BME 695 Engineering Nanomedical Systems
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Lecture 12: Assessing drug efficacy and nanotoxicity at the single cell level

12.1 Introduction to measures of efficacy for nanomedicine
- 12.1.1 for evaluation purposes, does structure/size reveal function?
- 12.1.2 nanomedical treatment at the single cell level requires evaluation at the single cell level
- 12.1.3 the difficulty of anything but simple functional assays (e.g. phosphorylated "functional" proteins)
- 12.1.4 the need for assays which at least show correlation to functional activity

12.2 Quantitative single cell measurements of one or more proteins per cell by flow and image/confocal cytometry
- 12.2.1 cell surface measures of protein expression on live, single cells
- 12.2.2 high-throughput flow cytometric screening of bioactive compounds
- 12.2.3 challenges of measuring protein expression inside fixed, single cells
- 12.2.4 when location is important 2D or 3D imaging is required to get spatial location of proteins inside cells ("locational proteomics" at the single-cell level)

12.3 Quantitative multiparameter phospho-specific flow/image cytometry as a single-cell, structural-functional measurement
- 12.3.1 attempts to measure "functional proteins" by detecting phosphorylation
- 12.3.2 example of phospho-specific, multiparameter flow cytometry
- 12.3.3 example of measuring single cell gene silencing by phospho-specific flow cytometry

12.4 Quantitative measures of gene expression – the promises and the realities
- 12.4.1 is gene expression at the single cell level really possible?
- 12.4.2 is it even useful to measure a single gene's changes?
- 12.4.3 gene arrays of purified cell subpopulations
- 12.4.4 RNA amplification techniques to attempt to perform single cell gene arrays

References

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