Recent advances in biomedical interventions with critical behavioral aspects (e.g., Pre-exposure Prophylaxis [PrEP], Treatment as Prevention [TasP]) have shown that reductions in HIV incidence will have to be achieved through implementation of combinations of interventions that include both biomedical and behavioral interventions. Designs that allow investigators to determine optimal combination of interventions hold greater promise for this purpose, and thus in the first part of the talk, I will discuss the relative properties of four leading candidate trial designs in combination prevention: a ‘single-factor’ design, a ‘factorial’ design, a ‘multi-arm’ design, and an ‘all-in-one’ design. Then I will focus on evaluation of complex epidemiological models of infectious diseases, which are used in understanding transmission dynamics of a disease, predict effect of interventions, and provide information for power calculations of community-level intervention studies. I will describe a framework for evaluating the predictions of these complex models and describe experiments that can be used to test their predictions.