Techniques May Come Techniques May Go But Stats Go on for Ever


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I tend to tell students, when appropriate, that statistics are like menstruation – not least because it momentarily wrests them from day-dreams or from texting each other. The latter, before we humans invented society with its higher ideals, was an admission of failure to conceive. Statistical analysis in science is an admission of failure to get to grips with experiments and have all the variables under control. Noticeably, the 'harder' the science the less are statistics necessary. In journals of chemistry or physics they feature relatively little; move nearer to the diversity of life (no coincidence SPSS is so named) and reliance on statistics to restore order amid chaos is vast. Between these extremes and at their best they impose a discipline of restraint on how results are viewed.

It is unsurprising that in this quite optimistic issue of *Oncology News*, the entirely descriptive article – on trends in radiotherapy – is most up-beat (alongside the conference report on melanoma treatment) and almost declares the end of the road in cancer therapy in sight! Descriptive work is fine. Among the seminal papers of the last 60 years, from DNA structure (just one and a half columns in *Nature* 1953) through monoclonal antibodies, PCR and DNA microarrays, original descriptions lack a statistical requirement. There are qualitative themes running through the more quantitative articles in this issue too. It is nice to see targeted therapies, be they tyrosine-kinase inhibitors or monoclonal antibodies, getting somewhere against common solid tumours. Indeed, the radiotherapy story also describes successful targeting, albeit spatial, rather than physiological

Order created statistically is to an extent illusory. It is hugely useful to put a figure on the amount of uncertainty we have about results, but to be pretty certain about something unimportant or trumped by other considerations, is not helpful. It is also a pity that in thus computer age we are left with baggage from the era of printed look-up tables for statistical relevance.The 0.05 p-value, reputedly conceived in a pub early in the 20th century has limited value today when a precise figure can be obtained easily and viewed for what it is worth. Given a 75% chance of finding a £50 note down the back of a sofa, I'd go a few extra yards for a quick look!

So the article on non-small cell lung cancer and conference report on metastatic colorectal cancer both report progress numerically and with statistical back-up but behind the figures the progress is incremental rather than seismic. Even the striking results on metastatic melanoma, described in seismic terms, means for a patient only a 50-50 chance of surviving two years. Obtaining quantitative results that stand statistical scrutiny means selection – of patients, lesions and measurements as formally defined in Response Evaluation Criteria in Solid Tumours. This reductionism can build a parallel universe where clinicians know well how best to treat patients who would be eligible for an RCT, but arguably short-changes the many who would have been excluded. Two articles in this issue deal with the real raw world. One concerns screening, which is intrinsically inclusive. Statistics are important in determining efficiency there. The other describes a computerised work management system, the value of which is not apparently so much its actual output, as being the motivator that gets different practitioners interacting.

Another illusion prevalent about statistics is that, computational power apart, they are like Latin: a hugely important but more or less dead language. Journals of statistics for statisticians (not necessarily medical) are full of controversy. It's not necessary to understand fully the arguments to realise that hypothesis testing is not the only route for statistical analysis and that familiar procedures are the subject of ongoing research and debate. Asked long ago to recommend a course in experimental methodology I was then running, a professor of surgery replied that his lads were taught statistics, so they were covered. There is more to designing a good experiment than getting your power calculation right. The stats lobby is strong and mysterious. Journals feel obliged to employ in-house statistical advisors but leave other aspects of experimental design to 'peer review': a blunt instrument indeed and a topic for another occasion.

Tennyson was not quite right about his brook. Its course, features and usage are subject to natural and man-made change. So the features and usage of statistics in medicine will change. Our view of them should certainly become less reverential, but they will still be there when microarrays and metabolic pathway inhibitors are old hat. Unless we can get a grip on all those variables! But mathematical modelling in biomedicine on that scale is at best embryonic and with a long gestation ahead.

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