nature

www.nature.com/nature

Vol 439 | Issue no. 7076 | 2 February 2006

When a vaccine is safe

Unfounded public fears place pressures on vaccine developers that go beyond reasonable safety considerations, as the search for an acceptable vaccine against Lyme disease may demonstrate.

Nothing gets forgotten as quickly as the threat of an epidemic that has been successfully headed off. Just look at all the allegations of media hype over SARS (severe acute respiratory syndrome), by people who think it was not a threat because so few ended up contracting it.

The short public memory reflects a low level of awareness of the largely invisible public-health activities that can now prevent infectious diseases running unchecked through human populations like they used to do — and as SARS might have done without the stringent quarantines and travel bans imposed to contain it. In wealthy countries, a lack of personal experience of infectious diseases has also induced a lack of respect for two of the main weapons that keep them at bay — antibiotics and vaccines.

Inappropriate use of antibiotics has allowed microbes to become resistant to many common treatments, creating serious health-care problems. And public suspicion of vaccines can undermine programmes aimed at eradicating particular diseases: the hostility in Britain to the measles, mumps and rubella (MMR) vaccine, based on unfounded fears that it might cause autism, is a case in point (see *Nature* **439**, 1–2; 2006).

Vaccination programmes often face problems of public acceptance as, by definition, they treat large numbers of healthy people. It is easier to provide a convincing case for vaccination when the risk of catching a disease is high and the consequences of infection severe. But what about a disease such as Lyme disease, where the risk of infection is relatively small, and the consequences not so deadly?

Lyme disease is transmitted by deer ticks, and is not transmitted person-to-person. The risk of infection is limited to areas where people share territory with deer, including swathes of central Europe and a growing envelope of rural and suburban North America. The disease is nasty but does not normally kill, and it can usually be cured by antibiotics. Confidence in the first Lyme disease vaccine stumbled after 1999, when it became available in the United States. A campaign claiming that the vaccine caused side effects, including autoimmunity (see News Feature, page 524), caused sales to plummet, and the manufacturer GlaxoSmithKline withdrew the vaccine in 2002.

So what does a vaccine maker have to gain from trying again? Baxter Vaccines, based in Vienna, Austria, must be asking itself this question. It has invested sizeable resources in developing a new vaccine, and is considering whether to put it into clinical trials. Baxter is not the only company seeking a Lyme vaccine, so manufacturers are clearly convinced that a potential market exists.

One reason for that is the growing extent of the disease, especially in the sprawling suburbs of the United States, where the number of cases in areas with systematic surveillance has doubled since the early 1990s. Good statistics are not available for Europe, but one study in eastern Germany showed the incidence up by one-third between 2002 and 2003. In Austria, the disease is endemic, with 130 new cases each year per 100,000 people.

> "Those who live in areas where Lyme disease is spreading deserve a vaccine."

Baxter will be hoping that increasing risk to the public will reduce the aversion to a vaccine. US physicians note that those keenest to be vaccinated tend to have first-hand experience of the disease and its unpleasant treatment, which involves weeks of injections with powerful antibiotics. Baxter's candidate vaccine has been engineered to remove the part of a protein that the opponents to the vaccine held responsible for causing problems, even though the US Food and Drug Administration found no evidence for such harm.

It may go against the scientific grain for marketing considerations to play such a part in steering vaccine development. But in the real world, this may be unavoidable. Lyme disease is a serious illness and those who live in areas where it is spreading deserve a vaccine. ■

Recycling the past

The reprocessing of nuclear fuel is an idea that should be laid to rest.

Plans to revive nuclear power are stirring on both sides of the Atlantic. In Britain, Tony Blair's government has been making upbeat noises about the need to replace existing nuclear power plants to fend off both national dependence on foreign sources of energy and global warming.

In the United States, however, President George Bush is said to be contemplating a step that will revive public concern about the link between nuclear energy and nuclear weapons — and could ultimately set back any prospect of reviving the former.

When it is released next week, Bush's 2007 budget proposal is expected to include a provision that would start to revive nuclear-fuel reprocessing. That would end a three-decade-old strategy in the United States that has sought to sever the connection between nuclear power and nuclear weapons.

Nuclear-fuel reprocessing aims to reduce the volume of spent nuclear fuel that has to be disposed of safely by recycling it for use in new types of nuclear reactor. But the recycling involves separating components that can readily be used to build nuclear weapons.

Of the countries with significant nuclear power capacity, the United States and Germany abandoned reprocessing early on, and Britain, having ditched the fast-reactor design that would burn the recycled fuel, looks set to follow suit. Japan is trying to build a

reprocessing plant, but only France has stuck resolutely with fuel recycling. An official study commissioned by the French prime minister found recycling to be costly, however, and France has not yet managed to 'close' its fuel cycle by finding a place to put its waste.

The United States had (and has) ultimate responsibility for the nuclear-fuel cycle at plants that have been built by US contractors around the world. It abandoned reprocessing in a bid not just to lead by example, but to prevent a situation whereby countries that operate US reactor technology might obtain access to plutonium production lines.

The decision to abandon recycling sought to put the nuclear weapons genie back in the bottle in arguments over nuclear energy, in the United States at least. Bush's plan would release it again — and galvanize US opposition to nuclear power. Its adoption by Congress would effectively concede that US plans for the safe long-term disposal of nuclear waste at Yucca Mountain, Nevada, are not going to solve the waste problem.

The plan to revive the nuclear-fuel cycle comes at a peculiar time. The Pittsburgh-based company Westinghouse, which constructed most of these US-built plants, is being purchased by Toshiba for $5 billion. This suggests that, in the eyes of some seasoned Japanese business executives at least, general global prospects for nuclear power are improving.

The case for a nuclear power revival has ben well rehearsed. The global panic induced by the 1979 performances of Jane Fonda and Michael Douglas in *The China Syndrome* — and inflamed by the real-life version released at Three Mile Island in Pennsylvania 11 days later — is beginning to die down. European memories of the 1986 Chernobyl accident are also fading.

Perhaps more to the point, the case now rests not on the specious grounds that nuclear energy will be immensely cheap, but on the rather more solid supposition that it is less bad than the alternatives. With coal causing global warming, oil and gas equated with dangerous energy dependency on outside suppliers, and renewable sources unable to produce the gigawattage that we apparently require, nuclear power is firmly back in the picture.

Yet the waste issue will need to be addressed before any ground is broken for a new nuclear power station in either Britain or America. Britain abandoned plans to build an underground waste repository in the north of England in 1997, and a report due this summer from a consultative panel, the Committee on Radioactive Waste Management, is only the first step in the search for a new approach. In the United States, the outlook for the Yucca Mountain project is uncertain, and the proposed repository there is, in any case, too small to meet forecast needs.

"The case for nuclear energy now rests on the supposition that it is less bad than the alternatives."

It may be that the Bush proposal reflects the administration's frustration over continued opposition to the Yucca Mountain repository. But, in the end, the only environmentally or financially viable path to nuclear power generation involves wrestling with the murky details of long-term waste disposal. Fuel recycling may look exciting on paper; in practice, it is part of the problem, not the solution. ■

Malaria quagmire

Progress in addressing Africa's largest health problem remains painfully slow.

Tackling malaria in Africa should not be beyond our means. For a few billion dollars a year, it ought to be possible to save the lives of millions of people and lift some of the world's poorest areas out of poverty.

All that is required, say specialists in the field, is access to tried and trusted remedies for those in Africa who need them most. Although vaccines and other new treatments would be helpful in the long term, some basic means of combating malaria, such as bednets impregnated with insecticide, are available now. Why aren't people getting them?

The economist Jeffrey Sachs is asking the question in his latest role as director of the UN Millennium Project, an ambitious initiative to reduce global poverty by 2015. At a meeting in Stockholm earlier this week, he gathered public-health officials, drug company executives, African politicians and others to try to find the answer.

Given the turf wars and squabbling that afflict this sphere, even the title of the conference — "A Malaria and Neglected Tropical Diseases Quick-Impact Initiative Meeting" — was likely to be greeted with scepticism, as the recent battle against malaria and other tropical diseases has been characterized by neither speed nor impact.

The World Health Organization's Roll Back Malaria Initiative, which in 1998 pledged to halve the malaria burden by 2010, has struggled to establish itself and looks set to fall far short of its main goals.

Even so, the past decade has seen considerable progress in global public health. Malaria, tuberculosis and AIDS are high on the public agenda, and funding for control measures and for research has grown rapidly. On the ground in Africa there has been considerable, if uneven, progress.

The Stockholm meeting nevertheless provided ample evidence of the huge obstacles that remain in the way of implementing control measures. It was told, for example, that manufacturers can already produce 75 million bednets a year. But instead of agencies simply buying them and shipping them on, they have to pass through a tortuous circuit of tenders and approvals.

Charity Ngilu, Kenya's health minister, also pointed out that most African countries have next to no health infrastructure for the efficient distribution of drugs and bednets.

None of these problems will be addressed overnight, as the interminable nature of some of the discussion in Stockholm demonstrated. The world's attention must remain firmly focused on these diseases, however, until donor nations, African governments and international organizations find solutions, and achieve universal access to these basic control measures. ■