

Lecture 6: Rare-event targeting of cells in-vitro and in-vivo

- I. Assessing nanomedical system (NMS) targeting at the single cell level
 - A. Fluorescent labeling of NMSs
 - B. First estimates of NMS binding by fluorescence microscopy
 - C. Internal or external binding by confocal microscopy
 - D. Single-cell image/confocal analysis
 - E. Flow cytometric quantitation of NMS binding to specific cell types

- II. Image confocal analysis of NMS binding to single cells
 - A. Ability to scan/locate cells of interest
 - B. Photobleaching challenges
 - C. Optical sectioning for 3D location of NMSs on/within cells

- III. A quick overview of flow cytometry
 - A. Basic principles
 - B. Capabilities and limitations
 - C. Use for assessing specificity and sensitivity

- IV. Rare-event analysis of NMS targeting to desired cells
 - A. Basic concepts of rare-event analysis
 - B. Strategies for rare cell detection
 - C. More advanced flow cytometry for ultra-rare cell detection
 - D. Examples of rare cell detection
 - E. Rare cell sampling statistics

References

1. Leary, J.F.: "Strategies for Rare Cell Detection and Isolation" In: Methods in Cell Biology: Flow Cytometry (Edited by Z. Darzynkiewicz, J.P. Robinson, H.A. Crissman), vol. 42: pp. 331-358, 1994.
2. Leary, J.F. "Ultra High Speed Cell Sorting" *Cytometry Part A* 67A:76–85 (2005)
3. Rosenblatt, J.A., Hokanson, J.A., McLaughlin, S.R., Leary, J.F.: A Theoretical Basis for Sampling Statistics Appropriate for the Detection and Isolation of Rare Cells Using Flow Cytometry and Cell Sorting *Cytometry* 26: 1-6; 1997.