

Ian Hall Audio

	<p>Thank you Andrew. Can you all hear me okay? So the first thing I have to say as a researcher using the UK Biobank resource is a huge thank you to all of you because if it weren't for the fact that you gave up your time and... to contribute to this then people like myself wouldn't have been able to do some of the research which we've been able to do and I suspect that what's going to happen as more and more research is become aware of the power at UK Biobank, the number of projects that are taking place will increase exponentially and I can tell you from discussions around the world that UK Biobank really is the envy of the international research community.</p>
00:00:45	<p>So as Andrew mentioned at the beginning we have very recently published the first major genetic study which used some of the samples you provided for UK Biobank. We called it the UK Believe Study, it was funded by the Medical Research Council and if anybody wants... is interested in the science I'm going to tell you a very high level overview of it but the actual paper is in a journal called Lancet Respiratory Medicine and we paid to have it open access so anybody who wants to can... if you just Google it it will come up and you can see it so it's fully open access.</p>
00:01:20	<p>So I guess I first became aware of the potential to use population genetics about 15 years ago when I did some work with a company that was based in Reykjavik called Decode Genetics and they had set up something which I guess was a bit like the Biobank principal whereby a company were doing genetic studies using samples from Icelandic individuals but were able to access the healthcare records of the Icelandic population through an agreement with the government and it very rapidly became clear this was a hugely powerful way to do good research and in fact subsequently as some of you may know, the Icelandic genetic and epidemiology studies have brought really a revolution I think to the sort of... to this area and so when UK Biobank came along it was clear that this was actually a larger population with more accurate information and so it was obviously going to be very powerful for doing genetic studies.</p>
00:02:21	<p>So I've got a few things in here which I'm going to get you to do a little bit of work on rather than me just sit here and stand and talk to you. So the first question I want to ask you and it's a Yes/No and it's a show of hands, is if you smoke is it inevitable that you will get lung disease? So if you think the answer is yes, if you smoke all your life you're bound to get lung disease please stick your hands up now. So a few people think so. And who thinks that the answer's no? Oh right so the vast majority of you think the answer is no and the vast majority you're correct. So in fact an interesting observation is that about a third of people who smoke will go on to develop Chronic Obstructive Pulmonary Disease or COPD as it's called whereas two thirds of the people don't and actually that's quite interesting because if you could understand why they didn't develop it you might be able to identify a new way to prevent the disease occurring in those who were prone to it. So that's the first question I have.</p>
00:03:21	<p>And the next question I have is when is your lung function at its best? Do you think it's when... and I'll ask a show of hands to say when it's aged 15, 35, 55 or 75? So who thinks your lung function is maximal when you're aged 15? A couple, oh a few people actually. 35? The majority. 55? Nobody so you're all on a downward route you reckon! 75 anybody? No. So you're right, so 35... so between about 30 and 35.</p>

	<p>Everybody's lung function is slightly different and in fact your lung function depends on how old you are, whether or not you've got chest disease, how high you are and your sex so women tend to have slightly lower lung function than men. But also, we thought it might be to do with your genetic makeup and that might be a prediction of not only how good your lung function is but also things like whether you smoke or not. So is anybody going to admit to being a smoker in this room? Oh we've got one or two. Okay does anybody... so I don't know have you tried to stop smoking at all or not? Not really, yes. So it's really difficult isn't? It's very addictive and so we also wondered whether or not...</p>
00:04:39	<p>So, so I'm going to ask another question who, when they were a child took a cigarette behind the bike sheds when they were at school? So that's definitely me. But so some of us, we've all... a lot of us have tried a cigarette at some stage but most of us didn't end up smoking long-term so the other thing we were interested in is trying to determine whether or not your genetic makeup might make a difference in terms of whether you ended up being a smoker or not.</p>
00:05:07	<p>So we've just done the lung function challenge. So the disease we are particularly interested in is Chronic Obstructive Pulmonary Disease. It used to be called Chronic Bronchitis when I was at medical school and the main symptoms are exercise related breathlessness, cough, sputum production, wheeze and although we've got treatments which help with the symptoms the only thing which alters the way in which the disease progresses is stopping smoking. We do not have any way of curing this disease once you've developed it. So having a predictive model which meant that we could understand the pathways better and who was at risk of the disease seemed to be a useful thing to do and UK Biobank seemed to be a great resource to do it in.</p>
00:05:46	<p>So this is what you don't want your lungs to look like. And when we set out to do this research we knew that the main risk factor for developing COPD was smoking. Now that's true in the UK but actually I do work with colleagues in Nepal and I can tell you that in Nepal while smoking is important, the most important determine of all is probably whether or not you cook on indoor stoves, such as the one in this slide here... so it's the indoor biomass exposure because these are very poorly ventilated rooms and that actually seems to be the main risk factor for COPD in countries like Nepal and air pollution is also important.</p>
00:06:27	<p>So I won't go through this because you've already heard it. We use the UK Biobank resource to investigate these issues and what we did was we picked out 50,000 individuals from UK Biobank based on their lung function and those lung function tests that you did, we pulled out the people that go the best lung function and the worst lung function and we had half of them smokers and half of them were non-smokers.</p>
00:06:53	<p>So the first thing they had to do was to work out who got the best lung function and this wasn't trivial actually because I wasn't going to sit down and look at 502,682 lung function traces because I would still be at it now if I had started. So we had to write some simple ways of doing this and we had some quality control principals, there's some national guidance on how you do this and the bottom line is that about 300,000 of the lung function measurements which were present were of a high enough standard for us to be happy that we could use them for this study.</p>

00:07:26	<p>And as I said we took 25,000 smokers, 25,000 non-smokers, there's about 5,000 people in there who have actually got COPD based upon their lung function measurements and we took people who got the best lung function, you know the best 5,000 heavy smokers who got good lung function so these people they seem to be protected from the effects of smoking and the people with the worst lung function and we had both smokers and non-smokers. And then we did this big genetic study, I'm not going to tell you about any of the details of that but essentially we looked at all of these 800,000 markers which Andrew told you about earlier across the whole of the [_00:08:02_] and we produced... those of us doing genetics produce these things, they're called Manhattan Plots because they're supposed to look like skyscrapers and this is just a pictorial representation of all the genes... of all the DNA in your genes and if you see a big red thing going up it tells you that there is something around that area which seems to predict in this case what your lung function was and you can see there were some quite big peaks there.</p>
00:08:25	<p>And we found a number of signals which predict firstly whether or not you've got good lung function if you're a smoker, secondly if you've got good or bad lung function if you're a non-smoker and thirdly whether or not you were at risk of smoking and in fact it turns out, it's really quite strong signals which predict whether or not you will end up smoking in later life. So there's a genetic basis for that as well.</p>
00:08:53	<p>So what might we do with all this information? Lots and lots of genetic information so I thought we'd have a little lottery. So everybody's got a combination of these genetic variants so you could have really good genes which means... not that you should go out and buy a packet of cigarettes but you know it means that potentially you're protected from the effects in this case of smoking on your lung function. But you could be unlucky and have a really bad set of genes which means that you're at high risk of developing lung disease later on. But of course most of us will have a bit of a mixture.</p>
00:09:28	<p>Okay so what I'm just trying to demonstrate is that you can start to build predictive models based upon the genetic data that we're generating and they're not that good at the moment but in the future they potentially will be useful both to look at disease risk and also to look at treatment response.</p>
00:09:44	<p>So just to finish off then. The study that we did describes some interesting genetic signals for lung function, for the risk of developing COPD and for tobacco addiction as well. As Andrew mentioned earlier the whole of the UK Biobank resource is nearly finished gene typing now and that means we can look at all 500,000 rather than the 50,000 that we pulled out from the extremes of the lung function distribution. And what also we should be able to do is to then look to say if you've got COPD or lung disease and you end up going into hospital, can we predict those people who are at high risk of ending up in hospital based on their genetic signatures. And, as I said right at the beginning, I think the key thing is that UK Biobank truly is a unique resource, it's the envy of the international research community and I've just given you one example of the study involving genetics on a single disease but given all the information that's in there you can see that any disease where there is information being collected cancer, heart disease, whatever it happens to be, these studies will be possible and they're possible without actually having to come back to you as individuals and say "oh</p>

	we need you to come and volunteer for another research study”.
00:11:02	So I’ve just got a couple of thank you’s to finish off with. So I’ve been here telling you about some of the work we’ve done actually there’s a whole bunch of people who’ve been involved, particularly my colleagues in Leicester who help to lead on this. Obviously we’re very grateful to UK Biobank and extremely grateful as well to the Medical Research Council who funded this sort of pilot genetic study. So I will stop there. If we’ve got time I’ll answer one or two questions, if not I will be around at the end and if anybody wants to have a go at the spirometry test at the end I’ve got some spare mouthpieces as well.
00:11:40	<i>I’m incredibly disappointed I missed out on being your attractive assistant there.</i>
	ENDS 11:45