

Proposal: Real-time optical biopsy.

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Statement of the problem.

Fine Needle Aspiration (FNA) is a diagnostic procedure based on the insertion of a thin, hollow needle into the diseased tissue to extract cells that will later be stained and examined under a microscope. The procedure is relatively safe and less traumatic than open surgical biopsy, but it has two major disadvantages: (i) there is a risk that the problematic cells will be missed (sampling error), due to the fact that very small volumes are sampled, resulting in possible false positive results; (ii) it may take days to weeks to obtain the results, due to the need of sample preparation, staining, visualization, and interpretation of results. While there are several ways to address the sampling error problem, including ultrasound guided FNA, there is currently no viable solution for the second problem.

The goal of this project is to develop technology that allows real-time diagnosis via the measurement of real-time Raman spectra in tissue through a needle commonly used for FNA.