New analysis method may reduce need for invasive biopsies

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Scientists have identified a quantitative method to measure changes in biomarkers, which may reduce or eliminate the need for invasive biopsies. The method, described in the February 2016 issue of *The FASEB Journal* uses a novel chimera design of DNA and small DNA with a companion contrast agent to allow antibodies to cross cellular membranes. Once across these membranes, the tissues being evaluated can be imaged a much greater level of detail than what is possible now. This could significantly impact the use of gene therapy and stem cell therapy, as well as lead to better diagnosis and treatment of cancer, Alzheimer's disease, viral infections, HIV, herpes and prion diseases.

"Dr. McCoy does not have to perform a biopsy to know the disorder and cure patients without surgery in Star Trek," said Philip K. Liu, Ph.D., a researcher involved in the work from the Athinoula A. Martinos Center for Biomedical Imaging at Massachusetts General Hospital in Charlestown, Massachusetts. "This finding avoids biopsy and it makes a 'McCoy diagnosis' one step closer to reality."

To make this advance, Liu and colleagues used three groups of mice. This first group received a complete chimera (antibodies to rhodopsin linked to a reporter agent and small DNA), the second group received a chimera without DNA. A third group had damaged retinas and a less rhodopsin. The first group showed a presence of the chimera in the retina using MRI (in vivo) or TEM (ex vivo). Uptake and targeting of complete chimera were compared in the third group and the first group. Results showed that the third group had significantly less uptake of chimera.

"There will be a time when biopsies are considered primitive," said Thoru Pederson, Ph.D., Editor-in-Chief of *The FASEB Journal*, "and as developments in imaging technology and techniques improve our capabilities, the need for invasive, and sometimes painful, biopsies is greatly decreased."

More information: J. Ren et al. Imaging rhodopsin degeneration in vivo in a new model of ocular ischemia in living mice, *The FASEB Journal* (2015). DOI: 10.1096/fj.15-280677

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