Editorial

Future trends in pathology: Artificial intelligence

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A R T I C L E   I N F O

Pathology is an ever-changing branch of medicine due to its continuous development and evolvement with science and technology advancements. From the traditional glass slides, we are in the era of digital slides now for the faster disease diagnosis. This is the boom of digital pathology which enables distant and remote consultations that is telepathology.

Artificial intelligence (AI) brings the revolution in the assisting pathological disease diagnosis, identifying patterns, improving the speed and accuracy in the cancer and diseases diagnosis.[1] Artificial intelligence describes the ability of a computer system to replicate intelligent/human behavior. Machine learning methods are used for this purpose. Machine learning describes computer algorithms that improve with experience and generate artificial knowledge. Deep learning, artificial neural network, convulutional network, deep network are remaining components of AI. Then there are transfer learning and graphical processing and multiple instance learning.[2] Whole slide scanning machines to development of AI based software for diagnosis of prostatic cancers is a great journey of many years (7-8 decades) with three revolutions in pathology.[3]

The above chart excellently highlighted by Safi S and Parvani AV[3] in the recent article of Diagnostic Pathology (2023) giving insight of multiple uses of AI. AI used in assisting diagnosis, predicting and prognostic diseases, molecular and genomic profiling to research, innovation to drug discovery.[3]

Besides the many advantages of AI as cited above, the question is can AI replace the pathologist?

The answer from the Liron Pantanowitz, chair and professor of pathology at the University of Pittsburgh while speaking at Life Sciences Baltics 2023 on the feasibility of artificial intelligence for pathology clinical practice said that Artificial intelligence should be used to help pathologists in their day-to-day activities rather than replace them. Software's cannot go it alone.[4]

AI can automate simple tasks, screen for the rare lesions and suggest diagnosis and prognosis, all whilst going over large datasets. It results in more accurate results with less error.[4]

But Pantanowitz was keen to highlight that AI should not replace pathologists. He added that AI plus pathologists is the optimal solution as opposed to pathologists alone.[4] Lack of data diversity is the drawback and limitation of AI leading to bias and inaccurate/unfair results in some conditions.[1,2]

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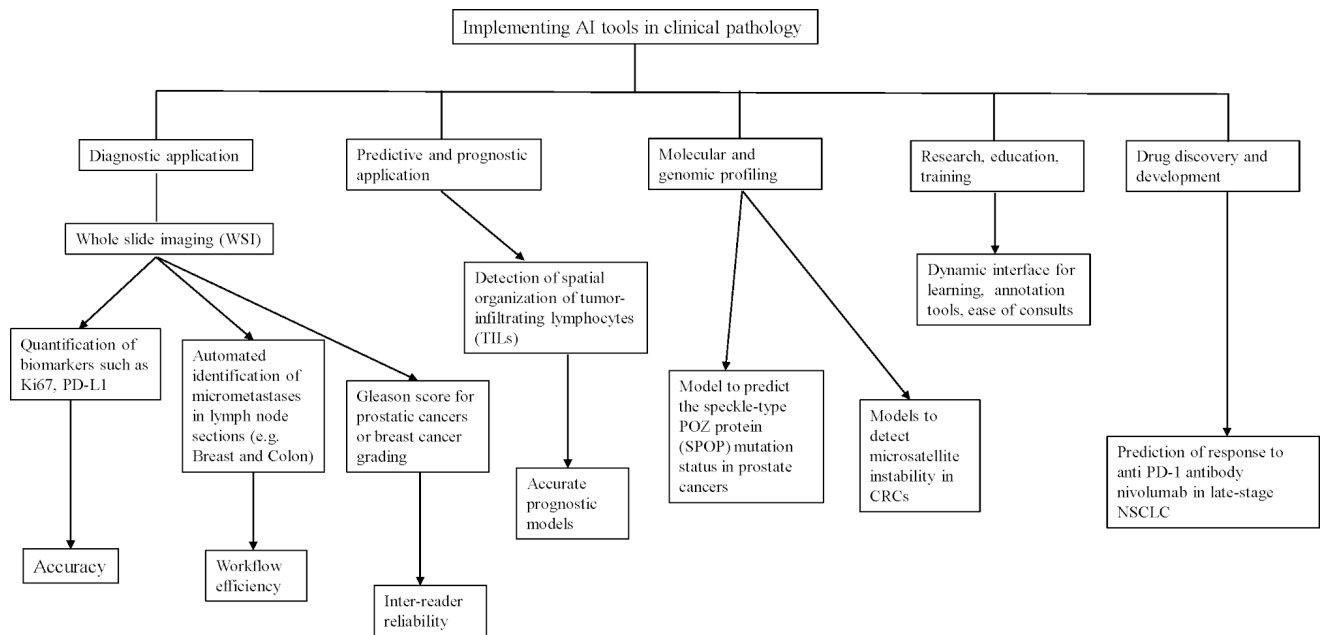E-mail address: drdhirajnikumbh@gmail.com (D. B. Nikumbh).

Figure 1:

Liquid biopsies, genomic and molecular pathology, immunopathology and immunotherapy, telepathology, nanotechnology, 3D pathology are the future trends in pathology. [1,2]

Let's hope Machine cannot replace at least in patients diagnosis.AI can assist, augment, help the pathologists for better and faster, accurate results with many advantages and free from interobserver and interobserver errors. Thanks to the advances in technology.

Happy and Innovative New Year 2024 to all the wonderful readers and researchers.

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