

## EDITORIAL



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# Medicine and Technology: A Partnership Shaping the Future

**M**edicine and technology have gone hand in hand for centuries. However, it was particularly in the last about 150 years that this development assumed truly impressive proportions. This was largely due to the widespread scientific and technological advances at the end of the 19th century in sequence of the so-called Industrial Revolution. This development influenced all areas of knowledge, including arts and humanities. In the field of medicine, this progress was driven, on the one hand, by unprecedented advances in biology and physiology and, on the other, by the discoveries in the fields of electricity, electromagnetic radiation, and radioactivity. Together, these factors enabled the emergence of innovative diagnostic and treatment tools, such as instrumentation for the acquisition of electrophysiological data, X-ray imaging, and, later, nuclear medicine as a whole. This symbiosis between medicine and technology expanded the limits of both.

The 20th century thus stood out as a period of extraordinary advances in diagnostic and data acquisition technologies. The introduction of digital technology, from the middle of the last century onwards, was crucial to the improvement and widespread use of existing analog technologies, as well as enabling the development of entirely new solutions. A significant milestone was the appearance of computed axial tomography (CAT) in the early 1970s — the first major success of digital technology and computing applied to medicine. Other notable advances followed, such as magnetic resonance imaging (MRI). These are just a few of the several examples demonstrating how the collaboration between medicine and engineering has resulted in stories of great success, especially in areas such as surgery — particularly neurosurgery — cardiology and pathological anatomy.

Thus, it can be said that the 20th century was essentially marked by the development of data acquisition technologies — imaging, laboratory, or physiological.

At the end of the 20th century and early 21st century, the paradigm began to change. The development of digital devices with high computational capacity, namely graphics processors (GPU), made it possible to improve and use processing algorithms that had begun to be developed in the 1970s and 1980s but which had no practical application due to a lack of available computing power.

Of this set of computing technologies, generally referred to as machine learning, deep learning algorithms stand out, as their functioning is inspired by the physiology of the brain. In recent years, it has become possible to implement algorithms for processing and analyzing the enormous variety of multimodal data that we are now able to generate easily and at low cost. For the first time, the role of data interpretation that was once exclusively reserved for doctors can now be shared with machines. It seems that computers have taken another qualitative leap forward and are now capable of performing high-level data analysis that was typically reserved for humans. What appears to be happening is that this process is only just beginning, and the remarkable results already achieved with Generative Artificial Intelligence are just the tip of the iceberg of what will be accomplished in the decades to come.

Therefore, it is clear that collaboration between doctors and engineers is here to stay and the two communities will have to work in an increasingly interconnected way. Doctors will have increasingly technological knowledge and engineers working on health applications will have increasingly greater knowledge of medicine. There has been talk for some time about training physicians-engineers. At the moment, the closest thing we have is biomedical engineers.

For these reasons, the Lisbon Society of Medical Sciences (SCML) has decided to create a Biomedical Engineering group, the aim of which is to propose initiatives that promote contact between these two communities that are so interdependent on each other. It is hoped that the launch of this latest issue will make a significant contribution to towards closer ties in favor of science and patients.

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Member of the Editorial Board (JSCMed)

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#### CHIEF EDITOR'S NOTE

With this issue, we gladly welcome the Universidade Católica de Lisboa - School of Medicine as a partner, endorsing the Journal of the Sociedade de Ciências Médicas de Lisboa (JSCML) as its official scientific publication.

From now on, our journal became the official scientific publication of the three schools of medicine in Lisbon.

We are strongly convinced that this partnership will be a fruitful tool in the development of health sciences in Portugal.

Victor Oliveira