

Science slam  
04:15 – 04:30 pm

## AI in breast care – hype or hope

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### Radiomics for automated breast cancer diagnosis: The truce between machine learning and deep learnings

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The use of radiomics in cancer diagnosis has seen exponential growth in interest over the past few years. Either via machine learning (ML) algorithms fed with engineered features or deep learning (DL) with convolutional neural networks, research in radiomic-based computer-aided diagnosis (CADx) is exploding. This isn't just thanks to advances in artificial intelligence (AI); it's also due to improvements in imaging, which is being continuously optimized to increase image quality and diagnostic performance. For X-ray breast imaging, 3D technologies like digital breast tomosynthesis (DBT), and more recently dedicated breast CT have been introduced to overcome the inherent 2D limitation of digital mammo-graphy. As a result of including the third dimension, increased insights into breast tumor characterization can be achieved. From the perspective of radiomics, these can translate into significant imaging biomarkers that may be used to develop CADx systems to help improve the diagnostic accuracy of breast cancer imaging.

In this lecture, the potential of ML and DL radiomics for quantitative tumor malignancy prediction in breast CT images is discussed. A variety of radiomic solutions, based on both independent ML and DL algorithms and on fusion strategies that integrate the two approaches are presented and compared. Promising results were obtained, especially when incorporating ML and DL radiomics into a single AI system. This suggests that ML and DL may complement each other – at least for some clinical applications and for specific image datasets – and the most effective fusion strategies can continue to be investigated in depth in the future.

#### Learning objectives:

- Describe the potential of 3D X-ray imaging and radiomics for breast cancer diagnosis
- Understand the main differences and the potential synergy of machine learning and deep learning in breast image analysis

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