

From experience, we believe that doctors are far less accepting of such ideas than patients or healthy non-physicians. Oncologists are more tolerant of the concept of ginger as a treatment for chemotherapy-induced nausea because these data come from a large trial with sound statistical analysis. However, its potential as an anticancer drug directly conflicts with the beliefs of most physicians, even though no precise mechanism of action has been confirmed for either potential use. We certainly do not suggest we all adopt ideologies such

as those advocated by the authors of books such as *How to Cure Almost Any Cancer at Home for \$5.15 a Day*, but perhaps many of us are guilty of intolerance of alternative therapeutic ideologies.

Albert Einstein is quoted as saying that insanity was “doing the same thing over and over again and expecting a different result”, and perhaps some cancer researchers are guilty of this way of thinking. Marcus Aurelius once said “the object of life is not to be on the side of the majority, but to escape

finding oneself in the ranks of the insane”. One cannot help suppose that if more physicians and cancer researchers were to adopt this philosophy and were less fearful of professional ridicule, then the true worth of natural products such as ginger might be determined, and doctors might have a more reliable idea of the relevance of the selenium concentration in our patients’ soil.

*Jonathan Krell, *Justin Stebbing*
Imperial College, London, UK
j.stebbing@imperial.ac.uk

Essay

Phase i trialist

There is a new breed of clinical trialist in cancer research. You might not have seen them yet—they will not be knocking down your door in the clinic. They do not know what HIPAA stands for. They do not know what to do in a code. They do not wear a white coat, you will be lucky if they wear a tie. They are not biologists—if you ask them to change the media, they will probably bring you some music you have not heard. They are the phase i trialists.

What is a phase i trial? It is a preclinical trial, but one in which no cells, mice, or rats will be harmed. Before one begins killing cells in

a dish, there is the step to decide how to treat those cells or mice in a sensible, yet new way. It is in this phase, before even stepping into a laboratory, in which we are now seeing an influx of other types of scientists—physicists, engineers, and mathematicians. Some of these folks have run out of problems in their field and have found fertile ground for their tools and physical science perspective in the dizzying biological complexity of cancer. Others have become frustrated by the esoteric nature of their first specialty—it takes a special mind to be happy studying things in other galaxies, or things so small that you need a super collider spanning three countries to learn anything new.

And then, some are just naturally dreamers, or follow their hearts into a specialty that has affected their life (cancer touches so many of us). It is these folks that I call the phase i trialists (i for the imaginary number, $\sqrt{-1}$), they are the smartest bunch of scientists that you have never met. Happy dreamers who can turn coffee into biological hypotheses. Mid-career scientists who trade their radiotelescope time for hospital badges. And what do you get when

you turn these folks loose in cancer research? You get crazy ideas such as applying information theory to genetics or the Helmholtz free energy to mitochondria. You get people who dream that biology can be explained by first principles—that we can build models on a chalkboard or a computer chip that can predict how a tumour will grow and evolve, how a person may live or die. You get phase i.

The biggest difficulty encountered right now is trying to get clinicians and scientists to listen to a physicist with a crazy idea. To be willing to bet some of their hard earned grant money and time on an mathematician’s model. To be willing to think back 30 years to the last time they took a calculus class and to wait until the testable hypothesis emerges from the equations. But, without scientists on both sides listening to each other, these crazy (and possibly transformative) ideas will never come to light, will never be tested, and we could miss out on something important in our joint fight against cancer.

Jacob Scott
jacob.g.scott@gmail.com



Where mathematics and cancer meet