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Editorial

The Role of Artificial Intelligence in Urology

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Artificial intelligence (AI) refers to the computer-based capability to imitate and perform human mental tasks. It is causing a pattern shift in terms of providing health care and decision-making for the clinicians. The advances in the medical technologies used in health care, such as Electronic Medical Records (EMRs), are providing enormous amounts of data. This large amount of data allows computer-based predictions and decisions to be made to aid in better patient care. By 2025, the growth rate of AI applications in health care is expected to be 29.3%, and the global revenue is estimated to increase by 40%. With the available patient data, the future health care system is likely to move toward AI outpatient clinics and preventive medicine. AI provides more accuracy and reliable clinical decisions; hence, it is going to be an essential part of the health care system [1].

The four subfields of AI in health care are as follows:

1. Machine Learning (ML): ML is a statistical technique-based programming that allows a computer to learn and recognize forms without clear instruction.
2. Natural Language Processing (NLP): It illustrates the ability of a computer to understand the written and spoken language in order to extract useful information and reliable details. A comprehensive data research such as Electronic Medical Record (EMR), doctor's notes, pharmaceutical products, and medical imaging can also be analyzed.
3. Deep Learning (DL) and Artificial Neural Networks (ANNs): In the network architectural layers, the ANN comprises of individual units that function like artificial neurons programmed to accomplish computer tasks and recognize complex patterns. DL requires training massive datasets of multilayered neural networks.
4. **Computer vision:** Computer vision technology is used for visual search, trend forecasting, augmented reality, and virtual reality. The radiological and pathological images and simple and complex endoscopic videos can be used by machines to understand the details and patterns in the images in order to identify the tumors or malignancy present in the diagnostic images. AI is applied not only to the diagnosis of urological conditions but also its management. Intrinsic and extrinsic challenges affect the progress and usability of AI in urogynecology, as well as in medicine overall. Development of guidelines for regulatory approval of procedures prior to widespread adoption could protect both patients and physicians. Artificial intelligence will occupy an essential role in the future of female pelvic medicine and reconstructive surgery and will no doubt progress rapidly [2].

In bladder tumors, by evaluating the cystoscopic image with convolutional neural network (CNN), it is possible to classify the image, including tumor lesions and normality. The objective evaluation of cystoscopic images using AI is expected to contribute to improvement in the accuracy of the diagnosis and treatment of bladder cancer [3]. Prostate cancer represents the most typical example of a pathology whose diagnosis requires multiparametric imaging, a strategy where multiple imaging techniques are combined to reach an acceptable diagnostic performance. However, the processing of multiple images not only places additional burden on the radiologist, it also complicates the reviewing process. Prostate cancer imaging has therefore been an important target for the development of Computer-Aided Diagnostic (CAD) tools [4].

The field of AI continues to grow in medicine. The reviews of the literature and proposal of reporting standard serve as methods to improve AI literacy for urologic clinicians. It should serve as a starting point in improving initial knowledge to make AI and Machine Learning (ML) accessible to all participants [5,6]. With the advent of "big data" Artificial Intelligence (AI) is needed to adapt and interpret data for the benefit of scientific progress and urological care. However, this approach might be of value is limited [7]. Another potential use of AI is in overactive bladders. Areas of exaggerated motion differences detected would represent increased focal detrusor contractions [8].

As Urology is a constantly changing specialty, pharmaceutical targets, genomic markers and technological

innovations must be analyzed objectively, taking into account costs to the health systems, risks and benefits to the patients, and the legal background that comes with them. Technological advances, such as artificial intelligence and deep learning procedures, have shown promising results but could not replace physicians' perspectives at the time. Research needs to be strengthened to make us reconsider changing the way we assess and treat our patients. [9]. Although AI and computer science will continue to provide and enhance personalized medicine, concerns regarding data protection, regulatory approvals, honesty in computer diagnoses, and programming biases should be reported. As clinicians, it is our responsibility to provide procedures with high-quality and responsible data that will guarantee universal applicability. Only human awareness, experience and good judgment will determine that these systems will work for the benefit of patients and health care providers [10].

In conclusion

AI is attempting to change urology practice. Urologists can make complex decisions. False diagnoses and other medical errors will be reduced. Moreover, high quality, high quantity, variety, and density of medical data improve the performance of AI models. Finally, it is highly recommended that urologists, uroradiologists, uropathologists, and uro-oncologists use AI techniques to improve their performance in challenging diagnosis, prognosis, and treatment planning conditions.

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