Université Lille Nord de France
Pôle de Recherche et d'Enseignement Supérieur

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Titre Thèse	Approach based on the parallelism between prognostic biomarkers and physiological µ-vibration concept to treatment decisions in breast cancer		
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Abstract :

Cancer pathology is a heterogeneous disease where several genes and cellular pathways have an impact on aggressive tumor behavior. Cancer treatment regimens are frequently tailored according to the genetic alterations or protein expression levels in individual genes using readily available archive specimens. Thus, a more specific tumor classification may be attained by identifying a set of criteria threshold with prognostic and predictive values. Therefore, statistical models will be developed that can identify candidate biomarkers which affect tumor behavior and patient clinical outcome (disease-specific and overall survival). Here, this will be done by integrating the results from genome-wide transcriptional, SNP, DNA methylation, RNA-seq correlated with physiological measurements by functionalized bio-sensor and clinicopathological features for the patient cohort.

Purpose and aims

Breast cancer is among the most common malignancies among women worldwide. Approximately 35 % of breast cancer patients will develop recurrence within 5 years after initial diagnosis. There is, therefore, a need to improve patient risk assessment and to personalize therapy according to a combination of patient-specific clinicopathological features and tumor characteristics. To improve stratification of breast cancer patients, we will evaluate genetic, epigenetic, abnormalities in relation both to clinicopathological and the physiological indexes history of the patient. These analyses will be performed on tumor samples retrieved from the bio bank at the Department of Oncology, Sahlgrenska University Hospital. On the biological level, clinical information will be obtained from the National Quality Registry at the Regional Cancer Center West and the Cancer Registry at the National Board of Health and Welfare.

We hypothesize that tumor property, e.g. physiological evolution, aberrant genetic and epigenetic changes may guide the selection of therapeutic targets and refine assessment of prognosis, which in turn could have a decisive impact on the outcome of future cancer treatment. It is therefore important to determine the biophysics events involved in cancer development.

The focus of this project is to:

1. Identify novel genetic and epigenetic biomarkers associated with breast cancer-specific survival which in turn might improve clinic-pathological classification,
2. Examine whether the identified candidate biomarkers are breast cancer-specific or general key cancer genes,
3. Assess without chirurgical act, by a concept on µ-beams vibration the tumor properties and tumor potential treatment,
4. Reduce the physiological volume liquid analysis byapplied a lab-on-chip cell concept.

Subsequently, these bio-physics parallelism may be useful as targets for early detection, drug development, patient stratification, and improved therapy.