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Editorial

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EDITORIAL

"Artificial intelligence is no match for natural stupidity."
Albert Einstein
Mathematician, Physicist, Scientist (1879 - 1955).

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ARTIFICIAL INTELLIGENCE: FROM THE PRESENT TO THE FUTURE Part 1

No sooner had we discovered with amazement the technological advances in dentistry over the past 2 decades and the pleasure of applying them in our dental practices that Artificial Intelligence (AI) burst through the front door.

Heralding a new era, AI touches all professional fields and regularly appears, often without our knowledge, in our habits, our praxis and in the real world which has become more and more virtual; or conversely, the virtual which becomes real through digital technologies to the point where we now speak of virtual reality in a new lexicon which perfectly expresses the scope of this neo-revolution.

A new vocabulary was born. It revolutionizes our mode of verbal and textual communication, which is practiced more via social networks, by increasingly concise sentences expressed more by emoticons (Hold! A new word introduced) than by intelligible words, sometimes said for us through a voice command (Siri, DEXvoice, cortana) … and so on.

In the previous editorial (vol 11 n 2) entitled "Revolution, evolution or involution", I introduced the present theme and promised to develop the impact of evolution and that of revolutions in all areas of modern dentistry, from fundamental (field of biomaterials to nanotechnology) to all specialties. Eclipsing the preeminence of AI in 2021 would lead us to speak more of evolution than of revolution, the first being a process of gradual transformation which implies a gradual, successive change while the other also proceeds of a change which involves abrupt and / or brutal, sometimes violent when it comes to emotion or politics.

In view of the diversity of the fields where artificial intelligence (AI) is involved, we have been led to develop this topical subject in two parts, from generalities to the field of dentistry.

The Oxford English Dictionary defines artificial intelligence (AI) as "the theory and development of computer systems capable of performing tasks that normally require human intelligence, such as visual perception, speech recognition, decision making and translation between languages ".

Another definition of (AI): "all the theories and techniques implemented to produce machines capable of simulating human intelligence" [1].

The French Ministry of Higher Education and Research is scientifically more precise. I quote: "Often classified in the group of cognitive sciences, it uses computational neurobiology (particularly neural networks),

1- "Larousse online encyclopedia - artificial intelligence" [archive], on Larousse.

mathematical logic (part of mathematics and philosophy) and computer science. It looks for problem solving methods with high complexity or algorithmic logic. By extension it designates, in everyday language, devices imitating or replacing man in certain implementations of his cognitive functions " 2.

This virtual world into which humanity has been projected has not spared the medical field; AI is booming at an exponential rate, alongside the explosive development of related basic sciences and advances in certain specialties. I will particularly mention the fields of clinical medical AI (prevention / prediction), diagnosis and monitoring / quantified self, better known as self-quantification (QS), which integrates technology into our practices in order to collect the various aspects of everyday life. Gary Wolf describes this practice simply as "self-knowledge through self-tracking with technology".

The sensors currently in use are information transmitters coupled with visualization and analysis applications of the data collected (complex algorithms). The accelerometer is a prime example of how it equips millions of mobile smartphones today. It can measure the number of steps taken, the running speed or swim, to detect body movement in time, which provides data on the frequency, intensity, and duration of the activity of the individual. This example shows the extent to which biomedical engineering, in which several players, including teacher-researchers, clinicians and industrial and pharmaceutical partners, are fully engaged in revolutionizing our health system in terms of both performance and predictions, the perception of the benefits and the risks and why not of the early or anticipated diagnosis, therefore of prevention.

Many other areas of health are affected including clinical decision support, AI applied to medical computing (automatic natural language processing, ambient clinical intelligence), and AI for medical research (e.g. : dedicated to drug discovery or disease modeling, medical biology (predictive tumor markers, oncology), medical informatics and diagnostic methodology.

In a recent publication of March 16, 2021 under the title: Artificial intelligence in medicine in 2021, Dr Giovanni Briganti, Co-leader AI4Health (Belgian Group AI for Health) develops the idea of increasingly efficient and intelligent diagnostic tools which are distinguished from conventional means and by extension predictive models including those recently used to diagnose Covid-19 or its complications related to infection. While evoking the highly fluctuating quality of these models, a handful of which (20 to 130 can actually predict aspects of the disease), he develops by extension the strong elements of recourse to medicalized modeling: "This trend is not trivial; it is explained by a specific need coming from the clinicians, who often do not need to know how a model works exactly, provided that it is able to predict an adverse event or a diagnosis: the needs are therefore gradually detached from reasoning dictated by classical statistics (made of conditions and use cases) to evolve towards more complex and catch-all models, even if not very understandable, as proposed by so-called AI techniques. " In turn, predictive models allow the creation of increasingly advanced diagnostic tools in different fields (radiology, clinical biology, neurology, cardiology, gastroenterology). "Predictive models and diagnostic tools support new monitoring technologies, allowing the individual (and his doctor or hospital) to have under control at all times a whole series of parameters and bodily variables. "

And he continues on the cutting-edge technological revolutions for 2021, wearables (or wearable objects), functional computers / monitors that are worn close to the body (smart watches or fitness trackers). They offer passive and on-demand sensor-based data collection functions that require proximity to the body and can e.g., record heart rate, measure blood pressure, perform ECG, EEG, assess respiration and

2- *"Synthesis report - France Artificial Intelligence" [archive] [PDF], on the Ministry of Higher Education and Research*, 2017.

oxygen saturation, measure body temperature, assess vision and movement, as well as detect and report abnormalities in these areas. It is especially interesting to know that these parameters "have counterparts validated by the American control and validation organization FDA. "

At the Superior Technology School of the University of Quebec, the main axes of health research currently interest medical imaging and neuroimaging, virtual and augmented reality in the field of rehabilitation engineering, as well as cognitive training of athletes in virtual reality, speech recognition, biomaterials, modeling of physical and biological systems, surgical simulation, decision support and diagnosis, design of orthopedic implants.

Join us, Dear Readers, in the next issue where we take stock of the technological advancements in AI and their imprint on modern dentistry.

Good reading