Plague

We've been warned. In the not too distant future antibiotics may no longer work at all if we don't take the problem seriously now. It is said to be more threatening to society than terrorism. **Dr Heather Fairhead** agrees. **Jenny Chapman** went to see her and catch up on her progress with finding new, and irresistible, antibiotics.

I can't help it, as I sit listening to Dr Heather Fairhead I see Marie Curie, Madame Pasteur, and that one day her name will join theirs in the history of medicine.

It is quite a while since I sat down for a chat with Heather, and today could not be more timely, the Chief Medical Officer, Professor Dame Sally Davies has the day before given a dire warning about what will happen if we fail to tackle the problem of bacteria resistant to antibiotics. We could regress to the era pre-penicillin when people died on operating tables with predictable regularity, when cancer was so absolutely deadly that people dared not speak its name. This really is very frightening stuff, and Heather and her team are among the very few people in the world trying to do something about it.

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And her approach is unique. 1963 was the last time anybody came up with something really novel in this field, and right now what's needed again is a thoroughly radical approach.

"Every living cell has DNA inside it, which is like a series of letters on pages in a book. Here at Phico we have an antibiotic protein that goes into the bacteria and tears up all the pages so they can't be read, which means they can't reproduce and can't survive. >

Dr Heather Fairhead

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"Most other antibiotics are chemical entities that will target the cell wall and it is very easy for bacteria to mutate and avoid them. What we are doing is not affected in this way. It is standalone, a radical shift."

Heather continues: "It is a one hit, which means courses of antibiotics will be much shorter. What we are doing can reduce 10 million bacteria down to 200 in a couple of minutes."

It sounds tremendous, but why have we had to wait so long, and will have to wait still longer?

"It takes so long because of funding. Our shareholders have been so supportive, but they don't have the deep pockets of big pharma. We could have been there years ago otherwise."

Heather's story is legend. She used to be in marketing, have her own company, but sold up everything, including her home in Sheffield, to pursue a career in science,

starting from scratch. It was while she was studying in the US that she saw the possibility for a new type of antibiotic that would overcome the problem of bacteria resistance, and she foresaw the need.

"It is a huge, huge problem and it is just going to get worse. Cases which are untreatable are still rare, but it takes so long to develop new drugs that if we don't do anything now we are still going to be in the same position years away.

"It has been said that it is as much of a risk as terrorism, but it is worse than that. From birth to death you get infections and most people take antibiotics at some time.

"You go for a routine operation and then take antibiotics and assume you are going to get better. There have been huge advances in cancer treatment, but a lot of the drugs affect the immune system and will only work if the patient can also take antibiotics. This means a lot of cancer treatments will not be viable – it goes far deeper than people realise. It will affect transplants, all sorts of procedures."

Heather founded Phico Therapeutics in September 2000, deciding to set it up in Cambridge where she thought it would be easier to raise funding than anywhere else. Initially she received investment from a now defunct Cambridge fund, and then the angels came winging in – there are 136 of them, people who see the company as a good bet, but also want to feel that their money is going to do some good in the world. To date, Phico has raised £11.5m, including £1m from The Wellcome Trust.

This funded clinical trials in 2009/10 for Phico's nasal gel, a liquid formulation to see off hospital bugs before they struck. This is currently in limbo. It worked, but Phico, with its limited funds, is now focused on where the greatest immediate medical needs resides.

"This is pseudomonas aeruginosa," Heather says, >

> Antibiotics are usually taken in short courses and people don't expect to pay a lot for them. Big pharma is more interested in drugs which people are going to take for a long time

spelling it for me. "It is a hospital-acquired bug which accounts for 10% of infections and they are serious ones. It is intrinsically resistant to many antibiotics and at the moment is treated with two to three types in combination.

"There are cases where it is untreatable. In Greece this has reached 85%, and Italy is bad too, and it is spreading. It is a very common cause of pneumonia in hospital, and people die."

Phico has the antibody to zap this and plans are underway to put it into external manufacturing – Phico is based at Babraham in a small set of offices and labs – and then into pre-clinical tests later this year.

The heartening news for everyone involved and for all of us is that the government has decided that in really pressing cases, such as the above, and where patients are gravely ill, the new antibody will be administered without having gone through extensive clinical trials.

This does not mean scrimping on safety, but not having to go through the vastly expensive Phase III trials which can cost hundreds of millions of pounds.

"The aim is to find ways of helping companies to get out to market sooner, and to push more targeted antibiotics."

So, with such a pressing need, how come we are relying so much on people like Heather, who has a team of just 19, and in turn relies on the goodwill and savings of Cambridge business angels? Where are the big boys in all this?

"It comes down to money," Heather says.

"Antibiotics are usually taken in short courses and people don't expect to pay a lot for them. Big pharma is more interested in drugs which people are going to take for a long time." This said, big pharma are showing interest in Phico, which meets Heather's ultimate aim, to sell out to a large drug company with the wherewithal to take the products global.

"After all, antibiotics are among the only drugs that actually cure people," she says. And if all goes to plan, the first Phico antibiotic should be on the market by 2015. ■