

Artificial Intelligence and Medicine

Simon Paul Attard Montalto

Currently, a 'hot' debate circulating throughout the more serious international media platforms focuses on the downside – or potential downside – of artificial intelligence (AI). The doomsday view warns that AI will become smarter than mankind and, essentially, become uncontrollable and take over the planet! Indeed, one AI expert has suggested that, since AI-driven processes will be far more accessible and will be put to nefarious use with relative ease by erstwhile crooks, it will become more dangerous than nuclear weapons where access and safeguards against their injudicious use is so great. In stark contrast, the use of AI-based methodology to identify Abaucin, a potentially highly effective antibiotic against *Acinetobacter baumannii*, was recently heralded on BBC radio as a groundbreaking advance in the fight against superbugs.¹ Certainly, by using rapid gene sequencing, AI speeded up the selection process of this antibiotic from amongst hundreds of other potential contenders and curtailed the pre-clinical trial research period that would otherwise have taken several years.¹ Clinical trials have yet to start and will still be required to verify the efficacy of this promising drug. Similar areas where AI-based technology has been applied include vaccine research (e.g. for RSV, Ebola),² management and prediction in type 1 diabetes,^{3,4} diagnosing retinal disorders⁵ and increasing early detection of sepsis by up to 20%.⁶

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COVER PICTURE

'Escaped rabbit in Maltese countryside monochrome violet in the style of Van Gogh'

Watercolour A3 size (29.7 x 42 cm)

By Chris Camilleri

Chris Camilleri uses Artificial Intelligence to generate images that are used for reference. He paints watercolour paintings of figures, portraits, animals and battle scenes. He likes traditional Chinese art, Tibetan thangka and high fantasy. His favourite painters are Otto Dix, J.W. Waterhouse and Frank Frazetta. Chris works as an anaesthetist. He is married to Georganne and lives in Qormi.

Artificial Intelligence describes the use of computers and/or technology to simulate intelligent and critical thinking/processing comparable to human beings, a notion pioneered by Alan Turing in 1950 and first coined by John McCarthy in 1955.⁷ In reality, AI has since been applied in medicine for several decades and generally uses computer-based 'virtual' data processing essentially centred around smart algorithms/databases/pattern recognition, and 'physical' machine-based interventions and robotics.⁷ Both have already been widely applied in radiological imaging and tumour detection, diverse robotic interventions, routine workflows and equipment maintenance, screening and risk assessment programmes (e.g. in mammography), including early alert systems based on symptomatology and early detection of metastases.⁷⁻⁹ This exponential increase in the application of AI in medicine has resulted in a substantial increase in submissions in AI-related domains, such that dedicated Journals on AI in Medicine and AI in Healthcare already exist and the New England Journal of Medicine (NEJM) plans to launch a sub-journal aptly named NEJM-AI in 2024.⁸

AI programmes have significantly reduced the burden of day-to-day health administration and patient care

including early clinical diagnoses and identification of non-compliance in treatment.¹⁰ AI is excellent in performing arduous and repetitive tasks that humans find tedious and rapidly lose interest, concentration and performance. Nonetheless, development of AI needs to follow clearly accepted guidelines, be aware of commercial interest and bias, avoid secrecy whilst safeguarding confidentiality, and ensure transparency. Issues relating to insurance, liability and responsibilities still need to be defined.

Undoubtedly, AI has already proven to be extremely helpful in numerous medical applications. But is it equal or better than doctors? Sometimes, the answer to this question is "yes": one study reported that AI outperformed 17 from 18 physicians in detecting cancer on chest X-rays, but this is certainly not always the case.^{11,12} Will AI make doctors redundant?¹¹ Unlikely. Can it free up quality time for doctors to perform hands-on clinical work? Definitely.¹¹ Hence, the medical fraternity should view this expanding modality as an integral and extremely useful adjunct. AI should be introduced at undergraduate level where, in all probability, already-computer-savvy students will embrace it seamlessly.

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