Biotechnologies, Imaging Modalities and Analysis Methodologies for Probing the Breast Cancer

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Dear Colleagues,

Breast cancer is the most threatening malignant tumor for women worldwide. According to the global cancer statistics, both the occurrence rate and mortality rate of breast cancer rank first among the female population, with 24.2% and 15.0% respectively. Early screening and identifying of breast cancer offer early opportunities for patients to receive timely treatments, thus elevating the survival rate and improving the life quality.

Imaging modalities, such as X-ray mammography, breast ultrasonography, and magnetic resonance imaging (MRI), are the most frequently-used approaches for screening of breast cancers in clinic. Nevertheless, none of these modalities is ideal to combine multiple advantages such as high sensitivity and specificity, low cost as well as fast measurement. The biopsy test is the golden standard to identify the cancerous cells, which, however, due to the disadvantage of invasiveness, only serves as the last option for patients suffering from breast diseases.

Seeking for the ideal approaches to probe breast cancer is always the effort for both scientists and clinicians. In recent year, a few technologies are emerging, as opposed to the conventional approaches, for probing the breast cancer, either invasively or noninvasively. For example, fluorescence technology has been developed to identify the cancer cells, which are known to overexpress Glut5, a sugar transporter accounting for the transfer of fructose across the cell membrane. Because Glut5 transporter is not overexpressed in healthy breast cells, the fluorescent-tagged fructose could be used to differentiate between healthy and cancerous cells. Another alternative for breast cancer detection is functional imaging. For example, the near-infrared diffuse optical/correlation tomography (DOT/DCT) have been developed to probe the abnormal tissue blood flow/oxygenation/oxygen metabolism. Because the cancerous cells are with the feature of abnormally higher metabolic demands, subsequently elevating the microcirculation and causing the poor oxygen status. Those functional abnormalities caused by the cancerous cells often appear earlier than the morphological changes that are detectable by the conventional imaging modalities. Hence, the functional imaging offers a new strategy for early screening of the breast cancer.

In addition to the biotechnologies and imaging modalities mentioned above, the advanced data analysis methods are emerging, in recent years, with aim to assist the diagnosis of breast cancer through integrating a variety of measuring modalities and numerous parameters. The data analysis methods, particularly those combing with the artificial intelligence (AI), have promising potential for future detection of breast cancer.

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To promote the latest progress in the creation, development and clinical usage of various approaches for probing the breast cancer, we invite the submission of original research or review articles to Special Issue of European Journal of Gynaecological Oncology. This special issue is planned to cover all of the new principles, technologies, or applications of the possible methodologies or strategies that will benefit for diagnosis or earlier screening of the breast cancer.

Key Words: Breast Cancer; Imaging; Biotechnology; Data Analysis

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