of regular educational programs and initiatives to help professionals stay up-to-date, including training for genetic counselors, physicians, and other healthcare providers, to help them better understand the latest advances in genomics and personalized medicine. These training programs are led by experts in the field, and are designed to be rigorous and comprehensive.

M42 | G42 Healthcare also provides training on omics and consumer genomics, which is very important in the fields of preventive and personalized healthcare. All programs are designed to be flexible and accessible, covering data analytics and medical informatics.

In addition to training, M42 | G42 Healthcare invests heavily in research and development in collaboration with leading academic institutions and industry partners. This is also a driving factor of innovation in the field.

What are some future goals and plans of M42 | G42 Healthcare in terms of innovation and technological advancement in personalized medicine?

DR. AL MARZOOQI: M42 | G42 Healthcare will continue to lead the way in terms of implementing digital healthcare systems throughout the UAE, developing personalized and precision treatment solutions, and continue to work with the government and other partners to advance the UAE's position as a healthcare leader globally.

Much of our intentions align with the nation's broader vision for the sector. By continuing to develop new technologies and solutions that advance precision treatments, and also healthcare access and outcomes, M42 | G42 Healthcare aligns with the UAE's goal of providing world-class healthcare services that are tailored to individual patient needs.

M42 | G42 Healthcare has access to platforms that combine genotypic and phenotypic data (which is sourced from Malaffi and Shafafiya) which gives a longitudinal read at an individual level thereby realizing the true potential of personalized and preventive treatments or therapies.

We will also continue to expand our genomics research capabilities, placing the UAE as a global leader in terms of healthcare innovation, development of new diagnostic and therapeutic solutions that impact patient outcomes.

Interview with Sameh El Fangary,

GCC & Pakistan Cluster President at AstraZeneca

Sameh is the Cluster President at AstraZeneca and has been in this role since December 2020, responsible for driving forward AstraZeneca's 'Growth Through Innovation' strategy in the GCC countries and Pakistan, while ensuring uninterrupted access to medication for patients in these markets. Sameh is a firm believer in establishing the right partnerships in both the public and private sectors in order to create a holistic healthcare ecosystem, to bring innovative treatments to patients across AstraZeneca's four key therapy areas: Oncology; Respiratory; Vaccine & Immune Therapies and Cardiovascular, Renal and Metabolic Diseases.

Sameh has more than 23 years of experience in the biopharma sector, majority of these in leadership positions across the region. Sameh's varied skill set and knowledge in multiple therapy areas, combined with his passion for science and dedication to patients, ensure an ongoing commitment and contribution to GCC countries and Pakistan in many ways – from local investment to local clinical trials and data generation.

AstraZeneca
www.astrazeneca.com

Sameh El Fangary

GCC & Pakistan Cluster President at AstraZeneca

How do you see the health sector in Abu Dhabi and the UAE in terms of its attractiveness to investors?

MR. EL FANGARY: The UAE has a very attractive health sector that is resilient and innovation-oriented. With a clear aspiration of becoming a "Global Life Sciences Hub", Abu Dhabi and the UAE has become the home for state-of-the-art facilities, hospitals, clinical research and life sciences services.

The regulatory system is very advanced ensuring fast access to innovative medications; in fact, the UAE has topped the Middle East and Africa (MEA) in terms of the number of approved medications containing novel active substances and the speed at which drug regulatory dossiers are evaluated and approved. Furthermore, Abu Dhabi and the UAE has developed an agile ecosystem that welcomes public private partnerships and collaborations that focus on innovation, adoption of new technologies and address public health issues.

At AstraZeneca, our priority is to work in collaboration with members of the ecosystem addressing the needs of people suffering from chronic diseases. A key area of focus is noncommunicable diseases, especially those related to Oncology, Cardiovascular, Renal and Metabolic conditions such as diabetes, heart disease and chronic kidney disease, or Respiratory and Immunology.

Does AstraZeneca intend to expand its investment in the UAE in the future?

MR. EL FANGARY: Absolutely. The UAE is one of AstraZeneca's key emerging markets, which together make up more than a quarter of our global business.

In 2022, we had 53 medicine launches in the region across all of our therapy areas (CVRM, R&I, oncology and rare diseases), with many more planned for this year that will provide life-changing medications for millions of people suffering with chronic diseases.

Last December our CEO, Pascal Soriot, witnessed a landmark agreement in Abu Dhabi with G42 Healthcare supporting research and development, innovation and sustainability. The agreement cements the UAE's position as a hub for research and innovation in life sciences and is the latest of a series of longstanding partnerships between AstraZeneca and key authorities in the UAE.

We are also partnering with the Department of Health Abu Dhabi as part of our global Partnership for Health System Sustainability and Resilience (PHSSR) to support their efforts to develop a sustainable and resilient health system, focusing on developing talents, supporting innovation and driving prevention of disease while ensuring resi- lience of the health systems towards future shocks.

We will continue working with our partners in Abu Dhabi and the UAE to progress diagnostic capability uplifting, localize diagnostic tests for oncology, bring more clinical trials and position Abu Dhabi as a hub for clinical research and data generation.

A key area of focus is noncommunicable diseases, especially those related to Oncology, Cardiovascular, Renal and Metabolic conditions such as diabetes, heart disease and chronic kidney disease, or Respiratory and Immunology.

You mentioned AstraZeneca's efforts in early screening and diagnosis, why do you think this is important and how is Abu Dhabi spearheading these efforts?

MR. EL FANGARY: Early detection and prevention are increasingly important as ageing populations, a changing climate and the lasting impacts of the pandemic are compounding the health, social, economic and environmental burden of disease.

Close to ninety percent of chronic kidney disease (CKD) patients, for example, remain undiagnosed; in oncology, a major challenge for lung cancer patients is that they are diagnosed at a late stage and by that time, the disease would have progressed.

It is a pivotal point that we can't achieve health equity without continuously focusing on detecting and intervening early. Otherwise, sustaining the increase in demand for healthcare services will be extremely difficult. In recent years, there have been tremendous advancements in health education, screening, early detection, technologies, and medicines that can potentially cure, or at least modify, the course of major diseases. So at least in some cases, we don't have to wait until patients fall ill to provide health and emergency care services. We need a fundamental shift in mindset to transition from reactive care to proactive care, which can only happen by improving early prevention and diagnosis.
Abu Dhabi has a very well-established healthcare ecosystem that can ensure exploring new technologies and solutions, validating them clinically and ultimately integrating them into the health systems of the emirate.

We are proud to be working with the Department of Health Abu Dhabi on tackling these challenges notably by introducing Qure.ai's technology that uses artificial intelligence to detect lung cancer from a simple chest x-ray, allowing early detection of the disease at an early stage and hence optimizing patients' treatment options .

How do you see the future of the health sector in Abu Dhabi and the UAE?

MR. EL FANGARY: Before looking at the future, it is important to highlight how exemplary the health sector was during the pandemic. Abu Dhabi and the UAE was a model for best practice during the pandemic where its strategy of "early detection, early treatment" helped to address COVID-19 effectively.

At AstraZeneca, we are committed to tackle climate change, leverage health equity, and build resilience in the healthcare system across the UAE.

There are lessons we can learn from this to inform our future decisions as well as apply to other disease areas, such as the importance of early detection and diagnosis in tackling both the health and economic burden of chronic disease.

In terms of digital health and innovation, Abu Dhabi and the UAE has consistently been an early adopter of new healthcare technologies and AstraZeneca will continue supporting this approach both in the UAE and region building on the success of some of our existing programs such as our ongoing work with Qure.ai in the GCC. We believe that innovation and digital health will be the cornerstones of healthcare in the future.
At AstraZeneca, we are committed to tackle climate change, leverage health equity, and build resilience in the healthcare system across the UAE.

G42 Healthcare and AstraZeneca Sign Agreement to Advance Life Sciences at BIO International Convention

G42 Healthcare, an Abu Dhabi-based leading health tech company and subsidiary of G42, an artificial intelligence and cloud computing company located in Abu Dhabi has signed a letter of intent (LOI) with global biopharmaceutical company, AstraZeneca, in the presence of the Department of Health – Abu Dhabi (DoH), the regulator of the healthcare sector in the emirate of Abu Dhabi aiming to expand their collaboration into the domains of diagnostics and clinical research, providing access to innovative solutions and treatments for patients in the United Arab Emirates and beyond.

Furthermore, we are certain that a healthy environment is critical for human health, and we must collectively take bold action to build a sustainable future.

With COP28 coming to the UAE this year, we look forward to continuing our work to decarbonize the health industry and support governments to achieve their net zero ambition. For that, we believe that the healthcare ecosystem in Abu Dhabi and the UAE will play a fundamental role in spearheading actions towards adoption of new technologies, optimization of disease management and revamping patient care pathways in an effort to decarbonize the healthcare system in the country.

Interview with Ashraf Mallak,

AVP and Managing Director Of Merck Sharp & Dohme GCC

Being one of the largest pharmaceutical companies globally, Merck Sharp & Dohme GCC consistently ranks among the top five in terms of revenue. The company offers a diverse portfolio of products that address various areas such as heart and respiratory health, infectious diseases. Its research efforts primarily target prevalent conditions affecting millions worldwide, including Alzheimer's, diabetes, and cancer, while also expanding into emerging fields like biologics. Alongside developing innovative therapies, Merck Sharp & Dohme GCC places great emphasis on ensuring accessibility and affordability for patients.

Merck Sharp & Dohme GCC

www.connect.msdgcc.com

Ashraf Mallak

AVP and Managing Director MSD GCC

What specific innovative treatments and breakthrough solutions does MSD plan to bring to the UAE through its strategic collaboration?

MR. MALLAK: MSD is reiterating the importance of public-private partnerships to have a meaningful impact on the enhancement of healthcare services, with such collaborations bringing together the entities' collective expertise and resources in medical research and patient care as we are keen to bring our future innovation to UAE in oncology, immunology, cardiovascular, neuroscience and expanded vaccination to prevent from cancer.

Can you provide more details about the areas of focus for the collaboration in the UAE and the MENA region?

MR. MALLAK: MSD will continue to work with the different players in the healthcare ecosystem in UAE and the region to expand patient access to innovative treatments and vaccines like cancer treatment and prevention, cardiovascular through collaborating on reforming policies, advancing the research footprint and patient awareness.

The UAE's innovation-friendly environment and fast-track registration process have positioned it at the forefront of healthcare innovation.

How will the exchange of knowledge and experience between MSD and the UAE contribute to advancing healthcare in the region?

Source: MSD GCC | Twitter

MSD Gulf is recognized by the Emirates Oncology Society (EOS) for its exceptional support in oncology care for cancer patients in the UAE, and has been awarded the prestigious "Cancer Awareness Partner of the Year" accolade.

MR. MALLAK: The Department of Health Abu Dhabi has had exceptional efforts in establishing a healthcare system that stands as a global model of innovation and sustainability. The forward-thinking approach, embracing advanced technology and fostering research and development have created an ideal environment for public- private partnership through exchanging knowledge in the research area

Are there any specific healthcare challenges in the UAE that MSD aims to address through this collaboration?

MR. MALLAK: Scarcity of the local data will remain a challenge, this drives MSD us to work with healthcare Ecosystem in the UAE under the patronage of the DOH on Real World Evidence to generate local data. This effort involves generating local data and developing targeted patient support programs for those in need.

Will the collaboration involve partnerships with local healthcare providers or institutions in the UAE? If so, can you provide examples?

MR. MALLAK: The collaboration will be on conducting research to generate local outcome data in the areas of breast cancer which comes at number one type cancer in UAE and lung cancer while different world class health care institutions will be a potential research partners like DOH hospitals, like Tawam, SSMC and Cleveland.

What role does MSD envision playing in supporting the UAE's healthcare infrastructure development?

Will MSD be investing in research and development activities in the UAE as part of this collaboration? If so, what are the areas of research interest?

MR. MALLAK: MSD will continue to work on advancing the research and generating local data in the area on oncology in lung and breast as the breast cancer is the most prevalent cancer in the UAE.

MSD continue to raise awareness in the UAE though our collaboration with patient organization to empower the patients and identify their treatment journeys.

How does MSD plan to ensure the accessibility and affordability of its innovative treatments and solutions in the UAE?

MR. MALLAK: The UAE's innovation-friendly environment and fast-track registration process have positioned it at the forefront of healthcare innovation. Alongside patient-centric policies, MSD is partnering with policymakers in the UAE to expand patient access to innovation by making its advancements available among the first countries in the world.

MR. MALLAK: By combining expertise and resources, this agreement is set to make a lasting impact on the UAE's healthcare sector, focusing on oncology; with joint efforts centered on driving scientific research, strengthening medical education, provide digital solutions and deploy data analytics in different research areas which aims at improving patient outcomes and solidifying the UAE's position as a leader in healthcare.

How does MSD plan to engage with local healthcare professionals and stakeholders to drive awareness and adoption of its treatments and solutions?

MR. MALLAK: MSD was recognized as the cancer awareness partner of the year in 2022 and we continue to raise awareness in the UAE though our collaboration with patient organization to empower the patients and identify their treatment journeys.

Are there any plans to conduct clinical trials or research studies in the UAE as part of this collaboration? If so, what therapeutic areas will be focused on?

MR. MALLAK: According to the Globocan 2020 report, breast cancer is the most common type of cancer in the UAE, while lung cancer ranks sixth in terms of incidence, with 1,030 newly diagnosed breast and 226 lung cancer cases, respectively. The statistics underscore the urgent need to address these malignancies and emphasize the importance of continued investment in Real World Evidence research.

According to the Globocan 2020 report, breast cancer is the most common type of cancer in the UAE, while lung cancer ranks sixth in terms of incidence, with 1,030 newly diagnosed breast and 226 lung cancer cases, respectively.

The Department of Health – Abu Dhabi and MSD GCC Sign Declaration of Collaboration to Support Healthcare Advancement and Innovation in Abu Dhabi

Interview with Alex Zhavoronkov, PhD, Founder and CEO of Insilico Medicine

Insilico Medicine, also known as Insilico, is a leading artificial intelligence (AI) company specializing in drug discovery, biomarker development, and aging research. Insilico is at the forefront of applying AI and deep learning techniques to accelerate the drug discovery and development process.

By utilizing advanced machine learning models and big data analytics, Insilico aims to reduce the time and cost associated with traditional drug discovery approaches, ultimately bringing safer and more effective therapies to patients in a more efficient manner.

Insilico Medicine
www.insilico.com

Alex Zhavoronkov

PhD, Founder and CEO of Insilico Medicine

Can you tell us more about the opening of the Insilico Medicine Generative Artificial Intelligence and Quantum Computing Research and Development Centre in Abu Dhabi?

DR. ZHAVORONKOV: We held the grand opening of the Insilico Medicine Generative Artificial Intelligence and Quantum Computing Research and Development Center in February 2023. The center is located in the International Renewable Energy Agency (IRENA) headquarters in Masdar City, Abu Dhabi's flagship sustainable urban development, the research and development hub. The grand opening was witnessed by nearly 100 ecosystem partners from the government, academia, the investment community, and the AI and biotech industry.

What are the main goals and objectives of the research and development hub in Abu Dhabi?

DR. ZHAVORONKOV: A key part of our global team is at the Abu Dhabi center, driving the latest technological advances in our end-to-end generative AI drug discovery and design platform. That team is growing, and brings together top expertise in AI and software development. This work directly contributes to our larger mission to accelerate the discovery of new drugs for patients in need, while also providing an opportunity for us to explore the use of our platform to advance sustainable chemicals and advance aging research.

Who were the key participants and stakeholders present at the grand opening event?

DR. ZHAVORONKOV: The event included H.E. Omar Al Olama, the Minister of State for Artificial Intelligence, Digital Economy and Remote Work Applications, Dr. Eric Xing, President of MBZUAI; H.E. Dr. Mariam Matar, MD, PhD, Founder and Chairperson of the UAE Genetic Diseases Association; Ahmed Baghoum, Acting CEO of Masdar City; Eng. Abdulla Abdul Aziz Al Shamsi, Acting Director General of the Abu Dhabi Investment Office; as well as Dr. Alex Zhavoronkov, Founder and CEO of Insilico Medicine; and Dr. Alex Aliper, cofounder and President of Insilico Medicine who leads the UAE center.

How does Insilico Medicine plan to collaborate with local biotech companies and academic partners in Abu Dhabi?

DR. ZHAVORONKOV: We work closely with academic and business partners who are working alongside us to explore the use of AI both in drug discovery and in the development of sustainable fuels and materials. We explore research opportunities with Mohamed bin Zayed University of Artificial Intelligence, the UAE Genetic Disease Association and other organizations.

> **We are excited by the tech talent and government commitment to expanding an AI-driven economy in the UAE. Also, the prime location, strong and stable economy, developed infrastructure and highly educated talent make Abu Dhabi an attractive place to continue to develop our technology capabilities.**

We have also signed memorandums of understanding with Aramco and Luberef to use our generative AI platform out of Abu Dhabi to design more sustainable fuels and materials.

What factors influenced Insilico Medicine's decision to establish its regional headquarters in Abu Dhabi?

DR. ZHAVORONKOV: We chose this location for a number of reasons. First, we are excited by the tech talent and government commitment to expanding an AI-driven economy in the UAE.

Also, the prime location, strong and stable economy, developed infrastructure and highly educated talent make Abu Dhabi an attractive place to continue to develop our technology capabilities.

Can you provide more information about the support Insilico Medicine received from the Abu Dhabi Investment Office (ADIO)?

DR. ZHAVORONKOV: Announced in January 2023, Insilico Medicine was one of three global technology companies to receive support and incentives from ADIO to increase opportunities to grow the company and accelerate tech expertise in the region. ADIO's support has helped us to further improve our Pharma.AI platform, raise our visibility, attract top talent and form important connections in the region.

What are the specific areas of focus for Insilico Medicine's research and development activities in Abu Dhabi?

DR. ZHAVORONKOV: The development of Insilico's end-to-end Pharma.AI drug discovery and development platform is now being supervised from Abu Dhabi, making it the first project of its kind in the UAE. While no drug has yet been discovered in the Middle East, Insilico hopes to drive a new era of AI-powered drug discovery in the region to make it possible. Insilico's platform being developed in the UAE has three parts: PandaOmics, which uses generative AI for target identification; Chemistry42, which designs new molecules from scratch using generative AI; and inClinico, an AI clinical trial prediction engine. This platform already generated over 30 internal and many external preclinical and clinical stage therapeutic programs, where each one of them has a potential to become a medicine to help patients.

platform already generated over 30 internal and many external preclinical and clinical stage therapeutic programs

How does Insilico Medicine plan to contribute to the digital transformation of the healthcare industry in the region?

DR. ZHAVORONKOV: We have already attracted top tech talent from across the world who have relocated to the UAE to work with us, and we will continue this process as we expand our center and grow our influence in the region. Our Pharma.AI platform can be used by many local institutions enabling them to do target and biomarker discovery at scale. In this, and through our local partnerships, and involvement in major tech events in the region, we are contributing to the expansion of the larger ecosystem, and are part of the larger mission to create an AI pharma hub in Abu Dhabi.

What is the overall mission and vision of Insilico Medicine, and how does it align with the establishment of the AI drug discovery hub in Abu Dhabi?

DR. ZHAVORONKOV: Our mission is to extend healthy productive life for everyone on the planet, and we are driven by patient first relentless innovation. This dovetails with the UAE's vision to grow a competitive pharma AI hub in the region. Insilico wants its R&D center to be a leading site of innovation in this effort, providing expertise, and strategic partnership opportunities for academia, pharma and energy companies.

What are the expected benefits and outcomes of Insilico Medicine's presence in Abu Dhabi for the local healthcare industry and the region as a whole?

DR. ZHAVORONKOV: Generative AI is being adopted in nearly every industry and provides an opportunity for the region to quickly scale up and become a player in the biotech industry. While the Middle East does not have a record of pharmaceutical drug discovery and development, it does have extensive scientific and technological expertise, as well as partnership opportunities across government and academia. The LEAP tech conference and the Global AI Summit in Riyadh; and the Arab Health Conference in Dubai are indicative of the kind of momentum happening in the region.

With three AI-designed drugs in the clinic and an extensive pipeline of over 30 programs, Insilico is one of the leaders in AI drug discovery and can help guide and bring awareness to this next generation pharma AI hub in Abu Dhabi.

How does the combination of AI-driven drug discovery and quantum computing contribute to Insilico Medicine's research and development capabilities?

DR. ZHAVORONKOV: We recently published a breakthrough paper in the Journal of Chemical Information and Modeling, a peer-reviewed journal from the American Chemical Society, in which scientists successfully combined generative AI and quantum computing for small molecule design. To our knowledge, this is the first time scientists have systematically replaced every component of GAN with VCQ and successfully generated molecules. Building on these findings, we can move forward in integrating the hybrid quantum GAN model into our platform for even more accurate and efficient AI drug discovery.

Are there any specific initiatives or projects related to aging research and sustainable chemistry that Insilico Medicine plans to undertake in Abu Dhabi?

DR. ZHAVORONKOV: Yes, Insilico's scientists in Abu Dhabi are actively involved in cutting edge research related to both aging and sustainable chemistry. In terms of aging, scientists including Alex Aliper, President of Insilico and head of the R&D center in Abu Dhabi, are involved in collaborative work performing multi-omics-based analyses in the context of age-related diseases. As part of this effort, Insilico's UAE scientists led research using our AI platform to identify novel biomarkers stratifying cancer patients, published in the distinguished Nature journal Cell Death Disease.

And Insilico's Abu Dhabi team is also helping to uncover dual-purposed targets for aging and disease using its AI platform. Recently Abu Dhabi team has also applied the Pharma.AI platform to identify and validate therapeutic targets against one of the most devastating diseases: amyopathic lateral sclerosis (ALS). In terms of sustainable chemistry, as part of our memorandum of understanding with Aramco, we are developing AI-based models to accurately predict the chemical and physical properties of multi-component fuels and fuel additives and their combinations; deploying AI-based models to generate and screen the chemical space for compounds with desirable blending properties to fuels; and looking at how we can produce robust fuel-specific AI-compatible data at scale. This is an exciting new use for generative AI — one that could help greatly reduce the environmental impact of fuels.

How does Insilico Medicine plan to leverage its global infrastructure and connections to create a drug discovery hub in Abu Dhabi?

DR. ZHAVORONKOV: We leverage the power of global partnerships and specifically the power of China to accelerate drug discovery and development process. By outsourcing development and manufacturing to China we have effectively converted the "designed in California, made in China" model by Apple into "designed in Abu Dhabi, made in China" model by Insilico. We are actively looking to grow our R&D center in Abu Dhabi, attracting top tech talent to the region, sharing our discoveries and innovations at conferences, and attracting academic, business, and pharma partners to engage with us on using our evolving generative AI platform to further their own therapeutic and sustainability goals. We are also sharing our journey broadly with media and on social platforms, spreading the word about the amazing talent and opportunities in Abu Dhabi.

"designed in California, made in China" model by Apple into "designed in Abu Dhabi, made in China" model by Insilico Medicine

Genomics Initiatives in Abu Dhabi

Abu Dhabi has undertaken significant genomic initiatives aimed at leveraging genetic data to improve healthcare outcomes and promote precision medicine. The Emirati Genome Program is a notable national project that focuses on utilizing genomic data to enhance the health and well-being of the Emirati population. Through scientific research and profiling of gene sequencing among UAE nationals, the program aims to gain insights into genetic variations, disease risks, and personalized treatment approaches.

The genomic initiatives in Abu Dhabi are driven by a commitment to advance healthcare through cutting-edge technologies and research. They contribute to the overall development of the healthcare ecosystem, fostering collaboration among various stakeholders such as healthcare institutions, research organizations, and government entities.

Emirati Genome
emiratigenomeprogram.ae

Abu Dhabi has boldly taken the lead in a national initiative to establish a globally recognized genomics infrastructure. This endeavor is centered around the city's keen interest in advancing genomics studies and applications, a move designed to improve the health and wellbeing of its residents, boost the economic performance of the genomics sector, and place the city as a global research hub in this field. The ultimate goal of these efforts is to revolutionize healthcare delivery in Abu Dhabi, potentially reducing healthcare costs through prevention and precision medicine.

A crucial landmark in Abu Dhabi's genomics journey was the endorsement of the UAE Genomics Council in 2021 by His Highness Sheikh Mohammed bin Rashid Al Maktoum. The council, under the leadership of His Highness Sheikh Khaled bin Mohamed bin Zayed Al Nahyan, is tasked with regulating, supervising, and directing the implementation of the Emirati Genome Programme across the nation's healthcare system. Abu Dhabi's objective is to weave genomics into the healthcare network, thereby enabling the implementation of both therapeutic and preventive programs aimed at reducing the occurrence of genetic disorders, disabilities, and death rates.

The UAE Genomics Council shoulders multiple responsibilities. Among these are overseeing government genomics programs, suggesting suitable legislation to control the field, and managing data acquisition and storage. It also actively supports the development of innovative therapies for rare and chronic diseases, promotes technical training and postgraduate programs, and fosters partnerships with world-renowned technology companies to propel genomics research. These collective endeavors underscore Abu Dhabi's dedication to becoming a world leader in genomics and personalized medicine.

The Emirati Genome Program in Abu Dhabi is a trailblazing study that uses sophisticated DNA sequencing and artificial intelligence technologies to generate a thorough genomic dataset about Emiratis. The program's mission is to investigate the genetic composition of the population and cultivate a personalized and preventive healthcare system. With the sequencing of over 340,000 Emirati gene samples, the program is amassing a valuable Emirati Genome Reference. This will further our comprehension of rare genetic disorders and pave the way for the development of targeted treatments.

UAE Genome Strategy

EMIRATI GENOME
FUTURE OF OUR GENERATIONS

A NATIONAL PROGRAM TO BUILD WORLD-LEADING GENOMICS INFRASTRUCTURE IN THE UAE, WITH THE AIM OF ENHANCING THE HEALTH AND WELLBEING OF THE POPULATION

- Increasing the genomics industry's economic contribution
- Becoming a global research leader in genomics
- Reducing healthcare costs through prevention and precision medicine

"The Omics Center of Excellence offers 4,000 sqm of sample processing and sequencing labs, with cutting-edge automation, capable of sequencing 500,000 genomes annually." - Dr. Fahed Al Marzooqi, COO of G42 Healthcare

Abu Dhabi is collaborating with innovative companies to leverage data from the Emirati Genome Program, pushing the boundaries of preventative medicine. Mubadala and Resilience have partnered to create Advance Biopharma Manufacturing capabilities, which could produce gene therapies. These joint efforts aim to translate genomics research into practical healthcare solutions and contribute to Abu Dhabi's economic growth.

To extract the full value of genomics, Abu Dhabi has instituted a comprehensive genomics policy, maintaining laws, policies, and guidelines to support research and applications. The city acknowledges the need for a sturdy infrastructure and culturally sensitive approach to integrating genomics into the healthcare system effectively.

Key organizations in Abu Dhabi's genomics initiatives include the Ministry of Health and Prevention (MoHAP), the Department of Health (DoH), and the Abu Dhabi Executive Office (ADEO). MoHAP and DoH have launched the National Genome Program, while ADEO regulates and oversees the Emirati Genome Program's implementation. ADEO ensures ethical practices and data security, promoting responsible use of genomics information.

The G42 Omics Center of Excellence plays a pivotal role in Abu Dhabi's genomics initiatives. As a participant in the Emirate Genome Program, the center has sequenced over 340,000 genomes, establishing Abu Dhabi as a global leader in genomics. Khalifa University has contributed by completing a population-specific Major Allele Reference Genome for the UAE population. NYU Abu Dhabi has supported research on applying genome science in cancer treatment.

Abu Dhabi's sequencing capacity and vast genomic database position it as a global frontrunner in genomics research. Genomics will play a vital role in identifying genetic risk factors, designing targeted interventions, and developing precision medicines.

Pharmacogenomics has enormous potential to optimize therapeutic outcomes based on individual genetic profiles.

Abu Dhabi's genomics initiatives demonstrate its commitment to innovation, transforming healthcare, and elevating residents' health and wellbeing. The city aims to stimulate the growth of the genomics industry and establish itself as a global research leader. With ongoing programs and the UAE Genomics Council's support, Abu Dhabi is making significant progress in personalized medicine, prevention, and precision healthcare, setting new global standards in genomics.

Main players in the Genomic Initiatives in the UAE

State Institutions

وزارة الصحة و وقاية المجتمع
MINISTRY OF HEALTH & PREVENTION

دائرة الصحة
DEPARTMENT OF HEALTH

مكتب أبوظبي التنفيذي
ABU DHABI EXECUTIVE OFFICE

EMIRATI GENOME
FUTURE OF OUR GENERATIONS

Private Entities

M42 G42 Healthcare

Universities

جامعة خليفة
Khalifa University

جامعة نيويورك ابوظبي
NYU ABU DHABI

UAEU
جامعة الإمارات العربية المتحدة
United Arab Emirates University

Dr. Stephen R. Grobmyer

Medical Oncology & Hematology, Oncology Institute – Cleveland Clinic Abu Dhabi

Can you provide an overview of the Genome Program and Cleveland Clinic Abu Dhabi's involvement in it?

DR. GROBMYER: The Emirati Genome Project (EGP) is an initiative in the UAE to collect blood samples and perform whole genome sequencing on all Emirati nationals. There are three flagship programs within the EGP: 1) rare and metabolic diseases, 2) oncology, and 3) pharmacogenomics. Cleveland Clinic Abu Dhabi has had the privilege of leading the flagship program #2 (oncology) of the Emirati Genome Project for the last three years in collaboration with partners from the Department of Health– Abu Dhabi and other local and regional partners.

How does Cleveland Clinic Abu Dhabi contribute to the Genome Program in terms of research, technology, and expertise?

DR. GROBMYER: Cleveland Clinic Abu Dhabi has a growing oncology program at the new Fatima bint Mubarak Center designed to provide the highest standard of multidisciplinary oncology care to patients. Genomics is now and will continue to be a critical component of cancer diagnosis and care. Our multidisciplinary teams are providing expertise on the implementation of genomic medicine in oncology and sharing best practices on the use of genomic information in clinical decision making. Our program is establishing standards for genomic counseling and reporting of genomic information to patients and caregivers. Finally, we are leveraging the Emirati Genome Project to enable research that will define the future of oncology care for patients in the region and beyond.

Can you share any notable discoveries or advancements that have been made through the Genome Program, thanks to the involvement of Cleveland Clinic Abu Dhabi

DR. GROBMYER: We completed a pilot of germline genetic testing for patients using data and information collected via the Emirati Genome Project. We have successfully shown the power of the Genome Project as a cost-effective resource to improve and streamline oncology patient care.

We are currently investigating the pattern of germline genetic mutations among the Emirati population with breast and ovarian cancer. This critical information, we believe, will help inform the next generation of diagnostic tests and interventions to reduce the burden of breast cancer and other related diseases in the UAE.

How does Cleveland Clinic Abu Dhabi collaborate with other institutions or organizations involved in the Abu Dhabi Genome Program to ensure the success of the initiative?

DR. GROBMYER: There is an incredible spirit of collaboration and optimism among those with whom we are partnering with to advance the Emirati Genome Project and optimize its impact. We share a collective vision about the tremendous potential of this work in improving healthcare and reducing the burden of cancer in the UAE and beyond. Our incredible partners in this journey include the Department of Health – Abu Dhabi and M42, with the National Reference Laboratory being key from within the Mubadala Health network. We have regular meetings to discuss opportunities and challenges and to chart the way forward. We have been actively collaborating on building and executing on clinical pathways for genomic medicine and research.

Looking ahead, what are the future prospects and plans for Cleveland Clinic Abu Dhabi's involvement in the Genome Program?

DR. GROBMYER: We are very optimistic about the Emirati Genome Project and its potential to reduce the incidence of cancer and improve the care of those diagnosed with cancer. Identification of patients and families with highly penetrant gene mutations will allow us to implement risk reduction and enhanced screening programs. Widespread utilization of genomic information will help us improve treatments for oncology patients. Finally, continued research into genomics will allow us to offer novel clinical trials and conduct research to lead the development of next generation of treatments for cancer that has the potential to impact patients in the region and beyond.

Interview with Thomas Launey

Acting Chief Researcher VP Molecular Biotech & Genomics Biotechnology Research Center

The establishment of the Biotechnology Research Center within Technology Innovation Institute serves as a crucial endeavor in advancing research and development in various emerging fields of biotechnology, aligning with national research priorities. With a strong emphasis on improving healthcare outcomes, the BRC leverages molecular and genomic strategies to pave the way for advancements in personalized medicine. Leveraging the latest advancements in molecular, cellular, and digital technologies, the BRC aims to cultivate expertise and promote biotechnological independence within the Emirates.

Biotechnology Research Center
www.tii.ae/biotech

Thomas Launey

Acting Chief Researcher
VP Molecular Biotech & Genomics
Biotechnology Research Center

As the driving force behind the development of Abu Dhabi's R&D ecosystem, can you elaborate on the strategies you employ to promote scientific discoveries and technological advancements?

MR. LAUNEY: Since the creation of the TII-Biotech Research Center, a year ago, we have been very active in our effort to engage with diverse partners: in ministries and other government entities, in major academic research entities, in hospitals, and in industry. Further, the mandate from our leadership, H.E. Faisal Al Bannai, is to ensure that every research project initiated by TII addresses a locally relevant need, whether it is in healthcare, food security or pharma. Because the benefits are obvious to the stakeholders, it is easier to engage with them and establish a shared commitment to the project's success.

What specific initiatives have you implemented to foster collaboration between the Biotechnology Research Center and other research institutions within Abu Dhabi and beyond?

MR. LAUNEY: Aspire is playing a central role by engaging biotech/healthcare stakeholders through workshops, with a very successful Future of Health seminar in May. TII is also sponsoring of international conference, in the UAE and abroad while BRC has been active in initiating collaborations with all major Abu Dhabi/UAE universities and with prominent academic partners in Europe, in Asia and in north America.

How do you ensure that the Biotechnology Research Center aligns with the broader goals and priorities of the Technology Innovation Institute?

MR. LAUNEY: The ATRC/TII is a tight knit community, with intensive and sustained communication both between research center and with the TII/ATRC leaderships. All projects are validated by leadership in a quick and efficient way, usually after a single presentation meeting.

Could you share some notable achievements or breakthroughs that have emerged from the research conducted at the Biotechnology Research Center?

MR. LAUNEY: BRC is still in its first year of existence and is currently concentrating on building its 3000 sqm facility with cGMP labs and advanced manufacturing and automation. In parallel, we are finalizing our national and international partnerships agreements, so we expect all use cases to proceed quickly once our facility is functional.

What measures do you take to attract top talent and researchers to the Biotechnology Research Center? How do you ensure a nurturing and conducive environment for their work?

MR. LAUNEY: For the first round of recruitment in BRC, we mostly targeted seasoned professionals with their own professional network which gave us access to a broad pool of talented candidates. One of the additional benefit of working on R&D is that the objectives are tangible products and the timelines short so the communication is clear. We also insist on fostering fairness and encouraging all members to freely collaborate within TII, with the only guiding principle being that it is beneficial for TII and Abu Dhabi.

BRC is still in its first year of existence and is currently concentrating on building its 3000 sqm facility with cGMP labs and advanced manufacturing and automation.

Can you discuss the impact and outcomes of the grant funding programs, such as to not restrict the ASPIRE Award for Research Excellence, specifically targeting health innovators? How have these programs contributed to the overall advancement of healthcare in Abu Dhabi?

MR. LAUNEY: While Aspire is part of ATRC/TII, our funding does not depend on Aspire. Aspire, as the program development and external competition funding arm of ATRC. Aspire ensures that it's funding programs are complementary to the TII Centers' research objectives, focus areas, and desired outcomes.

Can you elaborate on the long-term vision and goals for the Biotechnology Research Center and how it contributes to the overall development of the biotechnology sector in Abu Dhabi?

MR. LAUNEY: TII is the conduit between academia and industry, to train high level professionals and to create IP that can be licensed locally to foster the development of the Healthcare/biotech ecosystem. This is designed to lead to critical mass in biotechnology, with research centers, suppliers, advanced manufacturing, universities, regulatory entities and pharmaco thus creating a self-sustained attractive environment for biotechnology R&D and market commercialization in the UAE, and a regional technology hub.

What steps do you take to foster an entrepreneurial and innovative culture within the Biotechnology Research Center, encouraging researchers to explore commercialization opportunities for their discoveries?

MR. LAUNEY: IP creation and commercialization are at the core of every project creation at TII. For all members of BRC, in addition to recognized scientific expertise in specific domains of biotechnology and healthcare, we also select candidate based on prior experience in IP creation, entrepreneurship, or applied innovation.

There is also a lot of experience sharing toward the junior members of BRC, from experienced professional in IP research and commercialization. In an environment where experts both Aspire and TII Legal department are readily available, the learning curve is steep but the environment is very supportive.

How do you engage with local and international scientific communities to stay at the forefront of emerging trends and advancements in biotechnology research?

MR. LAUNEY: Because TII-BRC hire both nationally and internationally, we are already part of many scientific communities, in many fields and on several continents. Members are encouraged to attend major events in their area of expertise and to proactively engage with major players. TII also has a policy to involve international advisors to provide feedback and independent evaluation and advices on use cases. They may also help to identify additional key partners with unique innovative technologies. Both nationally and internationally, we fully understand the benefits of a strong network.

In your role as an overseer of the Biotechnology Research Center, how do you ensure that the research conducted aligns with the broader economic and societal needs of Abu Dhabi and the UAE as a whole?

MR. LAUNEY: We are in the privileged situation of being encouraged by our leadership to directly engage with stakeholders, and that the goodwill already created by ATRC, TII and Aspire gives us the opportunity to regularly consult ministries as well as major entities in healthcare and technology.

These actors are well aware of the TII's mission to create innovative solutions that will benefit all and we have found many partners willing to work with us to shape a better future.

Technology Innovation Institute Research

Bio-Medicine

Our research targets solutions in disease detection and new therapeutic fields by addressing existing and future challenges in research domains such as:

- Medical Imaging
- Wearable Technology and Biosensors
- Machine Learning for Health

Bio-Robotics and Nano

Our research is developing new technologies to imitate and augment biological systems and to e.g. introduce new diagnostic and therapeutic delivery mechanisms. Research domains include:

- Medical Robotics
- Nano- and Micro-Robotics
- Bio-Robotics

Bio-Informatics

Our research focuses on development of tools and analytical pipelines aiming to provide solutions to biological problems across a wide range of topics including medical imaging, healthcare, biomolecular and environmental biotechnology. Research domains include:

- Computational Biology
- Statistics/Data Analysis
- Bio-Informatics for Omics Data

Molecular Biotech and Genomics

To address questions of what molecular changes result in disease, add to food security, or can be utilized to develop new biomaterials we research biochemical, genetic and cell biology techniques, pharmacology and bioinformatics. Research domains include:

- Human Genetics and Genomics
- Bioengineering of plants and organisms
- Cloning and Synthesis
- Biomaterials

Environmental Biotech

Our research will lead to the development of innovative drugs, environmentally safe novel pesticides and agricultural techniques, more efficient desalination methods and give a better understanding of the regional biodiversity. We are using biochemistry, microbiology, synthetic biology and AI/ML to optimize the research-to-industry pipeline. Research domains include:

- Agritech
- Ecosystems and Cultures
- Biodiscovery and Biobank
- Desalination and Water Processing

Source: Technology Innovation Institute website www.tii.ae

Interview with Dr. Yendry Ventura Carmenate

CEO, Abu Dhabi Stem Cells Center

Abu Dhabi Stem Cells Center (ADSCC) is a pioneering healthcare facility located in Abu Dhabi, United Arab Emirates. It is dedicated to the advancement of cell therapy and regenerative medicine techniques, as well as conducting groundbreaking research in the field of stem cell and cellular therapies within the region. Established in March 2019, ADSCC was created in response to the increasing need for specialized medical services and treatments in the UAE and the broader region. ADSCC is committed to staying at the forefront of scientific advancements in cell therapy and regenerative medicine, with the goal of improving patient outcomes and meeting the evolving healthcare needs of the community.

Abu Dhabi Stem Cells Center
adscc.ae

Dr. Yendry Ventura Carmenate

CEO, Abu Dhabi Stem Cells Center

Can you tell us about the current advancements in stem cell research and regenerative medicine that the Abu Dhabi Stem Cell Center is involved in?

DR. VENTURA: Stem cells are undifferentiated cells that have the unique ability to develop into different cell types in the body. Stem cell research is an exciting field that explores the potential of stem cells to treat various diseases and regenerate damaged tissues. At ADSCC we aim to harness their potential and bring basic and transitional research discovery to the bedside. Some of the recent research areas we have been focusing on include:

1 DISEASE MODELING AND DRUG TESTING:

Researchers have been using stem cells to model diseases in the laboratory. By creating disease-specific stem cells, scientists can better understand the underlying mechanisms of various disorders, test potential drugs, and develop personalized treatment approaches.

2 TISSUE ENGINEERING AND REGENERATION:

Stem cells have the potential to regenerate damaged tissues and organs. Researchers have made progress in using stem cells to repair or replace injured or diseased tissues, nerve cells, cartilage, and bone. This holds promise for the treatment of conditions neurological diseases, osteoarthritis, and more.

3 STEM CELL-BASED THERAPIES:

Stem cells are being investigated for their potential use in treating a wide range of diseases. For example, hematopoietic stem cell transplantation (HSCT) is an established therapy for certain blood disorders and cancers. Additionally, ongoing research explores the use of stem cells to treat conditions like Parkinson's disease, diabetes, Alzheimer's disease, and autoimmune disorders.

4 INDUCED PLURIPOTENT STEM CELLS (IPSCS):

iPSCs are adult cells that have been reprogrammed to an embryonic-like state, allowing them to differentiate into various cell types.

This breakthrough has opened new avenues for personalized medicine, as iPSCs can be derived from a patient's own cells, reducing the risk of immune rejection when used for transplantation.

What is the significance of conducting Phase I/II clinical studies of extracorporeal photopheresis for the treatment of multiple sclerosis?

DR. VENTURA: The incidence and prevalence of multiple sclerosis (MS) are on the rise globally, and this trend is more notable in the Gulf Region of the Middle East. Although MS epidemiology is well studied in the West, there are only a few publications regarding the prevalence of MS in the UAE. One study, conducted in a single hospital in Dubai, revealed a higher-than-expected prevalence among the Emirati population and described Dubai as "medium to high risk" for developing MS. Another study in Abu Dhabi showed a moderate prevalence of approximately 64/100,000 (age-standardized), which is almost double the global average.

Although Multiple Sclerosis epidemiology is well studied in the West, there are only a few publications regarding the prevalence of MS in the UAE.

Conducting an earlier phase clinical trial like PHOMS (Randomized, controlled, open-label study evaluating the safety and efficacy of Extracorporeal Photopheresis (ECP) in the treatment of Multiple Sclerosis) will shed light on the immunomodulatory effects of ECP, its safety, and preliminary efficacy profiles in this disabling disease.

How are CAR T-cells being generated, and what evaluations are being done to assess their effectiveness and safety in treating hematologic cancers?

DR. VENTURA: We have finalized the platform that will be used to manufacture the CAR-T cells. The solutions that we are investigating are currently commercially available in the USA and other countries. With regards to effectiveness, we will use the preclinical data that has been generated by the companies that define the efficacy in target selection, robustness of tumor lysis by the modified T-cell, and specificity of target. The safety will include preclinical data on off-target effects, multiplicity of infection, percent of T-cells transduced or transformed, cell dose, sterility, endotoxin burden, persistence of the modified T-cell, and clinical response. When we look at clinical response there are several parameters to consider including the percentage of patients that can be categorized as Complete Remission (CR), Partial Remission (PR), Progression of Disease (PD) and No Response (NR). Clinically we will also be collecting data that looks at the side effects of treatment. These will be measured as Adverse Events (AE). AEs can be categorized on several scales to indicate how severe the event is and if it is related to the therapy, related to the disease or not related to the disease or the therapy. All of the parameters for these studies will be outlined in a clinical trial that will be submitted to the DOH for review and approval.

What are the immunomodulatory effects of Extracorporeal Photopheresis (ECP), and how have they been effectively used to treat conditions similar to Multiple Sclerosis (MS)?

DR. VENTURA: Great advances have been made in the development of drugs that are therapeutically beneficial in active MS, resulting in the introduction of different Disease Modifying Therapies (DMT) approved for clinical use. In contrast, there is a need for novel approaches that stabilize the disease course in patients with MS without imposing undue risks.

The efficacy and safety of ECP in MS have been explored in a small, pilot, controlled, and uncontrolled clinical trials with inconclusive results but with evidence of good safety and efficacy of the treatment, which is proposed as a therapeutic alternative in the subgroup of patients not responsive to or not eligible for traditional immunomodulating treatments.

With careful patient selection and optimal care, autologous Hematopoietic Stem Cell Transplantation has also produced outcomes not yet achieved with conventional Disease Modifying Therapies.

Based on this and its favorable safety profile (in MS and other conditions), the evidence suggests that ECP might be effective in MS treatment when administered using a more frequent and prolonged schedule than that used in previous studies. In the case of acute and chronic graft-versus-host disease (aGvHD, cGvHD), ECP has emerged as an accepted therapy (in the absence of immunosuppression) for steroid-refractory GvHD. Several mechanisms have been involved, including the apoptosis of alloreactive lymphocytes and differentiation of dendritic cells, while the current data suggests the triggering of an immune tolerance due to the generation of regulatory T-cells.

Can you elaborate on the plans to introduce autologous hematopoietic stem cell transplantation (AHSCT) as a standard of care for relapsing-remitting MS patients?

DR. VENTURA: Recent guidelines by American Society of Transplant and Cellular Therapy (ASTCT) have recommended autologous HSCT as standard of care, clinical evidence available, for treatment of refractory relapsing MS with high risk of future disability. Similarly, the EBMT has recommended the use of AHSCT as standard of care for patients with highly active RRMS failing at least one DMT.

Currently, the optimal conditioning regimen in terms of safety and efficacy is unknown. We will be using the most recognized and utilized regimen cyclophosphamide/ATG, in terms of safety and efficacy.

Autologous hematopoietic stem cell transplantation (HSCT) is a one-time immune-based treatment for relapsing remitting multiple sclerosis (RRMS) after which all disease modifying therapy (DMT) and immune-based therapies are discontinued.

Autologous hematopoietic stem cell transplantation (HSCT) in patients with active relapsing remitting multiple sclerosis (RRMS) halts disease progression, improves neurologic disability and quality of life, and provides a prolonged drug-free remission.

In comparison, with a few exceptions, regular DMTs must be taken on a continuous and chronic basis making MS the second most-expensive chronic disease for the health care system.

Autologous HSCT decreases annualized relapse rate (ARR) and time to disability progression, which are the most used outcome measures in clinical trials of MS.

With careful patient selection and optimal care (including mobilization regimen, conditioning regimen, plus post-transplant surveillance), autologous HSCT has also produced outcomes not yet achieved with conventional DMTs.

This includes:

- Prolonged absence of clinical disease activity, defined as no evidence of disease activity (NEDA).
- Reversal of neurologic disability defined as a decrease in the Expanded Disability Status Scale (EDSS) by at least 1.0 point (not achieved by any other current treatments available)
- Improvement in quality of life (QOL)
- Liberation from long-term use of DMT drugs.
- Health economics suggests it to be a more cost-effective current treatment strategy.
- Some expat community patients in our region may be helped with this mode of treatment due to socioeconomic factors and achieve long term overall benefits.

Thus, we propose that patients who have active relapsing remitting MS and eligible for AHSCT should be offered AHSCT as standard of care option, especially if they have failed at least one disease modifying treatment (does not have to be a high efficacy drug). The results of recent MS base propensity study did not find AHSCT inferior to the current most effective treatment option (Ocrevus) and in comparison, to others, of superior efficacy.

What are the future goals of the Abu Dhabi Stem Cell Center in terms of treating autoimmune diseases, including MS, through a combination of stem cells and extracorporeal photopheresis?

DR. VENTURA: Stem cell therapy has shown potential in the treatment of autoimmune diseases. In the case of MS, researchers have investigated the use of hematopoietic stem cell transplantation (HSCT). HSCT involves the transplantation of the patient's own stem cells after high-dose chemotherapy to eliminate the faulty immune cells responsible for attacking the central nervous system. This approach aims to "reset" the immune system and promote the regeneration of damaged tissue. We have successfully transplanted MS patients (number) with an impressive improvement in their symptoms. We are also exploring the use of HCST in another autoimmune diseases like systemic sclerosis.

Other types of stem cells (mesenchymal stem cells) I are currently being explored to be used in treating autoimmune diseases like refractory cases of rheumatoid arthritis.

Extracorporeal Photopheresis (ECP): ECP is a therapeutic procedure that involves removing a patient's blood, exposing it to a photosensitizing agent, and then irradiating it with ultraviolet light. This process is thought to modulate the immune system by inducing apoptosis (cell death) in immune cells and stimulating anti-inflammatory responses. ECP has been used in the treatment of various autoimmune diseases like MS and graft-versus-host disease (GVHD).

Primary immunodeficiency disorders are being diagnosed with precision with the advent of next generation sequencing. Today, diseases like severe combined immunodeficiency and phagocyte disorders can now be successfully cured by hematopoietic stem cell transplantation due to early and rapid diagnosis. The ADSCC offers allogeneic hematopoietic stem cell transplantation for such patients. The absence of a matched donor for a HSCT is no longer a barrier for curative treatment. The ADSCC has the capabilities for both T-cell deplete and T-cell replete allogeneic transplants.

How do you ensure the safety and ethical considerations in the research and clinical studies conducted at the center?

There are several aspects we take into consideration to ensure the safety and ethical issues in research involving humans as subjects in clinical studies conducted at the Abu Dhabi Stem Cells Centre:

1. We have a research policy focalized on the center's scope and quality assurance of the research project's elaboration, including remarks about protecting patients' rights and using stem cells approved by the DOH regulations and institutional standards.
2. We have an established Research Ethics Committee (REC) as Institutional Review Board (IRB) integrated by basic researchers, clinical staff, like medical doctors with scientific formation as Ph.D./M.Sc./Consultant Specialist in different clinical specialties, and a senior nurse, all with DOH registered licenses, who have signed the REC DOH undertaken letter and all have been Certified by the "Protecting Human Research Participants Online Training" by the US National Institutes of Health (NIH) platform, and also have been certified for Good Clinical Practice (GCP) and/or Good Clinical Laboratory Practice (GCLP), plus a lay member representing the community.
3. All research projects submitted to our REC by Principal Investigators (PI) and their research team have been reviewed, criticized, and improved with the participation of the IRB/REC members because we follow our REC Standard Operations Procedures, and of the most critical aspects of those evaluations are the research methodology and the informed consent forms elaborated for each of the projects.
4. We can confirm that the REC is committed to the quality assurance of the research process and the protection of patients' rights as established by the World Medical Association (WMA) Helsinki Declaration. Nevertheless, we need to continue educating all our staff in those aspects that can affect ethical behavior in research, regularly monitoring all research projects in execution, receiving/answering questions from patients or their legal representatives, and avoiding external and internal pressures that can affect the quality of the REC work.

Can you describe the process of participant enrollment for clinical studies? What criteria are used to select eligible participants?

DR. VENTURA: MS outpatients seen or referred to ADSCC shall be eligible to participate in the PHOMS Study. Neurologists in charge of MS patient care contact the prospective subjects and thoroughly explain the Study and implications of participating, and if the patient meets the inclusion/exclusion criteria and the informed consent is signed on the trial consent form, he/she will be declared as a recruited PHOMS Study patient and an electronic system allocates the patient to the ECP arm or the control arm.

The solicitation to participate will be done by face-to-face interaction with the patient, and no legal representative can agree on the patient's participation in the Study (except for illiterate patients). The complete eligibility criteria are publicly available at ClinicalTrials.gov ID with the identifier NCT05168384.

What are the major challenges or obstacles faced in the development and implementation of advanced cellular therapies in your research and clinical studies?

DR. VENTURA: Establishing high-quality manufacturing standards is a significant challenge for advanced therapies due to potential and known risks. Several challenges specific to advanced therapy clinical development include that most common animal models are unsuitable for preclinical studies, limiting preclinical data to guide clinical trials with robust designs. Other obstacles include the need for healthy volunteers and the approach to rare or orphan diseases. Finally, the processing costs are also elements to be considered, as manufacturing advanced cell therapies (e.g., CAR T-cell therapies) is notably expensive. The ability to use stem cells to treat/cure a disease where there is no internationally approved clinical cellular product. The challenge is there needs to be a path where doctors can prescribe a cell dose for patients to treat disease on a case-by-case basis. Currently without a clinical trial there is no path forward.

What are the major challenges or obstacles faced in the development and implementation of advanced cellular therapies in your research and clinical studies?

DR. VENTURA: Establishing high-quality manufacturing standards is a significant challenge for advanced therapies due to potential and known risks. Several challenges specific to advanced therapy clinical development include that most common animal models are unsuitable for preclinical studies, limiting preclinical data to guide clinical trials with robust designs. Other obstacles include the need for healthy volunteers and the approach to rare or orphan diseases. Finally, the processing costs are also elements to be considered, as manufacturing advanced cell therapies (e.g., CAR T-cell therapies) is notably expensive. The ability to use stem cells to treat/cure a disease where there is no internationally approved clinical cellular product. The challenge is there needs to be a path where doctors can prescribe a cell dose for patients to treat disease on a case-by-case basis. Currently without a clinical trial there is no path forward.

Are there any plans to expand the range of diseases or conditions being targeted for treatment using stem cells and cellular therapies in the future?

DR. VENTURA: Using the healing power of stem cells in an approved setting is becoming much more common. As example we have standard operating procedures established to manufacture Mesenchymal Stem Cells from several sources (adipose tissue, umbilical cord and bone marrow). These cells will be used for neurologic disease, orthopedic disease, autoimmune disease and autism. These are just a few of the planned uses of stem cells. We will also be transferring Induced Pluripotent Stem Cells (iPSC) from one of our academic partners to ADSCC. Clinical trials using iPSCs will be forthcoming for diseases such as Parkinson, Amyotrophic Lateral Sclerosis (ALS) and others. The UAE should plan on being part of the stem cell revolution that is happening globally.

Can you discuss any recent breakthroughs or exciting discoveries made by the Abu Dhabi Stem Cell Center in the field of stem cell research?

DR. VENTURA: After its inauguration in 2019, ADSCC designed a unique methodology for applying Autologous Non-Hematopoietic Peripheral Blood Stem Cells (UAE Cell 19) via nebulization. This work, conducted during the COVID-19 pandemic, resulted in a patent granted by the International Centre for Patent Registration of the UAE Ministry of Economy, along with three copyrighted Works of Science on treatment procedure recommendations, characterization of a method to harvest the stem cells, and the cell obtaining procedure. These IP-protected works were registered by the European INTEROCO Copyright Office (Germany).

Moreover, due to the advances in Hematopoietic Stem Cells Transplantation since 2020, ADSCC implemented the first Bone Marrow Transplantation Program (AD-BMT) in the UAE, completed a GMP facility for manufacturing advanced cellular products, and recently received the "Centre of Excellence" accreditation from the Department of Health (DOH) of Abu Dhabi.

How does the Abu Dhabi Stem Cell Center ensure that the knowledge and findings from its research are effectively translated into clinical practice and benefit patients?

By the time a drug or an investigational treatment reaches the market, an average of 12-13 years will have elapsed since the first proof of concept. However, depending on the outcomes of the PHOMS Study, evolving DOH mechanisms for accelerating the next phases of clinical trials should be required or benefit other patients under strategies such as "compassionate use." Once completed a required phase III trial, DOH shall review the evidence within a legal framework to support the use of ECP on MS and may grant a license or marketing authorization based on its quality, safety, and efficacy criteria.

List of Entities

Governmental Entities

Logo	Company Name	Website
مكتب أبوظبي للاستثمار ABU DHABI INVESTMENT OFFICE	Abu Dhabi Investment Office	www.investinabudhabi.ae
ADGM AN INTERNATIONAL FINANCIAL CENTRE	Abu Dhabi Global Market	www.adgm.com
ADVANCED TECHNOLOGY RESEARCH COUNCIL	Advanced Technology Research Council	www.atrc.ae
دائرة الصحة DEPARTMENT OF HEALTH	Department of Health	www.doh.gov.ae
مجموعة كيزاد KEZAD GROUP	Khalifa Industrial Zone Abu Dhabi	www.kezadgroup.com
MASDAR CITY	Masdar City	www.masdarcity.ae
UNITED ARAB EMIRATES MINISTRY OF HEALTH & PREVENTION	Ministry of Health and Prevention (MoHAP)	www.mohap.gov.ae
UNITED ARAB EMIRATES MINISTRY OF INDUSTRY & ADVANCED TECHNOLOGY	United Arab Emirates Ministry of Industry & Advanced Technology	www.moiat.gov.ae
وزارة الصحة ووقاية المجتمع MINISTRY OF HEALTH & PREVENTION	United Arab Emirates Ministry of Health and Prevention	www.mohap.gov.ae

Sovereign Wealth Funds (SWFs)

Logo	Name of Institution	Website
ADIA	ADIA	www.adia.ae
ADQ	ADQ	www.adq.ae
MUBADALA	Mubadala	www.mubadala.com

Logistics Support

Logo	Name of Institution	Website
ABU DHABI PORTS	Abu Dhabi Ports	www.adports.ae
الاتحاد ETIHAD CARGO	Etihad Cargo	www.etihadcargo.com
بوابة المقطع MAQTA GATEWAY	Maqta Gateway	www.maqta.ae
رافد Rafed	Rafed	www.rafeduae.ae
SKY CELL	SKY CELL	www.skycell.ch

Research, Laboratories and Pharmaceuticals

Logo	Name of Institution	Website
	ABU Dhabi International Medical Services	www.adi.ae
	Abu Dhabi Medical Devices Company	www.admd.ae
	Abu Dhabi Stem Cell Center	www.adscc.ae
	ADCAN Pharma	www.adcanpharma.ae
	Aster Pharmacy	www.asterpharmacy.ae
	AstraZeneca	www.astrazeneca.com
	Capital Health Screening Centre	www.capital-health-screening-centre-for-visa.business.site
	Hayat Biotech	www.hayatbiotech.com
	Health First Pharmacy	www.healthfirst.ae
	Imperial College London Diabetes Centre	www.icldc.ae
	Julphar Gulf Pharmaceutical Industries	www.julphar.net
	MPC Healthcare	www.mpchealthcare.com
	National Reference Laboratory	www.nrl.ae
	Neopharma	www.neopharma.com
	PharmaLink	www.pharmalink.es
	Pharmax Pharmaceuticals	www.pharmax.ae
	Planet Pharmacies	www.planetme.ae
	Technology Innovation Institute	www.tii.ae

Hospitals

Logo	Name of Institution	Website
	Cleveland Clinic Abu Dhabi	www.clevelandclinicabudhabi.ae
	Healthpoint	www.healthpoint.ae

	Johns Hopkins Medicine	www.hopkinsmedicine.org
	King's College Hospital London	www.kingscollegehospitaldubai.com
	Mayo Clinic	www.mayoclinic.org
	Mediclinic	www.mediclinic.ae
	Moorgields	www.moorfields.ae
	NMC Healthcare	www.nmc.ae
	PureHealth	www.purehealth.ae
	SEHA	www.seha.ae
	UEMedical	www.uemedical.ae
	VPS Healthcare	www.vpshealth.com

Universities

Logo	Name	Website
	Abu Dhabi University	www.adu.ac.ae
	Al Ain University	www.aau.ac.ae
	Emirates College of Technoligy	www.ect.ac.ae
	Higher Colleges of Technology	www.hct.ac.ae
	INSEAD	www.insead.edu
	Khalifa University	www.ku.ac.ae
	Mohamed bin Zayed University of Artificial Intelligence	www.mbzuai.ac.ae
	New Yourk University Abu Dhabi	www.nyuad.nyu.edu
	Sorbonne University Abu Dhabi	www.sorbonne.ae
	UAEU	www.uaeu.ac.ae
	Zayed University	www.zu.ac.ae

Companies

Company Name	Website	Startup type
88 Mind	www.get88mind.com	Mental Health
Abu Dhabi Telemedicine Centre	www.telemed.ae	TeleHealth
Algocyte	www.algocyte.uk	Personalized Medicine
ALLIANCE CARE TECHNOLOGIES INTERNATIONAL LIMITED	www.alliancecaretech.com	Digital Health
Alma Health	www.almahealth.io	Digital Health
ALOTEB LTD	www.aloteb.com	Health Product
ARISHI LIMITED	www.arishi.agency	Digital Health
ASTRA TECH LTD / RIZEK LTD	www.rizek.com	Digital Health
AUMET LTD	www.aumet.com	Digital Health
Cardio Diagnostics	www.cardiodiagnostics.net	Digital Health
CELLCOLABS CLINICAL LIMITED	www.cellcolabs.com	BioTech
CIBA HEALTH LTD	www.cibahealth.com	Digital Health
CURE SHOP LIMITED	www.cureshop.com	Wellbeing and Wellness
DarDoc	www.dardoc.com	TeleHealth
Dawn Health	www.dawnhealth.com	Digital Health
DAWSAT LTD	www.dawsat.com	Wellbeing and Wellness
DENDRYTE LTD	www.e-dendrite.com	Digital Health
DENTACARTS HOLDINGS LTD	www.dentacarts.com	Dental
Dental ID	www.dentalid.app	Dental
DEPtech AD	www.deptech.hypotheses.org	BioTech
DOBRAIN DATA LAB LIMITED	www.dobrain.us	Wellbeing and Wellness
Doctoori Connect Limited	www.doctooriconnect.com	TeleHealth
DoctorsAE	www.doctorsae.com	TeleHealth
DR ONCALL LTD	www.droncall.com.au	TeleHealth
Exsurgo	www.exsurgo.com	Health Product
FITTIAPP LTD	www.fitticoin.com	Wellbeing and Wellness
G42	www.g42.ai	Research
GETBEE LTD	www.getbee.com	Digital Health
GLYCANAGE LTD	www.glycanage.com	Personalized Medicine
HELPWEAR LTD	www.helpwear.ca	Digital Health
Housecall	www.housecall.ae	TeleHealth
I.T FLAKES LIMITED	www.dok32.com	Digital Health
IHEALTHSCREEN LTD	www.ihealthscreen.org	TeleHealth
INCLUSIVE LTD	www.iminclusive.com	InclusiveTech
Insilico Medicine	www.insilico.com	BioTech

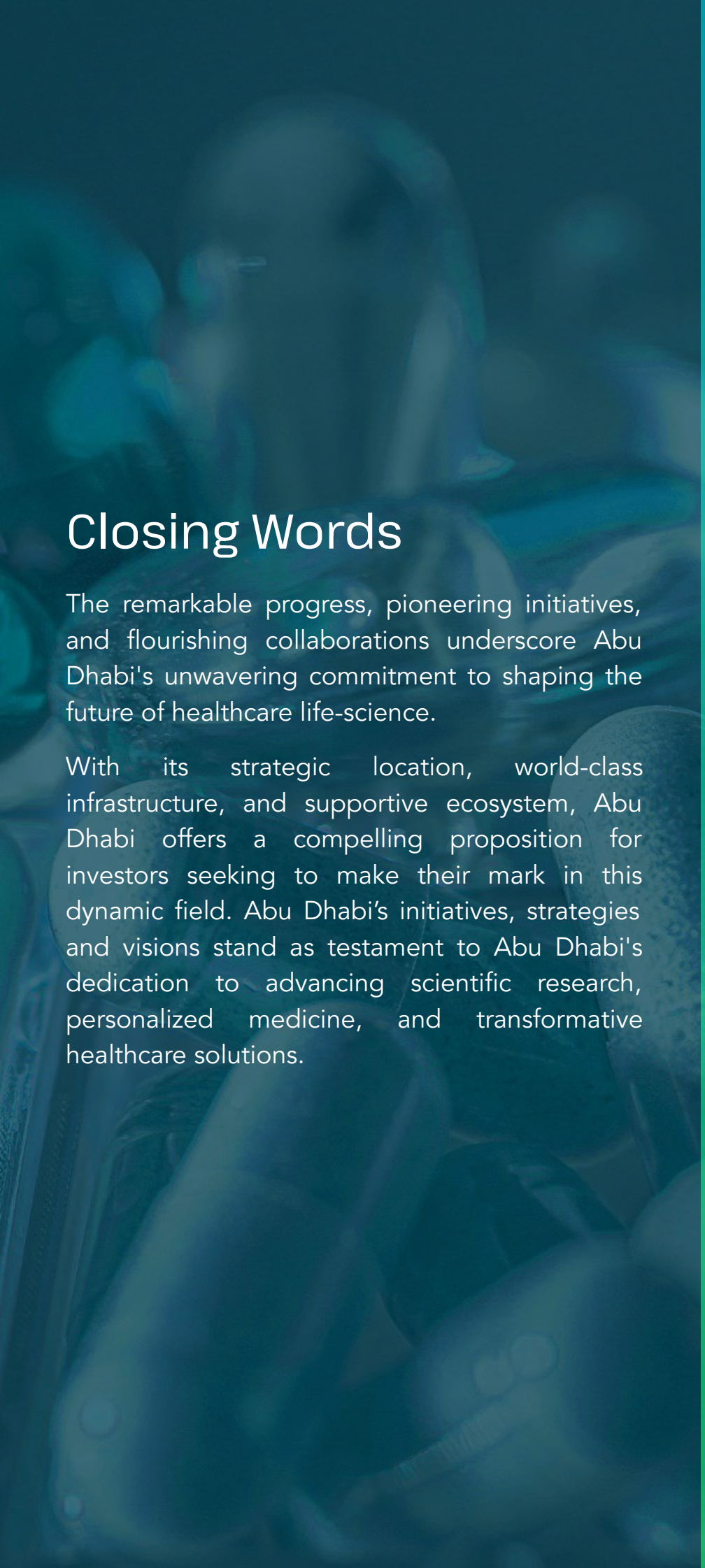
Company Name	Website	Startup type
ITD- INNOVATION IN TRANSPLANTATION AND DONATION LTD	www.i-transplantdonation.ae	Digital Health
JADE AUTISM LTD	www.jadeautism.com	InclusiveTech
Jool	www.jool.health	Digital Health
KEY2ENABLE ASSISTIVE TECHNOLOGY MENA LTD	www.key2enable.com	InclusiveTech
KLAIM HOLDINGS LIMITED	www.klaim.ai	FinTech Platform
Malafi	www.malaffi.ae	TeleHealth
Mashyah	www.mashyah.com	Wellbeing and Wellness
MDBX LTD	www.mdbx.health	Digital Health
Medgate	www.medgate.ph	TeleHealth
MEDICUS AI MIDDLE EAST LTD	www.medicus.ai	Personalized Medicine
MetroMed	www.metromed.me	Distribution & Suppliers
MIND TECH LTD	www.mindtechinc.com	Digital Health
MindTales	www.mindtales.me	TeleHealth
Nafas	www.getnafas.com	Wellbeing and Wellness
OKADOC TECHNOLOGIES LIMITED	www.okadoc.com	Digital Health
One Health	www.onehealth.ae	Distribution & Suppliers
ONEX MEDICAL	www.medicalonex.com	Distribution & Suppliers
OVASAVE HEALTH TECHNOLOGIES LIMITED	www.ovasave.com	Digital Health
PERCEPTIVITI LTD	www.perceptiviti.com	FinTech Platform
PHG MENA LTD / PHARMA GLOBAL MENA LTD	www.pharma.global	Distribution & Suppliers
PREDICTIV MIDDLE EAST LTD	www.predictivcare.com	Personalized Medicine
PROTEINEA BIOTECH LTD	www.proteinea.com	BioTech
PROVENMED TECHNOLOGIES LTD	www.provenmed.com	InclusiveTech
QUANTLASE INTERNATIONAL HOLDING	www.quantlaselab.com	Research
Razi Biotech	www.razibiotech.com	BioTech
REMMEDVR MEA LTD	www.remmed.vision	Health Product
Safecare Medical Industries	www.safecareind.com	Distribution & Suppliers
SCRIPS INC. LTD	www.scrips.com	Wellbeing and Wellness
SENIOR SAVINGS LTD	www.seniorsfirst.ae	AgeTech
SENSGREEN LTD	www.sensgreen.com	Digital Health
SOFTSMILE VISION LTD	www.softsmile.com	Dental
Takalam	www.takalamhere.com	Mental Health
TOOTHPICK HOLDING LIMITED	www.toothpickapp.com	Dental
UAE Montessori	www.uaemontessori.com	AgeTech
VEROFAX LIMITED	www.verofax.com	Distribution & Suppliers
VOITHY TECH LTD	www.voith.com	AgeTech
WAINSK LTD	www.wainsk.com	TeleHealth
Wewalk	www.wewalk.io	InclusiveTech

Incubators / Accelerators

Logo	Name	Website
HUB71	HUB71	www.hub71.com
PLUG AND PLAY ABU DHABI GLOBAL MARKET	Plug and Play	www.plugplay.ch
HealthTech Hub	Healthtech HUB	www.healthtechhub.co.uk
FLAT 6 LABS	Flat 6 Labs	www.flat6labs.com
techstars_	Techstars	www.techstars.com
500	500 Startups	www.mena.500.co

Sources

1. UAE Statistical Annual Report 2020.
2. UAE Statistical Annual Report 2020.
3. UAE Statistical Annual Report 2020.
4. Statista.
5. Statista.
6. The estimation of Abu Dhabi's market size was derived from the overall figures for the United Arab Emirates (UAE). To determine Abu Dhabi's market size as a percentage of the total UAE, the ratio of total inpatient and outpatient visits in Abu Dhabi compared to the UAE was calculated, according to the UAE Statistical Annual Report 2020.
7. Information provided by Department of Health.
8. Information provided by Department of Health.
9. Fitch Solutions.
10. Abu Dhabi Customs.
11. UAE Information - Fitch Solutions; Saudi Arabia, Singapore, South Korea, Israel, Ireland - Observatory of Economic Complexity.



Closing Words

The remarkable progress, pioneering initiatives, and flourishing collaborations underscore Abu Dhabi's unwavering commitment to shaping the future of healthcare life-science.

With its strategic location, world-class infrastructure, and supportive ecosystem, Abu Dhabi offers a compelling proposition for investors seeking to make their mark in this dynamic field. Abu Dhabi’s initiatives, strategies and visions stand as testament to Abu Dhabi's dedication to advancing scientific research, personalized medicine, and transformative healthcare solutions.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