In the Science and Technology Committee’s evidence session on the 24th October, Vicky Ford MP responded to Dr Peter Wilmshurst’s points about poor research standards by saying that “I suspect we should have a whole panel about the NHS and medical research, because I would not want to leave the constituents I represent feeling concerned, as patients, going into medical trials”. She also asked for evidence of a widespread problem if it existed. I would like to draw the Committee’s attention to evidence of such a widespread concern about important aspects of medical research.

The evidence of widespread concern about medical research is contained in articles published by the BMJ and other journals and also many conference proceedings on ‘over-diagnosis’ and ‘over-treatment’. There is also such evidence contained in the emails of a discussion group on ‘over-diagnosis’ organised by members of the Royal College of General Practitioners. The potential harm to patients is due to flawed research leading to widespread inappropriate diagnostic labelling, the adverse effects of inappropriate treatments and the associated waste of resources.

These problems about diagnosis and treatment stem mainly from troubled statistical concepts, especially that of the ‘false positive’ and the ‘P-value’. These concepts do not align with the reasoning processes used by doctors during diagnosis and treatment selection and also the reasoning used by scientists during scientific (as opposed to statistical) hypothesis testing. Because of this, they generate misleading evidence for use in diagnosis and treatment. There is also related unease within the discipline of statistics about its fundamental principles as evidenced by the long-standing and unresolved controversy between Frequentists and Bayesians.

In essence, I think that the root problem is not so much lack of personal integrity, ignorance or fraud but a mutual misunderstanding between disciplines about shared principles. I therefore do not think the problem can be resolved by improved regulation or training and education alone. We need to establish a better alignment between statistical, scientific and medical thinking. This is particularly important in medical research where the disciplines converge. I have outlined a possible way forward in two Oxford University Press blogs (1: https://blog.oup.com/2013/09/medical-diagnosis-reasoning-probable-elimination/ and 2: https://blog.oup.com/2017/06/suspected-fake-results-in-science/) and recent papers.

My professional training was as a hospital consultant physician. I have had many years of experience of looking after patients and doing research, mainly on the mathematics of diagnosis and scientific hypothesis testing. One of my mentors was the Late Professor Sir James Black FRS the Nobel Laureate, who was also the sponsor of my MD thesis on this subject. After his retirement, I left my tenured academic position in London to continue this unfashionable and demanding research at the interface of several disciplines that I considered to be of fundamental importance to medicine and science. I continued the work as an Honorary Fellow in Mathematics at Aberystwyth University and supported my family financially with income from my work as an NHS consultant physician.

I am an experienced clinical teacher, the originator and main author of the Oxford Handbook of Clinical Diagnosis; I am currently preparing the 4th edition. The final chapter of the 4th edition contains an outline of how to perform more sophisticated work to overcome many of the defects in medical research and to forge a stronger interface between medicine, science and statistics. I had resigned myself to helping the next generation of doctors, scientists and statisticians to acquire the
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skills to apply these solutions, but the Science and Technology Committee have raised my hopes that something might be done sooner.

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