**Statistical inference for response-adaptive clinical trials**

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**Location:** MRC Biostatistics Unit, University of Cambridge

**Detailed description:** Clinical trials typically randomise patients to the different treatment arms using a fixed randomisation scheme, such as equal randomisation. However, such schemes can mean that a large number of patients will continue to be allocated to inferior treatments throughout the trial. To address this ethical issue, response-adaptive randomisation (RAR) schemes have been proposed, which update the randomisation probabilities using the accumulating response data from the trial, so that more patients are allocated to treatments that are performing well. RAR has particular promise in the development of targeted patient-specific treatments, as well as in rare disease trials.

A long-standing barrier to using response-adaptive trials in practice, particularly from a regulatory viewpoint, is concern over their frequentist properties, such as bias and type I error inflation. The PhD project aims to help address this by developing statistical methodology for error control and unbiased estimation in response-adaptive clinical trials. The resulting inferential procedures would be of great interest and allow for a better understanding of the operating characteristics of trial designs incorporating RAR. Specific areas of focus could include:

- Investigating (by simulation and/or analytically) the conditions under which RAR inflates the overall type I error rate of a trial
- Developing exact methods for controlling the type I error rate in response-adaptive trials, through the use of adaptive testing procedures
- Extending recent work on unbiased estimation for response-adaptive clinical trials [1] to treatment-control differences, as well as continuous outcome variables

As part of the PhD there may also be the exciting opportunity to contribute to the design of planned response-adaptive clinical trials in breast and ovarian cancer.

**References:**

**Start date:** Michaelmas Term 2018

All application queries regarding eligibility should be directed to phdstudy@mrc-bsu.cam.ac.uk

**How to Apply:** Applications should be made on-line via www.graduate.study.cam.ac.uk/applicant-portal selecting course details MDBI22 PhD in Biostatistics

**Deadline for applications:** 4th January 2018