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EDITORIAL POINT OF VIEW

Medicine with Intelligence. Be It an Artificial One

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Since millennia, medicine has been using intelligence to deliver health. Natural intelligence, of course.

Since exactly 1956 (some say), artificial intelligence (AI) was added to medicine (1). Of course, in these words, the exact date of AI's birth in medicine contains some joke. But around this period, together with computers, algorithms for diagnostic or therapeutic improvements were developed (1), which added AI to medicine, in parallel with tens of other domains using AI today.

Artificial intelligence means the capability of computers to drive conclusions based solely on input data. This is the main source of bias in AI because it results from the way the data are entered into a system, which may involve errors.

There are two main branches of AI in medicine: the virtual and the physical.

Virtual AI includes:

- learning information;
- helping physicians in diagnostic and therapeutic decisions;
- electronic databases;
- management of health care.

Physical AI includes mainly robotics, which is designed:

- to assist surgeons
- to meet the needs of elderly people.

Artificial intelligence-assisted learning has two subfileds, including machine learning and deep learning (2). The learning process may be supervised, unsupervised or includes reinforcement (2).

Some of the numerous achievements of AI in medicine are already implemented, as described below.

In **cardiology,** a simple electrocardiogram may predict the development of future atrial fibrillation (3) or future cardiac dysfunction (4). The AI analysis of many imagistic procedures in cardiology (*i.e.*, stresss echocardiography for prognosis, SPECT for detailed diagnosis of coronary artery disease) have already important practical information.

In **cancer**, the progress of AI is impressive. A system based on Google Deep Mind Algorythm surpassed human experts in detecting breast cancer. Another algorhythm detected prostate cancer with 98% sensitivity and 97% specificity (5). An AI system detected skin cancer in 95% of

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cases, compared with the 86.6% of cases detected by dermatologists (5).

In **Psychiatry**, an algorhythm implemented by Facebook successfuly detected suicidal ideation (5).

In **nano proteomics**, the protein structure is already predicted by AI (6), with fantastic achievements being under way in this field.

In the field of **antibiotics**, Stokes JM *et al* (7) reported that the screening of 107 million molecules resulted in the identification of eight molecules which had a different antibacterial activity from that of the existing known antibiotics.

In **global health**, AI is largerly implied especially today, in an era of new pandemics (8).

Along with the undoubted benefits, there are also many **concerns**. For instance, entering a **huge amount of data implies several technical and ethical problems**, including (5):

- the way in which data entry is done may affect the final conclusion, with AI decision having no other influence than the entered data;
- people may worry about giving their personal data to improve AI algorythms – for instance, a UK study showed that only 63% of persons would accept to give their own data;
- AI could brake patents in a legal manner;
- new legislation is probably necessary in the field.

Artificial intelligence in medicine is developing without borders – let us just note the contribution of Google and Facebook in developing AI (see above)!

However, we are not yet aware of AI's contribution to medical science and practice. ❑

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