Take AIM

Smith institute
for industrial mathematics and system engineering

Using mathematics to outsmart cancer

TakeAIM Winner 2016:
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Cancer kills about 8 million people worldwide yearly — and this does not even account for the suffering many go through when fighting the disease at some point in their lives!

In recent years, new technology has allowed us to gather vast amounts of data on cancer and to gain insight into its complex mechanisms of evolution, which has resulted in great advances in the treatment of some cancer types. Many of the over 200 forms of cancer, however, are still poorly understood due to the genetic complexity of the deadly disease. In particular, the cancer cells' ability to adapt to their environment over time and thus become resistant to treatments applied still poses an unsolved challenge.

My research at StAMBio focuses on this very problem: It looks at the interaction between cancer cells and their environment in order to predict how they may adapt to it over time by genetic change. My computational model is aimed to become part of a complex spatial multi-scale model. Our research group's aim is to gain an understanding of the mathematical rules driving cancer's evolutionary process to then be able to anticipate its next move and 'outsmart' it with case-specific treatment.

Unravelling cancer's complexities by using mathematics — the 'language of science' — together with advances in medical technology opens up new ways of finding optimal treatment for an individual's particular health issue. Our future vision is to individually tailor treatment to patients, making it gentler and more effective for those who need help most urgently.

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The Smith Institute, enabled by the generous sponsorship of our leading corporate partners, ran the TakeAIM competition in 2016 to make visible the crucial role that mathematics will increasingly play in all aspects of our lives. The competition was open to undergraduate and postgraduate students working in the mathematical sciences. The authors of the two best entries each received £1,250 of Apple vouchers as their prize, with Amazon vouchers being awarded to two runners-up.