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Title	*Questionable research practices and how to respond to them*
Description	Seminar looking at questionable research practices, particularly within medical research and why we as scientists, we need to pay more attention to questionable research practices
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Contributor You're an adult audience so I'm not going to deliver adult material but I am going to use an adult learning approach to what I'm going to talk about today. And that is, engage your audience rather than just talk to your audience.

The topic you gave me was responsible – questionable research practices. And the reason I'm taking this approach is I went back and I looked at the last talk I gave here and it was on questionable research practices and so clearly I didn't get anything through to you because you need a second talk on questionable research practices. So I'm going to use a new technique.

I've done a lot as Glen kindly said. My credibility recently went up enormously in the eyes of my two boys and particularly my younger boy who was in theatre and arts and things like that. And that is I was featured on a Fox News – if you don't know Fox – not Fox News but a Fox TV Programme. One of the most popular ones which is the sci fi one has… What they do is they put little images into programmes which are called Easter Eggs and then their faithful viewers look and look and look at the programmes till they pick out these Easter Eggs. When they do, it becomes a shout out. And on one of the recent programmes the Head of the Evil Empire who was head of a drug company in a parallel universe who was doing unethical experiments and killed an FBI Agent in the process there's a funeral of the FBI Agent. And in that funeral there is a cemetery behind it and all of the markers in the cemetery have absolutely no writing on them except for one. And the name on it is Steneck.

And some very clever person actually fathomed that what they're symbolising there is that if you want to do illegal research what you have to do is kill Steneck and so that's what they had done. I'm gone and research integrity has gone, you can do whatever you want to do. I can't tell you what happened to my son's eyes with that that I had made it as a shout, Easter Egg shout it. Neither a term which I knew anything about that until that happened.

I want to talk about questionable research practices. And I'm a big fan of we need to pay more attention to questionable research practices than we do. I understand why misconduct is important I understand why we have to have misconduct policies and I would be happy to talk about misconduct policies. But by far of much more importance are questionable research practices and those are those things that fall short of the, you know, going out and absolutely

manipulating your data and lying and cheating and those sorts of things. But nonetheless have a significant impact on research.

So what I would normally do in a talk like this would be to (a) convince you that questionable research practices are significant and I would go through all the sordid data about all of the sordid things that your colleagues do that just falls under the radar. But I don't want do that I don't want to go through that standard. And I could also tell you what I would do about questionable research practices but then again you know I'm from the US and trusts anybody from the US as to what they have to say you ought to do and so on and so forth.

So what I want to do is I'm going to take you through an exercise in which I want to see what you want to do about questionable research practices. And I want to start that by using and we talked about this the other day – I want to start that by using an item that's been in the paper for the last few days, at least the Guardian as I've been reading it. And that is the nutcase. For those of you who don't – I assume everybody knows about it but if you don't the details will come out of it.

So what I'm going to ask first of all is what actually is at issue in that case. I mean why does it make front page news and what's at issue. If you had to summarise what the major issues are what are the issues. Okay, okay so we have a government critic that has been silenced so who is that? I mean critic, why this particular critic. Okay he's chairing a government advisory board okay so – but there're lots of people who chair advisory boards. What's made this one particularly – a scientist right. So what they're actually trying to do was to silence a scientist in this place. So, kind of jumping on science and someone speaking out about science.

Well why is that an issue? I mean why can't you shut up a scientist but you could shut up somebody else. What is it about a scientist that makes it special? Okay, trusted relationship. The fact that the drugs are witness is clearly very significant. Had it been another issue it might not have gotten the same attention. What do you do in the US to get the same attention? Well you are a scientist criticising the Bush Administrations policy on global warming. There was exactly the same response in that case going on. So you're right the drugs are something that elevate it. But still what's the issue here? So this issue, issue number one is actually the scientist's responsibilities. So one issue is the scientist's responsibility and that's a key one at this point. Should he of spoken out? Should he not have spoken out? What were his responsibilities there? What had he agreed to? What did he not agreed to and so on and so forth. So it isn't crystal clear that you have a scientist out there that could speak out and all of a sudden people jumped on him and so on and so forth. You'd have to carefully go through and I personally myself haven't seen actually what the terms are, what the terms of his appointment were. What did he agree to? What didn't he agree to? And so on and so forth.

I'm not going to talk about this issue but I'm going to tell you it is an extremely important issue and it – one evidence of this is that the Triple AS committee, the American Association for Advancement of Science two years ago – I'm a member of that committee, the committee on academic freedom – scientific freedom and responsibility. Took this up as an issue and that is scientists responsibilities as advocates. So we get hired as scientists to be scientists but we also advocate. And so what are the rules for advocating? We usually know the rules for doing science but what are the rules for advocating and what must you do and what you must you not do when you advocate. So it's a very important issue and I can talk more about it if you want to but it's not my primary purpose in talking today it's something else.

What's the second issue? There's a second big issue here at this point. Okay and what's the assumption that's driving this here? I mean what role does science have in government policy

anyway? So the assumption here is that science yields useful information which should be used in making decisions. Should it be the driving force in making decisions? Well that's an issue at this point. The government people would probably argue that thank you very much for your advice but there are other things that we need to take into consideration, i.e. what the public thinks about drugs and their concerns about them and so on and so forth. But there is an underlying assumption here thought that we really would like to make decisions, important policy decisions on the basis of good solid objective evidence. And probably we should get that from scientists and researchers and so on and so forth. Okay, okay alright.

So – and in this particular case what you're saying is is that the drug policy is related to health policy and so on and so forth. So what you're saying is that the government actually did make some commitment to base its decisions on that. Okay I don't want to take sides on the government at this particular point but my assumption would be is that probably in this audience most of you would probably like to leave quite a bit of room for objective scientific information when you make important decisions. So can I take that as a working assumption okay – that's a set up. So you know I've just gotten you to agree to something so that's a set up.

Well now we're going to see what you agree to. So this is going to be our working hypothesis. And if we can generate some scientific evidence that will help us in making our policies we'd like to look to that evidence and we'd like to work together – we'd like to move forward on the basis of that. Right well let's – let me now go then to research integrity and let's see what kind of policy decisions we want to make relating to research integrity. That's what I'm after today.

We agree, let me try this one on you – that the standards for integrity in research at least at Oxford University ought to be high. Are we agreed on that? Okay so this is a starting point. We should have our goal is high standards for integrity – why? Why do you care about that? Reputation of the university, okay. You think the public would think any less of you if you had low standards when it comes out. They might not think that you're very clever because you can bend rules and do other things. Okay, that's probably pretty good. They probably do expect high standards for integrity so that's it so you're strictly in the business of self preservation quality, of quality of the research, okay. So, we... the quality of the research. I would suggest that probably ought to be the top priority because you ought to think of the quality of the research first and then may be your reputation second is important.

What else? We're up on a medical campus here, biological sciences, yes. Fair play, okay, quality research... This'll probably have a variety of things under it – quality, environment we'll get into some of these things later. Let me just add one more so we can move forward and that is I think most of you up in the medical section up here is the integrity is important for the protection of human subjects. And I know a lot of you in this room are in that business of protecting human subjects.

So what our goal here is is that we want to assure that we have quality research and we want to protect human subjects. So just like we want to develop a policy that will protect the young in the UK from drugs and now we're looking out what's the scientific evidence for this. We're now at the basis of where – we want to create a policy where out goal is high standards for integrity. We're concerned about our reputation but this is probably what the public cares most about. They're funding this so they want high quality stuff to come out of this and that probably is our main goal and in the process oh yes by the way we don't want to harm human subjects.

So what I want to do is now I want to create a policy that achieves this, okay. Let's just pretend there are no policies out there and we've now agreed that this is where we want to go

and the question is how we are to do that? And course to do that you need scientific information because we've agreed on our prior page that you'd like to base your decisions on something firm. So I'm going to play the role at this point of the scientific expert. I'm going to see whether you will fire me before we get to the end of this session because I'm going to give you scientific advice which is the best scientific advice I can give you based on what I know. But I want to know at this point what do you want to know? You want to set a policy and your policy is designed to promote high standards for integrity and protect the quality of the research record. So now the question is to develop that policy what do you want to know? Okay what do you mean by where things can go wrong? Risk assessment, okay what are we going to assess?

What you're saying is it's a complex social system within which research resides and it's therefore going to be difficult for us to simplify this problem down to get the ingredients we need to make some decisions. Okay so I mean that's the logical point to go back to the drug case what is that all revolve around it's what drugs are there out there? How much are they being used? What impact are they having? And then based on that you step back and say once we have all of that information then how do we make some policies to change that situation if we don't like what we see. So we have to do basically the same thing here and we have to take a look at the research environment, see what is going wrong in the research environment and then try to decide what we do about that.

So what do you want to know about what's going wrong in the research environment? What kind of information would be useful? Previous research on – that's what I'm going to tell you, I'm going to give you that research but I want you to ask me the questions. There are about three/four hundred articles I could bring in for you at this point so I want some – yes, okay. So one way we could get at it would be to get what are the standards like? That's probably – that's an interesting question because until you know the standards of course you can't figure out what's wrong because what is wrong? Wrong is not doing what the standards say you should do. So that is in fact probably you need to know that information. What standards are you particularly interested in? Yes results well what's the public interested in? Public's interested in quality results, okay as a member of the public I probably mostly care about the reporting of the research because that's what people use. I want to know that it's based on accurate things and so on and so forth.

Well let me bring in some – let me start to bring in some evidence. If there were a group of clinical researchers sitting out there right now and I said to them "Yes we make decisions about the medications and treatments the public gets on the basis of clinical trials and medical research." So that's, you know, there's this work, go out and do a trial. Does that work? Go out and a trial and so on and so forth. So if I turn to a series of researchers and I said to them – clinical researchers – what's making that literature unreliable? What are the biggest problems with that literature? What do you think the clinical trial researchers would say? A lack of negative results, okay. Negative results not reported. Anything else? Design – biased design. Design conduct interpretation all along the way bias creeps in.

What else? Lack of resources... Researchers always say they're underfunded, not sure... Conflict of interest, conflict of interest or unreported conflict of interest, okay. Conflict of interest and it's usually the reporting of it that's important. These are all right, evidence bears us out. This is exactly what researchers say you know I mean you can predict it. So this is the scientific evidence.

What haven't you put up here yet? Fraud and misconduct, right? Fraud and misconduct... And fraud and misconduct what we call FFP in the US, Fraud, Fabrication, Falsification and Plagiarism or just fraud – that's way down the bottom of the list. They don't worry about that.

Why not? They don't spot it and it isn't as common as these other things. It isn't as common as these other things up there. What's that? How do we know what that it isn't as common? Well this is question number two you might want to do. Is – so how common are various research practices?

So what you've told me on this page are what you think researchers will say. This is their estimate of what's going on. And now what you want to know is actually do the researchers actually know what they're talking about. Can you imagine researchers actually not knowing what they're talking about? Well the fact of the matter is in this area most researchers are not experts about this sort of thing. They don't have the expert evidence, they haven't. And one of the interesting things about policy in this area, the way policy has been set in this area. And you might think about this is that when misconduct i.e., cases of major fabrication, falsification, first appeared what did you do? Well you collected information. How did you collect information? By calling in scientists to tell you what was going on. Were they experts? No, they were not experts. Were they biased? Yes they were biased because they didn't want regulation. And so the scientists very early on painted a relatively rosy picture of what was going on in research. The rosy picture that they presented and this is a talk I could give as well but let me just summarise this the testimony they gave when they came in as expert witnesses were number one, research misconduct is rare. And that term was widely used, okay. Somebody give me a definition of rare besides pink in the middle. One in a thousand – and where did you get that? I just made it up, right. Just made it up – that's right, that's right... one in a thousand.

What's a rare disease? Unusual, yes... Well the fact of the matter was that the numbers were all over the place. It was a term that was widely used, why did you use it, well if it's rare we don't have to worry about it. But what do you mean whether it's rare or not? So the first question under how common is it is number of cases. And there actually were some early estimates that said some was around one and a hundred thousand. And what the research now suggests – so I'm giving you the research evidence which you're going to just have to decide what you want to do about it but the research evidence is it's somewhere between one and a thousand and one and a hundred. Now over a period of one to three years will engage in a practice which is a serious offence, which researchers will regard as a serious offence.

And there's quite a few individual pieces of evidence that document. One journal started tracking every article that came in for gross Photoshop manipulation, one journal checked that out. When you think you know that's probably the stupidest mistake you can make to Photoshop something in so as all you have to do is blow it up and you see where the cut lines are on it. One in a hundred. They did articles. They had 800 articles, they had 8. They got to 1,100 articles they had 11 cases and so on and so forth. It came out at one in a hundred.

So there's – the evidence here is that it's about one out of a hundred, may be one in a thousand. The early studies were always have you observed misconduct? And when you ask have you observed misconduct the numbers come in somewhere between 10 and 40 to 50% researchers say they have observed misconduct. The pioneering studies were the studies that said have you done, engaged in misconduct and given a definition of misconduct was. That's the pioneering studies. And those are the ones – I mean I know the researchers who did that and when that started coming in they a) didn't think researchers would admit this in a survey, which they did do, and they were surprised at the numbers. The numbers in the `[[Martinson 0:22:06]]` came in at about point 0.6%. Martinson is now doing a second very large survey population and I just asked him again where the numbers are and he said they're coming in precisely the same.

Oh absolutely and Martinson will tell you over and over again that this one in a hundred is a conservative estimate for a wide variety of reasons, that being one of them. The other one

is that you can probably predict that there is a tendency to under report rather than over report. You know what are my incentives to come in and say I just fabricated data on a survey that I think is confidential but I'm not sure it's going to be confidential versus somebody actually admitting it. So this is. How do we stand here for Oxford's high standards of integrity – is that okay? Can the Vice Chancellor Grant say "We're in good shape at Oxford because we think that only one in every one hundred of our researchers engages in major misconduct." Do you know? Do Europeans know? The sad answer is no they don't. The sad answer is is that at this point Europeans by and large have not embraced this question. They haven't tried to get the information.

And I can tell you we're trying in a variety of ways. One of the reasons I was at the European Science Foundation is they now have a series of member organisations looking into various integrity issues and one of the integrity issues is how do we get Europeans to do studies of what actually is the situation in Europe. The European Commission has really not wanted to do it so it's a matter now of going to the individual funding agencies and others to do it. It's been a struggle to do it in the US and we have a paltry amount in comparison to other funding that we have but we at least do have research on research integrity to generate that out.

So the numbers here are about one in a hundred. The main question now is what the main focus of policy has been in the US, in Europe and in the rest of the world has been on this – getting rid of that. That's what the main emphasis has been on. So the emphasis have been is universities must have a misconduct policy and a procedure for investigating it. And the feeling is if we can do that we have met our obligations for a good research misconduct policy. So now the question is do you agree? We probably have to do something about this so that's one obvious policy you must have. You must have a misconduct policy that will address these cases in an effective way. I can tell you that they do not currently do that so OORI, all cases in the US must be reported to the Central Government, to the agency that funds it. Office of Research Integrity sees about 15 cases a year. By this estimate it should be, see between 150 and 1,500 cases a year. The National Science Foundations sees about 10 cases a year it should see probably between 100 and 300 cases a year. And the other Federal Agencies in the US Government hardly ever see any cases even though they're supposed to.

So one issue is that whether this is the only policy focus we have or not it's not working. It is catching only a few of the most obvious cases and it's really not addressing the vast majority of cases that are out there. And my prediction is that that's true here. My prediction is that's true in Europe, we don't know. May be you're exemplary, may be you don't have the same problems that we do. But I can tell you that our system doesn't work and my guess is that your system probably isn't working as well. So that's the misconduct there.

Now the question is are we satisfied at this point? Do we know all we need to do? Well as I just said to you researchers themselves say they think this is trivial in comparison to other things when it comes to the accuracy of the research record. What they say is that things that we call questionable research practices have much more impact on the quality of the research record. Do you believe that? Do you want any evidence of that? What would you like to know? Well what I would say here is a questionable research practice is any practice that falls short of an identified standard and doesn't sink to the level of being falsification, fabrication or plagiarism, okay? So I'm not meeting my professional obligations as they've been defined but I'm not actually going out there and cheating. So what I'm doing is I'm walking as close to the line as I can possibly walk but I'm not going to fall off.

Where would we come across this? Okay, that's jumping ahead to where I'll go next and that is why? At this point we still want to identify what are the problems that we have. So let

me just in a very short summary give you some of the evidence of where the problems are out there. If you take a typical scientific publication, alright, your assumption about that scientific publication is that it's an objective, unbiased, accurate report on the research – correct. Well this is, right. But we're saying after it's gone through peer review, okay. So it's been peer reviewed, it's gone through a journal.

Okay, so what are wrong with publications? Number one the authors don't accurately represent who contributed to the publication. Authorship is notoriously inaccurate. Two ways, people on there who shouldn't be on there because they didn't do anything and people who aren't on there who should be on there because they wrote the whole article. The latter being the pharmaceutical companies who shop articles around and look for an author, a very high percentage of those in some fields. The other being the Head of a Laboratory who comes in every once in a while, says hi to everybody, is very good at bringing in funding and has her or his name on every publication that comes out: two abuses that are very common in research.

Yes but from the sad point of the public do I really care about that, the articles are still accurate. Well probably the ghost authorship you ought to worry about because somebody else is writing it. And the Honorary authorship means that you're having people promoted into high prestige positions on the basis of publications and work that they actually didn't do. So it's undermining the research record.

Okay we've gotten by the authors, we'll go down to the abstract, okay? Abstracts notoriously over sell the research. They don't accurately report it – well big deal. Everybody reads the full article, right. No, absolutely not they don't. They're vitally important and yet they're inaccurate 30/40% of abstracts over sell them, okay. So now we get down into the methods section. Well methods sections are traditionally plagiarised. They're hard to write, they take a lot of time, nobody cares about them – that's where you're going to find plagiarism. Plagiarism is fairly high.

We have right now a new requirement for our physical and social and behavioural scientists that all researchers, students and Post Docs must receive training in responsible research practices. Why do we have that? Because the Inspector General of NSF one summer ran through a whole series of grant applications to NSF through plagiarism software and was appalled by what came out. And went over to Congress and said "Look what's going on." And Congress said "Somebody's not being educated properly." And then they wrote that in as an actual requirement.

So plagiarism is a problem. Footnotes, footnotes are again notoriously inaccurate and I think the numbers in many many publications are about 15% of the publications are seriously – in footnotes and documentation – are seriously misleading. And what does that mean? These five articles support my view and you read those five articles and they don't support your view. Two of them don't exist, one was made up and so on and the other three supports something entirely differently. It – this is an interesting aside but researchers don't read articles anymore and if you wonder about that there was an article about a month ago in Science about the way new softwares are making it possible for researchers to actually not read articles anymore but to just strategically pull out information as fast as they can. And they say in that but of course people are still reading articles but they aren't reading articles out there. So the abstracts are what are used, nobody reads the articles if they did read the articles they're inaccurate. And we haven't even gotten to the point of how good is the statistical design which has been shown – one study that was done the statistical ties – statistical quality pre peer review was about 80% were deficient. After peer review and statistics advice, they got only 20% of them were still crumby statistics. That was the good news.

Well there are serious doubts in the peer review system. And what you always come up with in the peer review system is, yes we know it's flawed but nobody has a better system at this point. Interestingly under the Bush Administration a few years ago they actually proposed that peer review be contracted out. That NIH does all of its grant peer review through a traditional peer review system and people in the Bush Administration saw no reason at all why you needed scientists doing peer review. You could contract it out. Well I don't think anybody agrees with that. I think that they think the system works but it is flawed and it needs to be improved.

So the point here is that these questionable research practices are there. They have current rates of anywhere as between 5, 10 up to 20, 30, 40% but most importantly, they definitely impact the quality of the research. They undermine the reliability of the research in significant ways. I just had somebody whose in a major policy position in the – over in the European Agencies tell me his estimate was that 80% of the research that's published really isn't worth very much. I mean that may be pretty high but there's a lot of cynicism in some fields as to just how good is the research that is out there. What the quality of that? And there are now some studies going on looking very specifically at design issues and so on and so forth and finding out that there are whole problems out there.

And those things, these questionable researchers' practices have an impact. So something as simple as duplicate publication and that's where I just need more articles in my resume and therefore I just simply publish the same article three times under different names, change the authors around but I publish it three times. The people who do the Cochrane Reviews that try to scour the entire literature and find out what does the literature tell us about best practices in area – science based medicine you were talking about. One of the biggest problems in doing science based medicine is weeding your way – getting through the duplicate publications, the crumby publications, the publications that don't report. The negative evidence that doesn't come in and so on and so forth to actually try to come up with a good decision. And there have been estimates done that these questionable practices result in the over use of drugs on a major scale. So you're talking about literally tens of millions of pounds that can be wasted as a result of particular questionable practices in an area.

So – and I don't want to go on with this any longer but what I want to tell you as your scientific advisor – okay I'm your David Nutt, I'm your scientific advisor at this particular point. I want to tell you that these things are really important and they are in my view number one on my list of 15 danger struts – okay. So rather than keeping cannabis down at 12 or 13 as Nutt was advising at this point what I'm telling you is you have previously had a list that had FFP as number one and then some place down the list you had questionable research practices. And you said by the way if you were in the US those things really are the sorts of things that academic institutions and researchers ought to deal with. Government Agencies and bureaucrats like research administrations shouldn't be involved in this. We can handle this as peers – the answer is no you can't handle as peers.

So that's the scientific evidence. The scientific evidence is that these things are important and they're not properly being handled by the system that's in place. So now we go back to you and we say "Alright you've got enough information now to start to develop some policies. What do you want to do?" Or do you want more information? Okay. You've asked the next obvious question of why? I mean that's one question about po-. So that's the next thing you'd want to know. I mean you want to develop an intervention at this point you want to develop a policy that will do something. You now know that you have ex number of you know cannabis users and drug, tobacco and so on and so forth. You now have an idea what the landscape is but you still don't know why this happens at this point. Why does it happen?

Well the evidence seems to be on why. Funding pressure, which is probably the one that people always give the research administrators, it's probably not a primary cause. It's probably – there are other things out there. The things that seem to have the greatest impact are concerns about justice, fairness and quality. In some, the research environment, it does seem to make a difference what kind of an environment you work in. This comes primarily from the Martinson studies but it comes from others as well. It comes from some of the studies of how researchers respond to research ethics committee regulations. If they respect their research ethics committee requirements and they think they're dealing with an intelligent staff there, they tend to follow what the research ethics committee tells them to do. If they think they're working with a bunch of bean counters who have unfair regulations and I just told this to Richard's staff that his staff could be the primary excuse for misconduct if people didn't like him and the staff: if they didn't respect them.

So it's these sorts of things these justice, fairness, equity out there. Those seem to be the things that drive it. And the other interesting thing that seems to be coming out at this point is that there is a slippery slope and that researchers who engage in questionable practices are more likely to engage in serious misconduct. So that once you find a justification for bending one rule then you find a justification for bending two and bending three rules.

So there's some more evidence that you've got out there. And now I want to give you one other final piece of evidence out there and that is you probably would want to know is how can we influence behaviour. And of course the solution to that now is training and education. And the answer is on training and education is very mixed at this point. The one study that has done – looked the most closely at this has found very little, few correlations between the training that researchers had and the behaviours that they subsequently engage in. It's actually very disappointing what impact the current training we have has on researchers.

And in fact there is in some evidence that training can have a negative impact. Why and how? Well we teach courses of the research environment as a tough world out there and here's what you need to survive in it. It's what's called survival skills programmes that we teach our PhDs in particular. Those seem to actually encourage in some areas more aggressive behaviour, more bending of the rules and more unethical behaviour. So you know not only is it difficult to figure out how you can influence behaviour in a positive way but there's some evidence that you can actually do harm if you do the training the wrong way.

Okay, that should give you enough evidence now to develop a policy. So now what I want to know is what policy are you going to put in? Okay so – but if I understand correctly you say yes it's interesting but I'm not ready to make a policy decision at this point. I'd like to wait a little while before I make a policy decision. Now that is itself a policy decision when you do that, okay, because whatever harms there are in the system right now you say "I'm willing to tolerate those going forward for fear of making a mistake down the road." And that is notably at least in the US our attitude toward the regulation for example of consumer products, okay. That consumer product is dangerous it ought to be regulated. Well what's the evidence? Well you bring in the evidence and the evidence was a few people with broken legs. No, I'm sorry that's not good enough you need some dead bodies. So what you keep doing for most regulations is you pile dead bodies on to the scale until it finally becomes so much that you…

And that's exactly what's going on in the world of research integrity right now is that the bad news comes out and when it finally gets bad enough, of course what's happens at that point. Then somebody steps in and does something about it but you don't step in and do something

about it. Somebody from the outside usually steps in and does something about it. So the most notorious recent example of that in the States was conflict of interest. Oh we can handle conflict of interest, no problem at all, we're good at that. We need to just sit down and talk about it intelligently and put in some policies and so on and so forth. Well then all of a sudden it was discovered that there were just a few people at the National Institutes of Health who happened to be at the very top who were already pulling down six figure salaries who were pushing them up into seven figure salaries by a whole series of questionable contracting arrangements at that point. What happened? Congress stepped in and there was conflict of interest regulation and actually it was burdensome conflict of interest regulations.

People in the NIH offices, who were running computers and doing nothing more than that, suddenly had to divest their savings accounts for their kids to go to college, because they may have had a pharmaceutical in there and something like that. I mean it was a draconian solution to the problem. So it's a strategy the let's wait and see but it's a risky strategy if the dangers are a little more than you want out there, right, right. And those are – I mean they're general but they are probably I would suggest from my experience two of the most effective things that can be done based on the fact that if you're going to change some of that up there what has to change is the Institution. And the way the Institution changes is by bringing more and more people on board.

I've been coming here for I can't remember – what was it five/six years ago the first time I came over Richard. And I must say the C change that I've seen at Oxford over that time is really significant. I mean we were squirreled away, one small group of people was it Green College? Chatting about this, wondering about who else was thinking about this. And now it's clear that there are discussions all along the way. And from my standpoint those are steps that are very positive but you can't just set a few policies and become complacent. You know just say "Boop that'll solve it, that'll solve it." And walk away then. And you can't do that, you can't do that. This has to be interjected in the everyday conversations and what it has to do and what's the most difficult thing is to get it actually into the research settings. And that's why, you know, the courses we teach and other things like that are very good but the more we can link those with the normal training of researchers and the more we can link them with the day to day work of what researchers are doing I think the better off we'll be. So for my standpoint the two challenges are number one to get those questionable research practices up and discussed and then to move them into the research settings and get them discussed in those settings.

As I said my view is that you're moving forward in very significant ways here and I'm particularly impressed that you're doing it with the small amount of funding – that's `[[how 0:46:12]]` you do it in some cases. And just think what you could do if you had more funding to do it and so on and so forth. But funding sometimes is an important commitment it is.

So anyway that's – I mean that's my view of questionable research practices and you know a rough view of what your policy ought to be and I will leave it at that.
