Applications on AI-enhanced breast imaging

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One of the most promising areas of health innovation is the application of AI in biomedical imaging. Medical imaging has always been an integral part of disease diagnosis and treatment decisions. With the possibility to use AI for image, i.e radiomics analysis to identify findings either detectable or not by the human eye, radiology is now moving from a subjective perceptual skill to a more objective science. Out of the myriad proposed use-cases for AI in radiology, breast cancer is one of the most researched. Advances in radiomics analysis, i.e. the extraction and correlation of multiple imaging parameters with different variables of interest (patients' characteristics, histopathologic, genomic, molecular or outcome data) and machine learning (such as deep learning) are on the cusp of providing more effective, more efficient, and even more patient-centric breast cancer care support than ever before. Radiogenomics aims to correlate imaging characteristics (i.e., the imaging phenotype) with gene expression patterns, such as molecular subtypes, gene mutations, and other genome-related characteristics. Radiogenomics is designed to facilitate a deeper understanding of molecular tumor biology through the extraction of parameters derived from image processing and analyses of medical images that are linked to the geno- and phenotypic characteristics of the tissue. Due to the non-invasive nature of medical imaging and its ubiquitous use in clinical practice, the field of radio/-genomics is rapidly evolving and initial results are encouraging. This presentation will explain the concept and methodology of radiomics/genomics and AI, summarize the current applications of radiomics/genomics in breast MRI and address its challenges and limitations.