A revolution is underway

Artificial intelligence

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Artificial intelligence (AI) is about to revolutionise the diagnosis, surveillance and treatment of several diseases. Driven by technological development and research progress, growth in the AI market will surge over the next decade. An explanation.

"Artificial intelligence will improve medical diagnostics accuracy and also testing quality."

RUDI VAN DEN EYNDE
Head of Thematic Global Equity

Situated somewhere between myth and reality, artificial intelligence feeds a great number of fantasies in the collective psyche. It is nonetheless a source of considerable progress in the healthcare domain. The scope of application is wide-ranging, encompassing research, epidemiology, prevention, diagnostics and treatment. Experts unanimously agree that AI will improve healthcare quality, pertinence and efficiency. It will help optimise the tackling and monitoring of many diseases while also cutting costs. Over the medium term, AI will promote the emergence of more predictive and more accurate drugs, which will also be more personalised.

The long-time misgivings harboured by the medical profession are now being dispelled. Experience now demonstrates that human input will remain a key factor, particularly regarding concerns over liability. Artificial intelligence will be a simple decision-making tool. Medical staff will use their experience and skills to validate the choices proposed by machines. It is also certain that AI alone will not suffice. It is a non-exhaustive system which will only be able to reply to specific issues in which it has been previously "trained". Full autonomy is a giant step away from programmed learning.

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Promising developments

Medical imagery is particularly dynamic, with the most advanced projects currently concentrated in this sector. Several scientific reports have demonstrated that equipment has been developed which is able to detect cancerous lesions to a high degree of precision, improving upon conventional methods. This is notably the case for lung cancer, the deadliest cancer, causing almost two million deaths worldwide annually. Researchers from the Northwestern University Feinberg School of Medicine and scientists from Google AI[1] have joined forces to develop an algorithm capable of identifying even extremely small malignant pulmonary nodules with an efficacy rate of 94.4%. By way of comparison, the six radiologists participating in the study recorded a greater margin of error in terms both of false positive tests (11%) and of false negatives (5%). This AI system provides two tangible advantages. Early tumour detection increases recovery potential, while the accuracy of the diagnosis limits invasive, risky and expensive medical examinations.

According to the World Health Organisation, 152 million people could be affected by dementia by 2050. Some 70% of cases could be diagnosed with Alzheimer's disease. In the absence of a cure, Alzheimer's must be treated as soon as the first signs appear, in order to slow down the neuro-degenerative process. Artificial intelligence could also play a key role in this case, as demonstrated by research published by the University of San Francisco[2]. Based on a simple cerebral scanner analysis, the algorithm can detect the presence of the pathology on average six years before a human diagnosis.

A giant market

Driven by technological development and research, the AI market will surge over the coming decade. The latest report published by the ReportLinker Institute backs this assumption[3]. The estimated market was 4.9 billion dollars in June 2020 and could grow to an estimated 45.2 billion in 2026, reflecting an average annual growth rate of 44.9%.

"The healthcare artificial intelligence market could grow to 45 billion dollars in 2026."

Fuelled by the constant increase in computing power, the machine-learning segment will expand particularly rapidly. Predictive analysis – driven by the boom in healthcare data – could also follow suit. On the other hand, the lack of qualified human resources and reticence among healthcare workers are the two main constraints. Irrespective of the actual projections, a clear trend is discernible. The US, boosted by significant investments over the past five years, will be the main driving force in this market.

Excellent prospects in radiology

Alongside ophthalmology and dermatology, radiology is one of the most advanced medical disciplines in the domain of artificial intelligence. This sector, which has been undergoing active transformation for a long time, will certainly gain in reactivity, efficiency and precision. The potential benefits are clearly visible, including the early detection of certain cancers, which can then be treated more rapidly. Using a range of images, AI may also be able to detect predictive pathological markers and provide specific protocol guidance for medical examinations for each patient, depending on their medical history and profile.

Health-risk prevention will not be the only advantage gained. Artificial intelligence will also undoubtedly play a practical role by providing a second opinion, refuting or confirming, for example, an initial diagnosis by a radiologist. Automating certain tasks will also contribute by liberating examination time, thus enabling more patients to be seen. The broader exploitation of medical imaging data could symbolically lead the industry, by promoting research, training and technological developments.

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1. "End-to-end lung cancer screening with three-dimensional deep learning on low-dose chest computed tomography", Nature Medicine (May 2019).
2. "A deep learning model to predict a diagnosis of Alzheimer disease by using F-FDG PET of the brain", Radiology (November 2018).
3. "Artificial intelligence in healthcare market with Covid-19 impact analysis by offering, technology, end-use application, end user and region – Global forecast to 2026", ReportLinker (June 2020).

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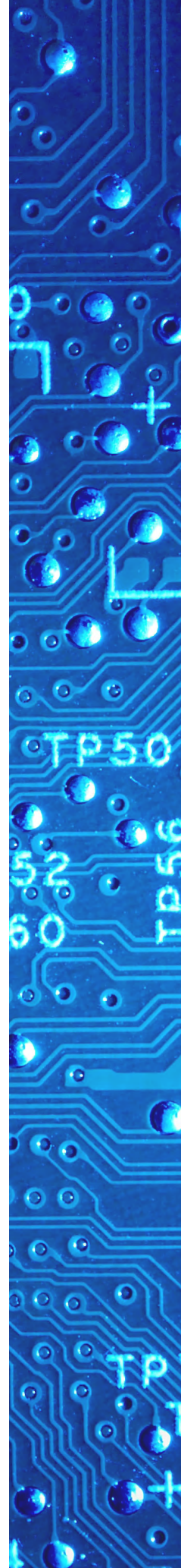
"Scientific hypotheses remain difficult to prove on a very large scale."

According to PwC[4], the surge in artificial intelligence will depend chiefly on dynamic healthcare company investments and the level of acceptance by the population. Entrepreneurs and users appear generally in favour. 75% of managers surveyed expressed their readiness to invest in AI in the near term. This strategic decision is motivated essentially by an expected increase in productivity, estimated at 15-20%. Meanwhile, 55% of patients surveyed were not averse to using AI for their healthcare. Although their level of enthusiasm is more ambivalent, the proportion in favour is trending higher. Some specialists believe that the 5G roll-out could accelerate change by facilitating access to technology and by democratising usage.

Transformation levers

It is clear, however, that the promised revolution will not happen overnight. Artificial intelligence is still in its early stages. Profitability is relatively limited. The level of maturity among available applications is currently highly contrasting, including within the healthcare sector. The first applications will probably not be operational for a few more years at the earliest. As promising as they may appear, scientific assumptions are still difficult to prove on a very large scale.

In order to optimise the potential harboured by AI, its ecosystem will have to be structured, formalised, promoted and funded. The reliability and security of developed solutions will have to become priority issues for promoters and investors. Gauging added value and developing dedicated business models are two other determining factors required to promote the roll-out of new techniques. Specific digital-usage regulations will also have to be put in place. A fine balance will have to be struck in order to avoid hindering the prospects of potentially innovative schemes for the community while also protecting individual freedoms. The future of artificial intelligence will, effectively, depend mainly on the exploitation of healthcare data, which is its main fuel.
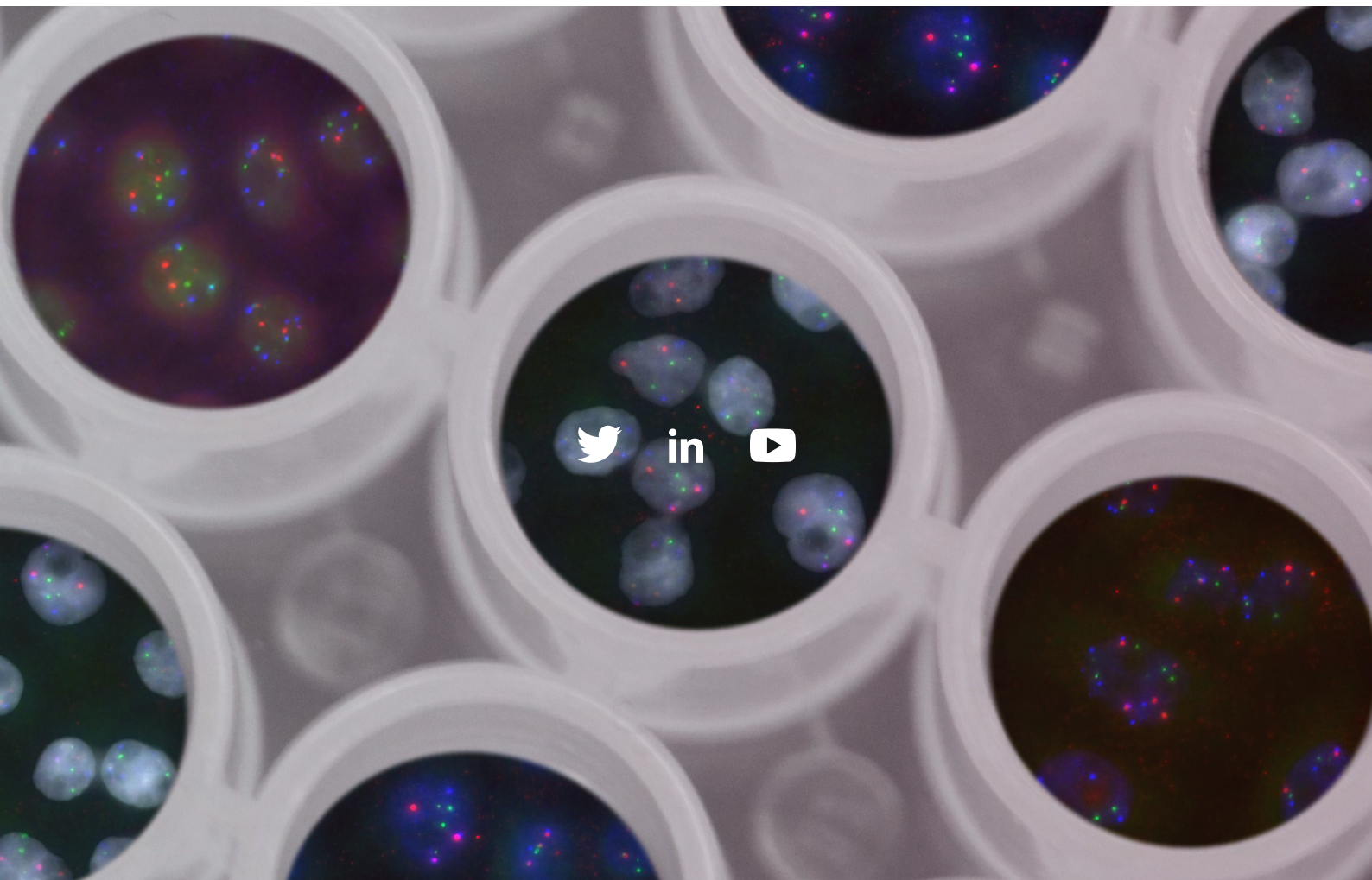
Candriam, as an experienced observer of the transformations underway in the healthcare sector, intends to support the development of the most pertinent and useful applications for patients, by drawing on a network of skilled experts to identify, support and value the companies which will produce tomorrow's technological solutions.

The US, a future leader in healthcare AI?

According to research & consulting firm Frost & Sullivan*, the global digital healthcare market will grow by 160% over four years, to 243.5 billion dollars in 2023. Artificial intelligence will be one of the main drivers of this predicted growth. Certain segments clearly harbour greater promise than others. Over the past five years, sector investments have been essentially channelled towards imaging and diagnosis (20.7%), candidate-drug research (18.6%), discovering new action mechanisms (10.3%), real-life data collection & analysis (18.1%) and genetics (10.8%). The US has been highly active in this field, representing 73.3% of investments, which is well ahead of China (14.8%) and the UK (3.8%). Experts agree that the next five years will be decisive in developing the potential of this strategic market. In a context of rapid change, acquisitions and partnerships in the IT and technological domains will provide companies with major competitive advantages.

(*) "Global Digital Health Outlook 2020", Frost & Sullivan (August 2020)

4. "Global top health industry issues: Defining the healthcare of the future", PwC (October 2018).

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