

Convolutional neural network for automatic detection and characterization of abdominal aortic aneurysm

We read with great interest the recent report by Camara et al¹ on the development of an artificial intelligence (AI)-derived method to enable automatic detection of abdominal aortic aneurysms (AAAs). Using datasets composed of 200 computed tomography angiograms from patients with an AAA and 200 matched control patients with a nonaneurysmal infrarenal aorta, the authors developed a method using a convolutional neural network (CNN). Testing demonstrated the robust accuracy of the model (99.1%, with an area under the curve of 0.99). Their results point to the interest of such an application for the screening for AAAs. The VGG-16 neural network architecture was used to develop the AAA detection system, and transfer learning was applied to the neural network. It would be interesting to determine the accuracy of the CNN before transfer learning to show the added value of transfer learning to the pipeline.

The use of CNN to classify aneurysm from nonpathologic aortas has so far been poorly reported.² Nevertheless, several studies have recently demonstrated the interest in CNN to develop a fully automatic segmentation of AAA.³⁻⁵ These studies showed good accuracy for the methods compared with human experts and demonstrated the feasibility of using AI for automatic measurement of the AAA maximal diameter.⁴⁻⁶ Hence, CNN offers perspectives to develop applications oriented toward screening and identification of AAA and new tools to facilitate its anatomic characterization, which could improve preoperative planning and follow-up. As stated by the authors, in addition to the development of advanced imaging analysis, machine learning has the potential to build predictive models of patients' outcomes. Several studies have underlined the interest to better assess AAA growth, the risk of rupture, and the risk of postoperative complications, including mortality and reintervention.⁷⁻⁹ AI has the potential to enhance precision medicine. Although further studies are required to evaluate the accuracy and external validation, applications for clinical practice can hopefully be expected within the next few years.

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