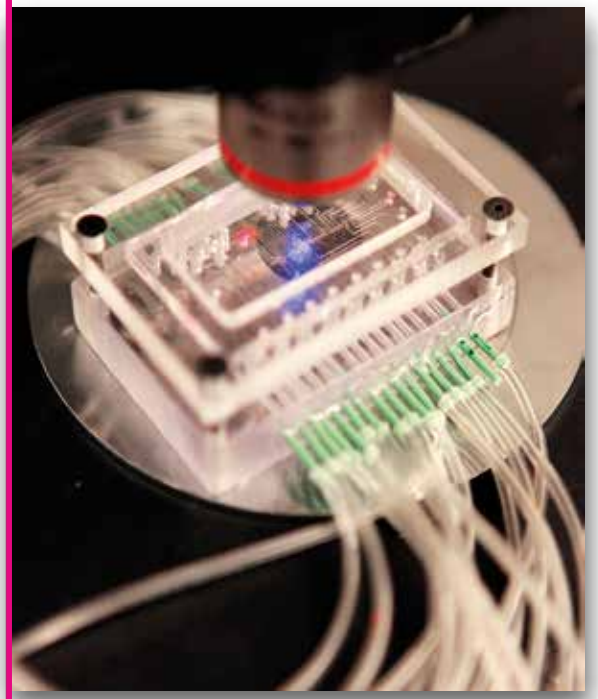
Paul Smith S1



Early diagnosis

“I went to my doctor with a persistent cough. With a new nanotechnology device called lab-on-a-chip he analysed my genetic profile in ten minutes from a drop of my blood, and prescribed an antibiotic suited to me.

But the analysis tells a lot more. It’s found I’ve got defective genes which mean a risk of developing an incurable liver disorder when I’m much older. The doctor said he could prescribe a drug to reduce the risk but I’d have to take it for the rest of my life.

I’m only 28, and it might never happen, and of course there would be side effects over all that time. What do I do? Am I already ill, now?”

NanoAthero

Dr Jane bold S2

The cost of clinical trials

“I am managing director of a start-up company using nanoparticles to encapsulate drugs to treat patients with late-stage atherosclerosis, delivering the drug right to the vulnerable heart cells. But from the lab to the patient is a long process. We did experiments in mice first then tried them on healthy human volunteers. The results were good.

We did our second clinical trials in real atherosclerosis patients, but we found we needed to remake our particles to survive longer for treating the diseased cells, compared with mice. Such delays are common in bringing cutting edge treatments to market, but will our ‘venture capital’ funders keep supporting us long enough?”

NanoAthero

Heart patient
David Strongman

S3

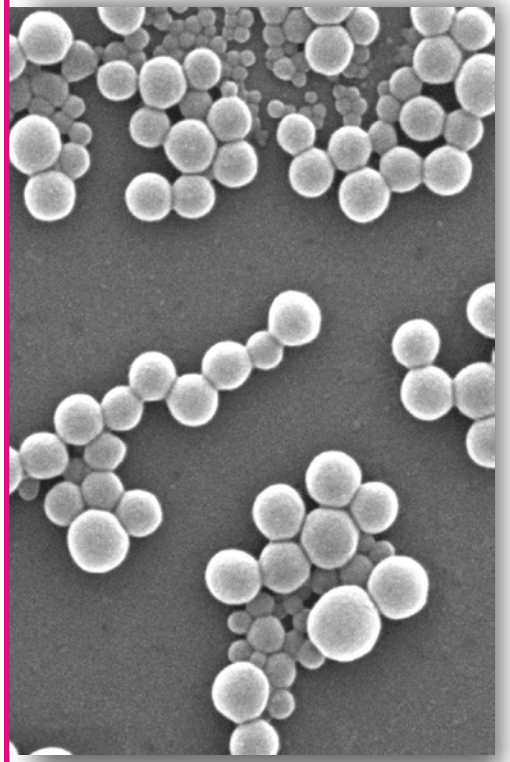
"I got no warning of the heart attack. Just this sudden terrible pain in my chest and I blacked out. I woke up in hospital with tubes and wires sticking everywhere.

Atherosclerosis has blocked an artery, so they've put in a metal stent to keep the blood flowing. I'm lucky to survive. I've got a diet and exercise routine. But it could happen again. The doctor asked if I'd be willing to do this trial with tiny nanoparticles to see if they can detect this plaque building up again in my arteries.

There's a risk it may not work for me, and the particles might end up somewhere else in the body. But should I do it so people like me don't suffer in future?"

Sir Richard Macdonald
FRS scientist

S4



Where do nanoparticles go in the body?

"My research group has refined a way to encapsulate a drug inside magnetic nano-sized particles to travel through the blood. We attach antibodies to the particles to target only the diseased cells.

A magnetic field releases the drug and destroys the cells leaving healthy cells untouched, with less side-effects than injecting the 'naked' drug.

In a lecture, activists shouted, *'But nanoparticles are too risky. They can migrate to other parts of the body and can cause side effects themselves.'*

'But no medical progress is without risk,' I replied. *'Which risk do you prefer?"*

Jennifer evans

S5

Caring for my mother

“It’s been hard looking after Mum since her stroke.

She’s come to live with us now, but she’s a shadow of herself. All her right side is affected.

She can still talk but keeps forgetting words and she gets so frustrated because her mind is still good. It’s a strain being a carer and keeping my job. There’s a new trial implant the doctor suggested she could have that would monitor her basic body levels and send an alert to a nurse if there’s anything abnormal.

Would she feel it was a help or would she feel she was being checked all the time, like she’d lost her independence?”

NanoAthero

The heart surgeon Victoria steele

S6

Advanced warning?

“I am a heart surgeon, and I’ve seen it all. There’s so much more we can do nowadays to save people after cardiac arrest.

But it’s still just remediation after the damage is done. And even the stents we put in to reopen blood vessels sometimes cause inflammation and the whole process starts again.

We really need advanced warning that people have got unstable plaques in their arteries, before it’s too late. One idea is to inject magnetic nanoparticles to target the plaque, to show up on an MRI scan.

The particles get flushed out of the body afterwards but will lots of people want to be screened this way, when they don’t feel ill?”

NanoAthero

Professor Charles Ledbury

S7

The Ethics Committee

“I chair the Ethics Committee for a leading hospital. A research team wants to do clinical trials of a pancreatic cancer treatment involving nanoparticles.

The particles arrested the cancer in mice, but we know the cancer develops slightly differently in humans. So the researchers tried a revolutionary method. They tested nano-particles in an ‘artificial’ human pancreas, which they grew from human pancreatic stem cells built up around a polymer scaffold into an ‘organoid’.

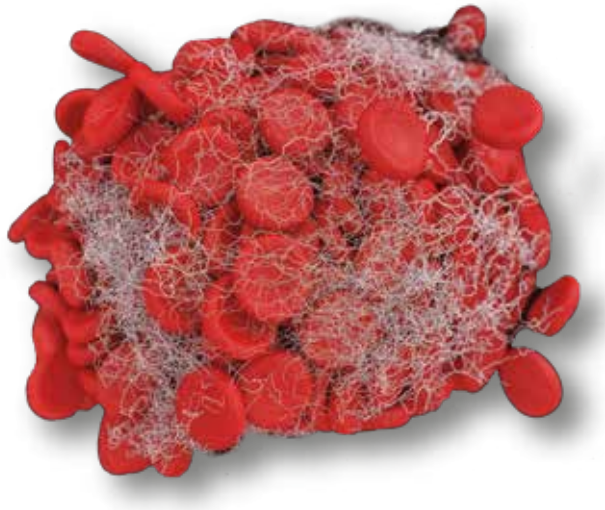
The results were promising, but do these ‘organoids’ predict real patients well enough? Are the combined data good enough yet for us to allow tests of the nanoparticles in volunteer cancer patients to begin?”

NanoAthero

Dr Amanda Pearson

S8

Personalised medicine



“Nanomedicine is part of a shift away from blockbuster drugs for millions of people, to treatments more specific to certain types of patients.

Our research group is repairing damaged cells from a leukaemia patient’s immune system, using new genome editing methods, then putting them back in the patient using nanoparticles. Clinical trials show real promise. But each patient has to have cells from their own body.

We only have resources to treat a very few. We could make more ‘generic’ cells, to use in more people, but they won’t work as well. How far can we ‘personalise’ medicine within the constraints on health care resources?”

NanoAthero