The answer to noninvasive biomarker development in lung cancer

During an overcrowded exhilarating session on Monday 27th November at the RSNA 2017 Congress in Chicago, Dr. Hugo Aerts, from Harvard University in Cambridge, explained to delegates that artificial intelligence (AI) is indeed playing a pivotal role in the development of new imaging biomarkers for lung cancer.

A key topic of interest during this year's congress, delegates gathered in the room to listen closely to Dr. Aerts discuss one of today's most trending subjects across healthcare, and in particular, in radiology. Dr. Aerts used engaging comparisons to demonstrate his points on the matter, in fact comparing the impact of AI on radiology to that of self-driving cars on transportation. Just as self-driving is capable of exceeding human performance in some instances, AI can assist radiologists in areas where they have limitations, such as determining if a lung nodule found on screening is benign or malignant.

"Benign and malignant nodules often look similar to humans," Dr. Aerts said. "By finding very subtle differences in the nodules, AI can go beyond human performance."

Dr. Aerts explained to the audience how current methods for sampling lung tumours such as invasive needle biopsy has limitations, as they are often unable to fully capture the spatial state of the tumour.

Whereas, radiomics which represent the quantification of tumour characteristics through medical imaging, is in fact suited to tracking a tumour's physical characteristics before, during and after treatment.

Indeed, medical imaging offers the additional advantage of being a noninvasive technique that can be performed with minimal risk or inconvenience to the patient, Dr. Aerts reminded delegates. And the use of Deep Learning (DL) provides access to an immense amount of data that allows the radiologist to draw more accurate conclusions.

"Through the application of AI in radiology, we can extract more information from the image than meets the eye, improving treatment for the patient," Dr. Aerts said.

"You need to know the volume and extent of a tumour for treatment, but it's much more difficult to predict survival," Dr. Aerts said. "Through DL, we can find characteristics that predict if patients will have good outcomes. It is replacing what is already done and improving it."

Dr. Aerts and various colleagues carried out a study this year which involved 262 North American and 89 European patients with lung cancer. They identified previously undescribed associations among radiomic imaging features, molecular pathways and clinical factors. A number of imaging features like intra-tumour heterogeneity showed predictive value for specific disease pathways.

"Several biomarkers have been discovered in research settings and hopefully will be in the clinic within the next few years," Dr. Aerts explained.

Reminding the audience to keep calm over the notion of AI, Dr. Aerts warned against the mistaken notion of machines eventually taking over.

Concluding his points, Dr. Aerts summarised by saying that "AI will change how radiology is practiced, but will not remove the need for radiologists".

Image Credit: RSNA

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