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Guest Editorial

Future of breast imaging

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Breast imaging is at a very exciting place from where the future looks very promising. Rapid integration of risk assessment tools, individual risk factors and medical history and addition of technologies such as Digital Breast Tomosynthesis, Contrast Enhanced Mammography and Contrast Enhanced MRI are paving way to early detection of breast cancer.

The heterogeneity of breast cancer is well known, and the classification continues to evolve from the traditional histological variants to distinct subtypes based on immunohistochemical expression and further molecular classification. Heterogeneity in genetic expression is likely responsible for variable behaviors and prognosis.[1] The pioneering work by Perou *et al.* in the beginning of the century has led to the evolution of multiple gene panels (assays) such as 21-Gene recurrence score (Oncotype Dx), Prosigna gene signature, Mammaprint etc.[2] These technologies have allowed medical oncologists to move away from one hat fits all approach to a more personalized treatment plan with de-escalation of adjuvant and neoadjuvant treatments.

However, despite advanced imaging techniques such as MRI, PET CT, targeted treatments, and tailored chemotherapeutic regimes, we are still quite far away from having patient specific predictive information which would allow improved therapeutic interventions and retain quality of life for the patient.

MRI is established in the neoadjuvant treatment of breast cancer as the most accurate way of evaluating the response to treatment and estimating residual tumor tissue before patient goes for surgery, but it would be most ideal if there was a way to know how the specific tumor would respond before the administration of chemotherapeutic agents.

MRI images are enriched data, a goldmine for machine learning. Advancement in artificial intelligence (AI) will allow mining of these rich data sets and determine individual characteristics of the breast tissue (signature) which will provide prognostic and predictive information.[3] This will further direct treatment selection for the specific type of breast tissue, truly personalizing adjuvant and neoadjuvant treatments.

Artificial intelligence and Machine learning will play a significant role in screening and diagnostic breast imaging. Kristina Lång's recent publication in *The Lancet* demonstrated the safety of AI based mammography reporting showing comparable results with double reading while substantially lowering the screen-reading workload.[4]

While we are racing ahead with technology and AI, advocacy efforts also need to be enhanced so that we can offer the right breast cancer screening test to women based on individual risk factors and breast density.

Breast imaging radiologists are integral to breast cancer diagnosis and management. The future of breast imaging will involve ongoing research and strong multidisciplinary collaboration, which will deliver cutting edge care to our patients, allow transformative advocacy, and provide compassionate support.

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