



Kumaran Kolandaivelu, MD, PhD

Young Clinician Award

Investigator Profile



Education

- MD, Harvard Medical School, 2005
- PhD, Massachusetts Institute of Technology, 2005
- MS, Massachusetts Institute of Technology, 2003

Clinical / Professional Appointment

- Brigham & Women's Hospital/VA, Cardiology Fellowship
- Massachusetts Institute of Technology, Research Fellow

Recent Honors and Awards

- 2008-2009, Soma Weiss Fellowship Teaching Award
- 2008-2009, BWH Resident Teaching Award

Impact on Care

- Poor medication compliance is a key health care inefficiency.
 - One month after a heart attack only 60% of patients are compliant with their medications, falling to less than 20% after one year.
 - Patients nonadherent to cardiac medications are 3 to 10 times more likely to die after a heart attack than compliant patients.
 - Noncompliance leads to ~\$100B direct health care costs annually
- Provider ability to assess outpatient compliance is limited. Indirect approaches are biased while direct approaches are easily manipulated and need not reflect longitudinal compliance patterns.
- Hair testing - a well-established forensic technique for detecting illicit drugs - offers a promising approach.

Abstract

We are developing a standardized and objective biochemical assay of compliance. Rather than test hair for presence of drug, the assay will analyze hair for trackable substances, or tags, that are formulated with drugs (Figure 1). We will perform an *in vivo* screen on a rationally assembled compound library to determine potential tag candidates with optimal properties, and then test the ability of these tags to monitor inter-day compliance. Specifically, we aim to

1. **Establish** a weighted compound library and a standardized assay method for chemical separation, identification, and quantification
2. **Restrict** the library for tag compounds displaying optimal hair uptake
3. **Validate** the ability of our assay to detect administration patterns in a Fgf5⁹⁰/Fgf5⁹⁰ long-hair mouse model.

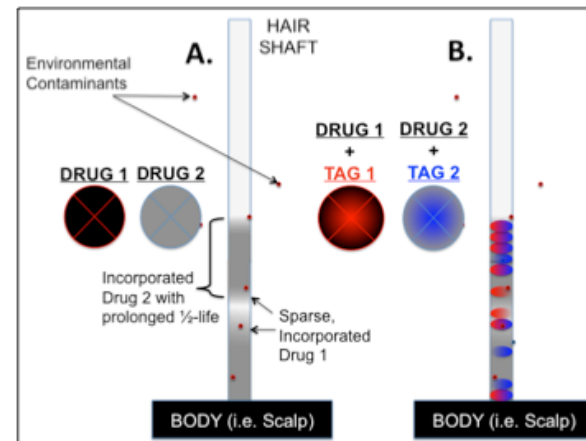


FIGURE 1. A) Two drug regimen (1 & 2) with widely disparate, suboptimal hair accumulation properties. Drug 1 has sparse hair uptake and environmental contaminants. Drug 2 has suboptimal pharmacokinetic properties. B) Drugs (1 & 2) formulated with tags with attributes optimized for hair uptake and compliance monitoring.