



nature publishing group



► **COVER:** 'Back to the chalk board' by Lara Crow, inspired by the articles on p657 and p671, which discuss the roles of physics and pH in cancer, respectively.



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A friend once said that, “biology is chemistry, chemistry is physics and physics is math”. Although this is clearly an oversimplified view of things, this statement emphasizes the importance of interdisciplinary research in all areas of science and mathematics, and this is certainly true in cancer research.

Having recently covered mathematical modelling of oestrogen signalling in breast cancer and the role of physical and mechanical processes in metastasis, we continue the theme of interdisciplinary research on page 657, where Franziska Michor and colleagues discuss what physics has to do with cancer. We hope that our readers will agree that this article presents an accessible view of the power of physics for helping us to better understand the complex processes at work in tumours and their microenvironments. In addition, it highlights the Physical Sciences-Oncology Centers program that was launched by the US National Cancer Institute in 2009, which aims to bring together physicists, chemists, mathematicians and engineers with cancer biologists in order to better apply principles from the physical sciences to the study of cancer.

Although chemistry is probably more familiar to many of us than physics, Diane Barber and colleagues (page 671) provide us with a reminder of the importance of a phenomenon that we learned about in introductory chemistry but which we may not have thought much about since: pH. Most tumours have a ‘reversed’ pH gradient in which intracellular pH is increased and extracellular pH is decreased; this can affect pH-sensor proteins, leading to cancer cell adaptations, and it also has therapeutic implications.

So, for those of us who consider ourselves to be biologists, it’s time we considered how the study of chemistry, physics and mathematics can help us to better understand, and ultimately treat, cancer.

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Printed in Wales by Cambrian Printers
on acid-free paper