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PHYSICAL SCIENTISTS TAKE ON CANCER

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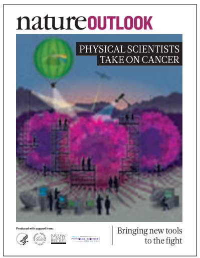

Cover art: Nik Spencer

Despite a huge worldwide research effort, cancer's mortality rate has barely changed over the past few decades. But as we report in this Outlook, collaborations between biologists and physical scientists are bringing fresh perspectives that are starting to bear fruit.

Cancer research was a joint enterprise between physicists and life scientists until about 40 years ago, when the focus switched to the molecular, genetic and cellular aspects of the disease (page S50). Robert Gatenby argues that so much focus on the underlying genetics of cancer may be obscuring the bigger picture (S55). New research backs him up, and shows that cancer is not strictly a disease of genetic mutations — its development and spread are influenced by the physical forces exerted on cells (S56).

Computer modelling is providing a better understanding of the interplay between physical, genetic and cellular aspects of cancer (S62). Mathematical modelling leads to better predictions of how a tumour will evolve, and which drug regimens will be most effective (S66). And nanotechnology is yielding drug carriers that can transport chemotherapies to their targets more accurately (S58), and diagnostic tools to identify cancer at an earlier stage (S64). One start-up company that uses this diagnostic approach is Applied Proteomics, co-founded by a cancer biologist and a computer scientist (S52).

Until we unravel cancer's basic principles, the battle can only progress in inches, rather than in miles. According to oncologist David Agus and Nobel prizewinning physicist Murray Gell-Mann, such leaps forward require grand theories, an encouraging publishing environment and researchers willing to test big ideas (S61).

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Lauren Gravitz
Guest Editor

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