

INTRODUCTION

Solid tissues are complex structures composed of heterogeneous mixtures of morphologically and functionally distinct cell types. Successful collection of tissue samples for molecular analysis requires critical considerations. It is essential to analyze the pure specific cell types to accurately identify and define the biologically important processes in actual pathologic lesions. Laser capture microdissection (LCM) is a state of the art technology for isolating highly pure cell populations from a heterogeneous tissue section. The DNA, RNA or protein from captured cells can be used for a wide range of downstream applications such as gene expression analysis, DNA sequencing, loss of heterozygosity, and proteomic assays, etc. Protocols have been developed and optimized for the acquisition of high-quality RNA and DNA from both frozen and formalin-fixed paraffin-embedded (FFPE) tissue in our core lab.

Table 1. Optimal Source Material

	Frozen	FFPE
DNA	+++	+++
RNA	+++	+~++
Protein	+++	-

Figure 1. The workflow of LCM

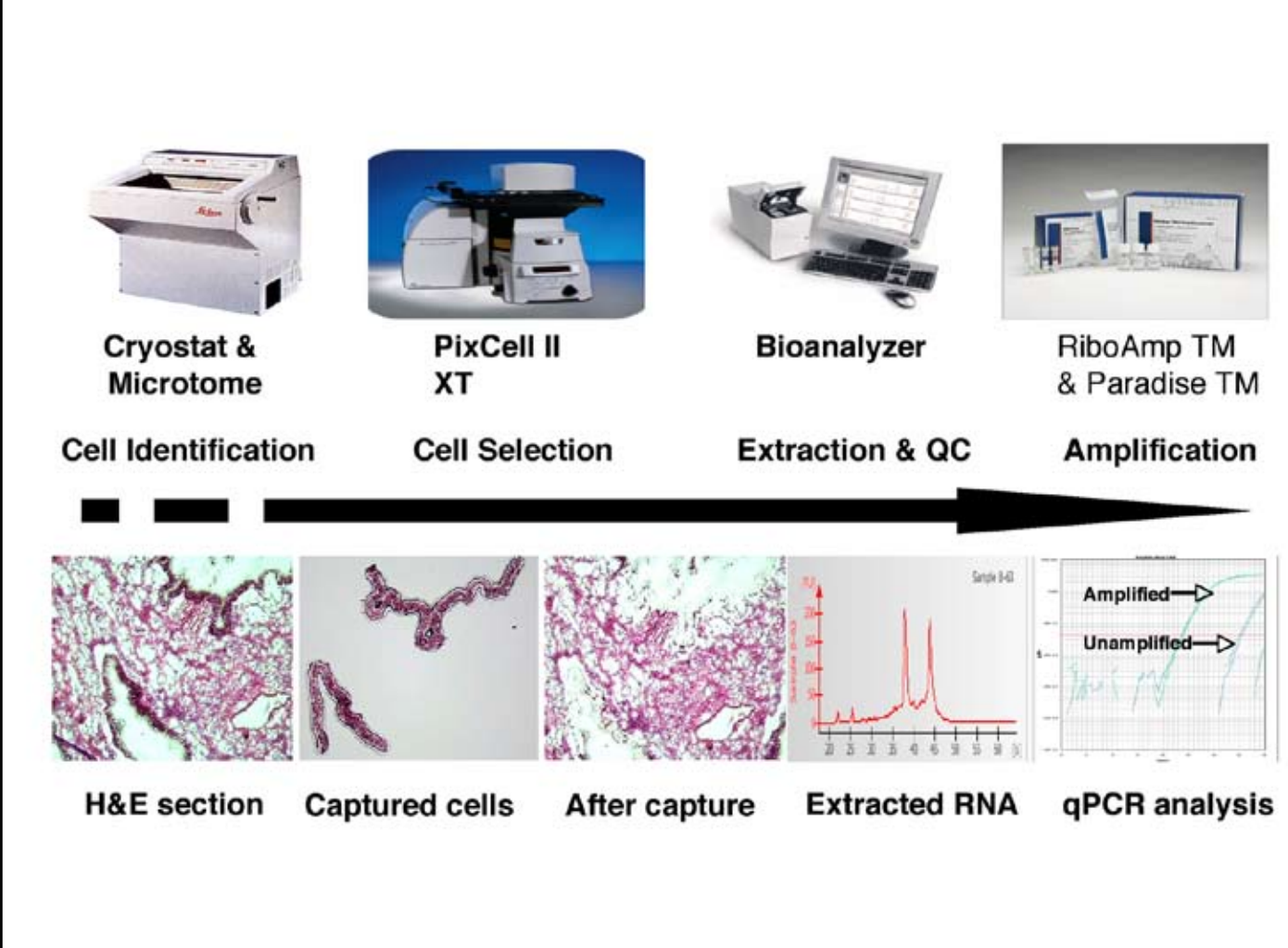


Figure 2. LCM is required for detecting alterations of DNA damage response gene *ATR* in Hodgkin's lymphoma

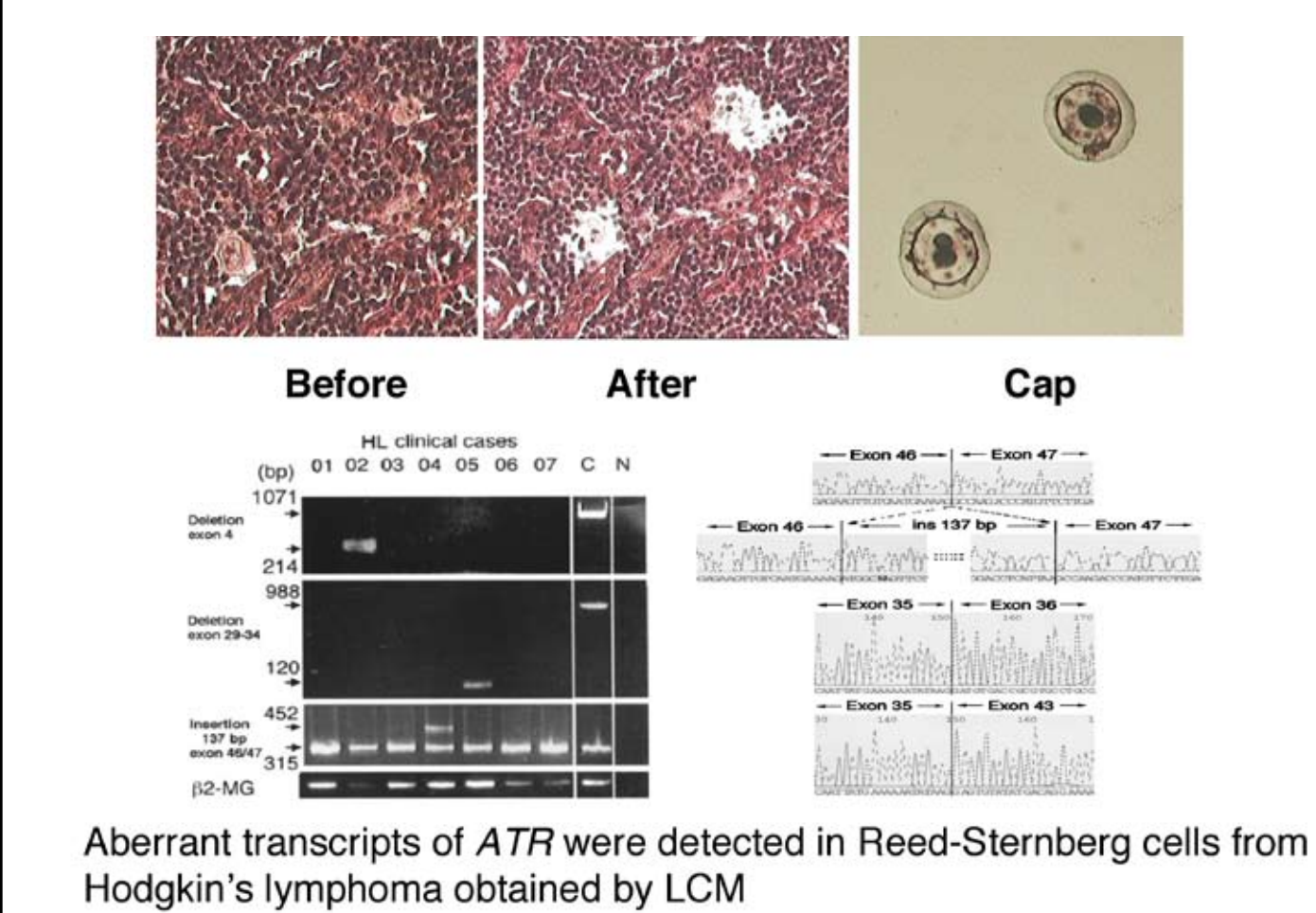


Figure 3. LCM significantly reduced prostate cancer and autosomal dominant polycystic kidney disease tissue samples pre-analytical variability

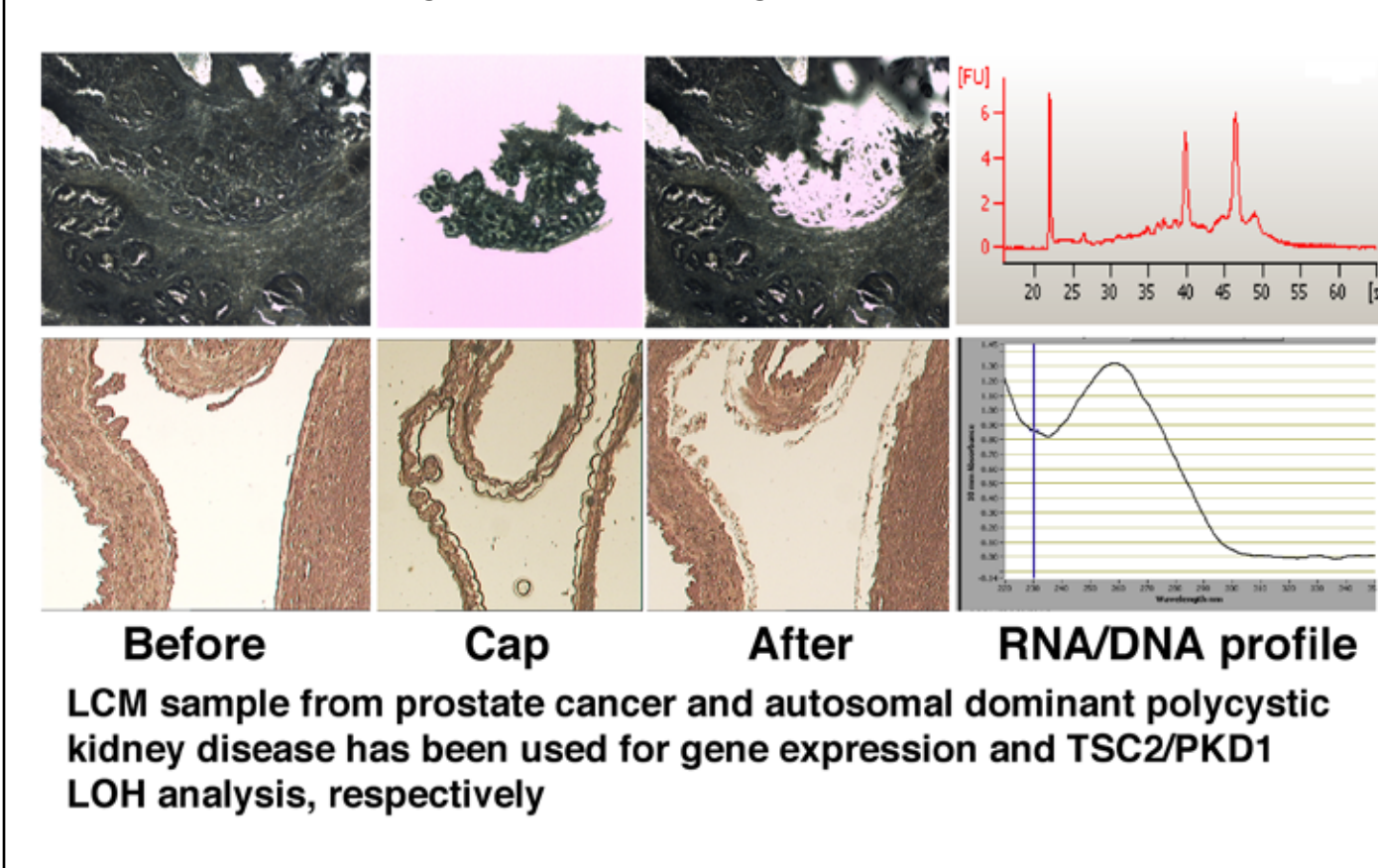


Figure 4. Gene expression profiles from LCM tissue differ from that of whole tissue

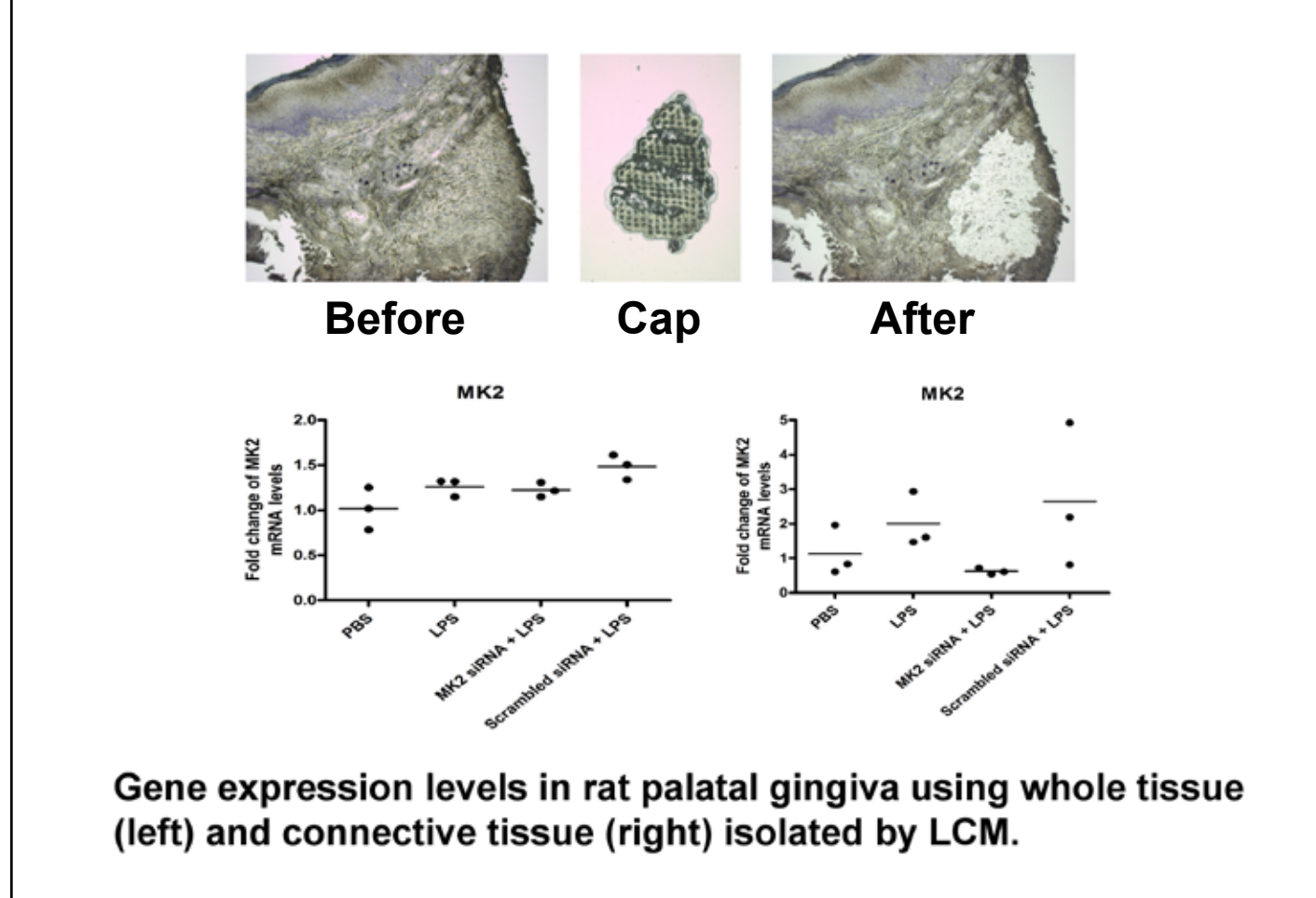
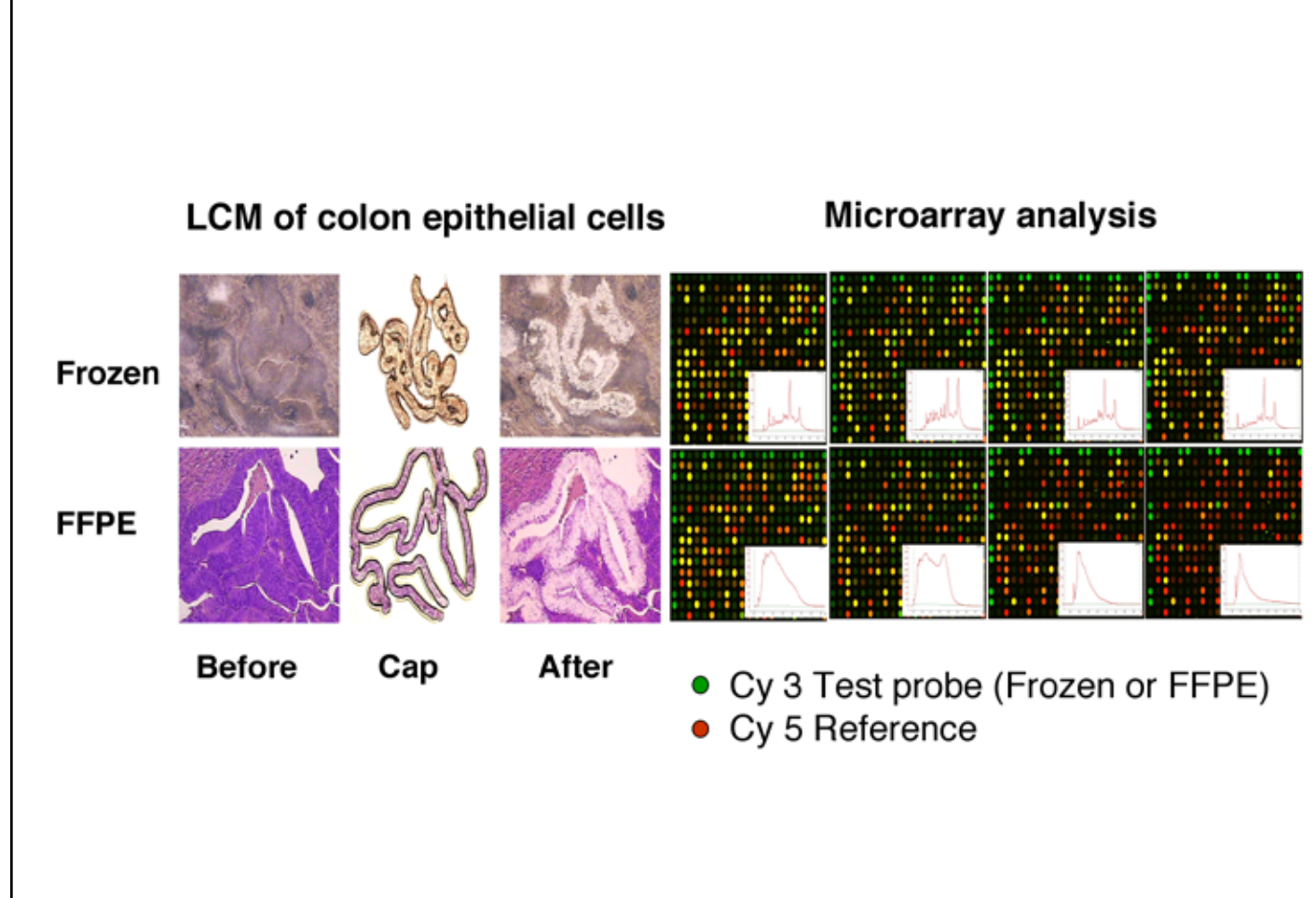


Figure 5. RNA from both frozen and FFPE tissue can be used for gene microarray analysis



CONCLUSION

Our work has shown that LCM can efficiently reduce tissue specimen pre-analytical variability. Combining LCM and the Tissue Biorepository, has opened ways to find and identify biomolecules that are specific for various cell types, tissues, and their morbid alterations. Together they offer a comprehensive means by which researchers can utilize valuable human tissue specimen and cutting edge technology to facilitate the basic, translational and clinical research.