Investigation of Bayesian adaptive randomisation schemes in multi-arm clinical trials

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, adaptive randomisation schemes have been proposed, which update the randomisation probabilities based on accumulating evidence from the trial, so that more patients are allocated to treatments that appear to be performing well.

Many adaptive randomisation schemes in the literature are formulated within a Bayesian framework, with the randomisation depending on posterior probabilities [1]. However, the properties of some Bayesian Adaptive Randomisation (BAR) schemes in the multi-arm setting have not been systematically investigated, particularly more recent BAR schemes such as those proposed in [2].

Depending on the interests of the intern, the project would cover some of the following areas:

- Investigating (by simulation and/or analytically) the conditions under which BAR inflates the overall type I error rate of a trial
- Extending BAR schemes that incorporate patient covariates [3] to the multi-arm setting
- Assessing and mitigating the impact of time trends in patient characteristics on the performance of BAR schemes

There may also be the opportunity to contribute to the design of planned clinical trials that will incorporate BAR.

References

