Novel predictive biomarker panel, using a Luminex-based RNA assay.

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Technology Overview and Applications — Quantigene Plex Assay

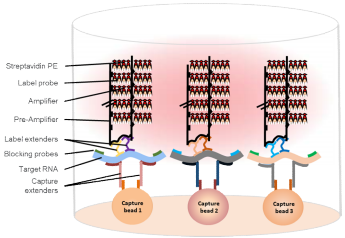

Figure 1. The target-specific probe set and signal amplification.

The Invitrogen™ QuantiGene™ Plex Assay by Thermo Fisher Scientific uses branched-DNA (bDNA) technology to amplify signals, measuring gene expression by probing RNA. bDNA uses sequential hybridization of oligonucleotides to a captured target RNA in order to amplify a signal for quantitative measurement (**Figure 1**). Thermo Fisher uses branched DNA in several platforms, including gene expression, fluorescent in situ hybridization (FISH), and flow cytometry (**Figure 2**).

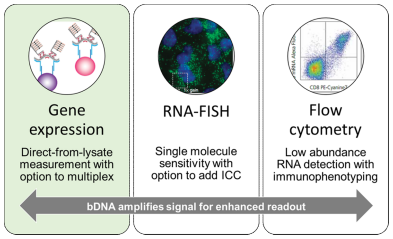

Figure 2. Applications of the Invitrogen™ QuantiGene™ Assay.

Translational Research in Molecular Oncology

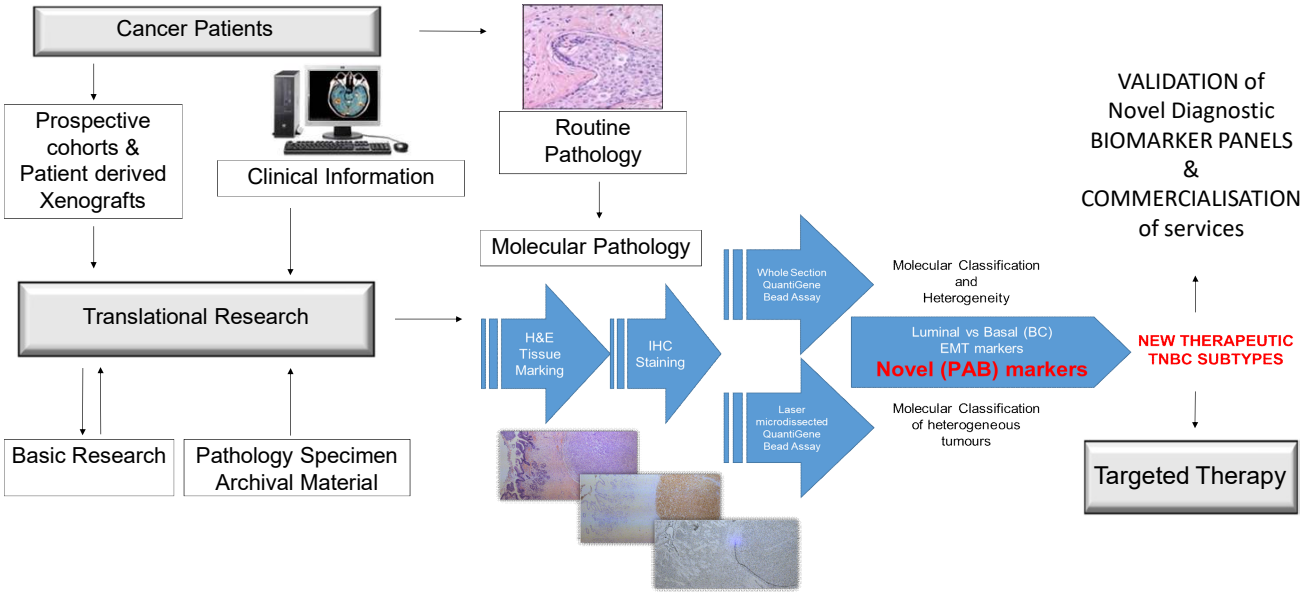

Figure 3. **Workflow to classify breast cancer samples at a molecular level** includes staining whole sections with Haemotoxylin and Eosin (H&E), followed by specific immunohistochemistry staining. An Invitrogen™ QuantiGene™ bead-plex assay is used to measure gene expression of luminal/basal markers, epithelial/mesenchymal markers, the expression of the phosphatase protein 2a (PP2a) subunits and the PP2a activity biomarkers (PAB). Samples can be classified using whole sections and also provide information on heterogeneity of the sample. Laser Microdissection is used to capture different tumour sites within a sample and fed through the pipeline for classification using the bead assay. A novel Biomarker panel predicting sensitivity to PP2A activators, in a specific molecular subtype of Triple Negative Breast Cancer (TNBC), was identified. The diagnostic biomarker panel is validated and currently commercialisation efforts are ongoing (ACT project, FUSION, MCST grant). Current research include the use of the technology and novel biomarkers in tumours from different origin and in liquid biopsies (markers in blood).

Achievements in 2017

- ✓ Luminex - jove **Award**
- ✓ Launch of **spin-out** company, Biotech Innovations Ltd.
- ✓ Presented ThermoFisher SCIENTIFIC **Webinar** entitled *"The power of multiplexing and applications of the QuantiGene Plex Assay in oncology research and diagnostics".*
- ✓ Filed **patent** entitled, "Optimisation of a multiplex RNA-based Expression Assay to molecular classify Breast Cancer patients"
- ✓ Filed **patent** entitled, "Novel Biomarkers predicting sensitivity to PP2A activators in Cancer"

Research Team

1. Dr Romina Briffa. Gene amplifications in Colorectal Cancer (Post Doc Fellow) *in collaboration with St Andrews University (FISH, CRISPR, Quantigene plex assays)*
2. Professor Christian Scerri. Principal Investigator, Clinical Genetics. *Clinical correlates, Genetic analysis, Dissemination and Communication*
3. Ms Maria Pia Grixti. PP2A complex Deregulation in cell lines (PhD student) *Cloning, polysome bound mRNA, RNA seq*
4. Professor Godfrey Grech. Principal Investigator, Translational Cancer Research. *Validation and commercialisation projects*
5. Dr Shawn Baldacchino. Validation of novel Biomarkers (Post Doc Fellow) *Quantigene plex assays, tissue microarrays, Laser microdissection facility*
6. Dr Christian Saliba. In vitro sensitivity assays and Quantigene (Post Doc Fellow) *Quantigene plex assays, laser microdissection facility, xenograft models*
7. Ms Jeanesse Scerri. Therapy Resistance in HER2+ BC patients. (PhD student) *Liquid biopsies, fluorescent microscopy, molecular diagnostics*

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Faculty of Medicine and Surgery
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Project Partners

EurOPDX Translating Knowledge in Oncology

APPLIED BIOTECH LIMITED

Luminex complexity simplified.

The University of Malta Research, Innovation & Development Trust

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