

Corporate Scholarship Presentations

C1.3

Medical Advancement and Innovative Technology

10:45 Room 428

Multicolour Flow Cytometry in Clinical Haematology

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Cellular immunophenotyping refers to the detection of molecules on the cell surface, within cytoplasm or intracellular organelles. Such molecules can be visualised by flow cytometry using fluorochrome-tagged monoclonal antibodies. Flow cytometers have the capacity to analyse multiple parameters on a single cell with high precision and throughput. Different cell populations can be graphically presented as distinct clusters. Subpopulations or minor events can be isolated and characterised by sequential gating strategies.

Application of flow cytometry in clinical setting requires knowledge of physics related to excitation and emission of fluorochromes from source of lasers at various wavelengths. Moreover, an adequate understanding of the biology of molecules and cell type is mandatory. In the recent decade, there are new combinations of fluorochromes and antibody conjugates that support robust multicolour flow cytometry assays including diagnosis of haematolymphoid malignancies and minimal residual disease (MRD) monitoring. The quality of data, however, depends on correct antibody panel design and instrument setup. The sensitivity and resolution also require optimal colour compensation to avoid spectral overlap.

A short turn-around-time (TAT) in one to three hours for the diagnosis of haematolymphoid malignancies according to World Health Organization guidelines can be achieved using multicolour flow cytometry. This is essential in order to initiate immediate treatment for acute leukemia and to triage cases for relevant molecular genetic testing. Laboratories also employ sequential staining with screening and confirmatory panel as a cost-effective approach. The technology of multicolour flow cytometry can provide information of antigen co-expression and thus can identify patient-specific immunophenotype for subsequent MRD assay. Moreover, the ability to work on lower sample volume has facilitated the analysis on paediatric and body fluid samples. The smaller number of assay tubes to handle also improves workflow efficiency.

Despite the emerging advancement of molecular technology, flow cytometry remains as an indispensable service in haematology laboratories.