Knowledge Transfer Network

Industrial Mathematics

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# STREAMLINING DRUG DEVELOPMENT WITH BETTER CLINICAL TRIAL DESIGNS

**Industrial Mathematics KTN TakeAIM Competition 2011 Winning entry**

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At the start of the millennium, big advances in basic biomedical research, especially the sequencing of the human genome, generated great optimism that innovative products would soon become available to prevent and treat human disease. However, this was being met by spiralling costs of drug development and a dwindling success rate for bringing new products to market. Concerned with this discord, in 2004 the US Food and Drug Administration launched its Critical Path Initiative to encourage scientists to make the drug development process more efficient and improve what it regarded as 'cumbersome assessment methods'.

I am currently developing new clinical trial designs that allow several treatments to be compared at once. These designs allow poorly performing treatments to be dropped as the trial progresses so that resources are gradually concentrated on only those that are most promising. Also, should it become apparent that one of the treatments is a 'blockbuster', the whole trial can be stopped early and the benefit reach patients quicker. Preliminary results from my research have already been used for a public sector study into reducing the side effects of HIV therapy.

On top of requiring less time, less patients and less money, perhaps the greatest potential impact is to help change a culture of high risk decision making, prevalent in the drug development industry, where the strategy is often to put all eggs in one basket by committing to large scale studies, investigating just a single treatment, on the back of insufficient early evidence of effectiveness.


The use of mathematics has profound consequences in all walks of life, but the opportunities that it opens up often go unrecognised or underexploited. The Industrial Mathematics KTN, enabled by the generous sponsorship of NAG, ARM and Unilever, ran the TakeAIM competition in 2011 to make visible the crucial role that mathematics will increasingly play in all aspects of our lives. The competition was open to all undergraduate and postgraduate students working in the mathematical sciences who wished to convey the potential influence of their work. Authors of the best two entries each received an iPad 2 as their prize.