



Weekend Australian

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Disease an unnecessary evil

The accelerating pace of medical advance promises enormous public health benefits, writes **Gustav Nossal**

AS a young medical science graduate I was actually planning to be a virologist. I'd developed a tremendous interest in viruses as the smallest forms of life, figuring that if I could understand viral replication I could understand the origin of life. That was my naive 21-year-old point of view.

It turns out that wasn't so far from the truth because it was using viruses as tools that the early pioneers developed molecular biology. Max Delbruck, Alfred Hershey and Salvador Luria won the 1969 Nobel Prize in Physiology or Medicine for their fundamental work in viral replication. I didn't know anything about that, of course. It was before their work that I sought to advance my ambition of being a virologist.

After finishing my medical degree and hospital residency I chose to study under famous Australian virologist Frank Macfarlane Burnet. To my utter dismay, when I arrived in Melbourne from Sydney in 1957 Burnet had switched the interest of his whole institute from viruses to immunology, so I'm an immunologist by default.

The key developments in those early 1950s and 60s were, one, a revolution in our understanding of how the white cells of the blood make the precious antibody molecules that keep us free from infectious disease and, two, the dawning realisation that immunology was about much more than just vaccines.

Specifically, immunology is about auto-immune disease, when the white cells turn traitors and begin to attack organs of the body. Examples of that are type 1 diabetes, rheumatoid arthritis and multiple sclerosis, as well as many other diseases. Further specific examples are in the field of transplantation, where these same white cells seek to reject the organ — be it kidney, heart or liver — that the surgeon has so carefully placed in the body. Unless we turn that immune attack off the transplant will be promptly rejected.

The next example is the field of allergy, which is basically an antibody response gone wrong, an inappropriate response to things such as pollen, house dust mites or even certain foods such as peanuts. And finally, immunology was soon shown to be relevant to the cancer field, with many investigators trying to develop vaccines against the disease.

So a field that had initially been confined purely to public health now stood within the mainstream of medicine and medical research. Clearly, it was very exciting to be caught up in that scientific tidal wave, from the late 50s to the early 70s, of all that dawned on the medical community.

My Burnet lecture on Wednesday evening was a tribute to my great mentor. I drew the field back to the grand challenges of health in developing countries. Whereas many infections have been conquered in industrialised nations, infections still represent the greatest single cause of mortality in the Third World.

The first part of my lecture was entirely political. I made the point that the world has easily got the capacity to get on top of these health problems if it has the will. In fact, distinguished health economist Jeffrey Sachs, from Columbia University's school of public health, has figured that an extra \$US100 billion (\$109bn) a year would materially eliminate extreme poverty, particularly in Africa.

You'll say \$US100bn is a lot of money, but I put it to you that the wars in Iraq and Afghanistan cost one country alone \$US700 million a year. And if you ask what the world can do when it really wants to move, look at the stimulus packages put in place following the global financial crisis. They total \$US3 trillion, 30 times the amount we're talking about.

On Wednesday I made a plea that the world move towards the target of 0.7 per cent of gross domestic product for reducing poverty and ill health in developing nations. It's a target the UN has mandated for aid. Australia has pledged it will move the aid budget from 0.3 per cent of GDP to 0.5 per cent by 2015.

Already, there've been tremendous strides in global immunisation. We have raised routine immunisation coverage of infants and children from a very low level to about 70-75 per cent. But that still leaves 25 million children worldwide unimmunised each and every year.

I think anti-vaccination activists do the world a great disservice. Not only do they put their own children in peril but, similarly, they put innocent others in peril as those unimmunised children represent a reservoir in which viruses and bacteria can multiply. Their parents may have an intellectual objection to vaccination or they may have inadvertently failed to have their youngsters vaccinated, but the fact is children who are not vaccinated pose a serious health risk to themselves and others.

Of course, nothing in medicine is 100 per cent effective. And serious adverse events from vaccination do occur, but they are vanishingly rare. The risk-benefit equation is monumentally tilted in favour of immunisation. Vaccines are unquestionably the most cost-effective public health tool in history.

As far as the age of vaccination goes, that



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varies from disease to disease. Some vaccines we deliver at birth such as hepatitis B. Many vaccines we give first at two months of age, followed by further booster injections later. Some, such as measles, are not usually administered until 12 months.

Despite the powerful weapon immunisation is in the battle against such infectious diseases, effective vaccines have yet to be developed for the big three: HIV-AIDS, malaria and tuberculosis. Many fresh approaches to vaccine are being investigated for each disease, yet none has yet reached the stage of being commercialised.

Scientists and medical researchers have also made recent advances in other areas of public health, notably nutrition. There are grave problems of under-nutrition in developing countries, particularly with respect to vitamins, minerals and high-quality proteins.

The Bill and Melinda Gates Foundation has a large program that is proving very successful in developing genetically modified staple crops such as wheat, maize, sorghum and bananas to deliver more nutrients. This is an area of rich promise.

Innovative new methods for controlling the mosquito vector of malaria are under development. There are, for instance, hi-tech studies on the smell functions, the olfactory functions, of mosquitoes. They're designed for, on the one hand, chemo-attractants to trap mosquitoes and, on the other hand, chemo-repellents that can be used for personal protection. Some of the chemo-repellents in the Gates program are 1000-fold more powerful than DEET, the active ingredient in practically all personal hygiene repellents.

There also has been spectacular success with the use of insecticide-impregnated bed nets. As well, new drugs to combat malaria are in the pipeline. Right now there are 11 drugs in clinical trials, five are based on artemisinin, a compound isolated from the plant *Artemisia annua*, or wormwood.

In terms of what we can do here in

Australia my message is that we must solidly get behind vaccination protocols for infants and children, including the new cervical cancer vaccine, which is not administered until girls are about 12. If we do this we can essentially get rid of serious infectious diseases from our community. That includes diseases such as meningitis, pneumonia and certain types of diarrhoea.

What's more, Australia must do its part, financially and scientifically, to bring these same benefits to the developing world without delay. Let's sting the conscience of the world into action.

We may not meet my youthful goal and discover the origin of life, but we can assuredly improve life for billions of people worldwide.

Gustav Nossal is former director of the Walter and Eliza Hall Institute of Medical Research and Australian of the Year 2000. He presented the Burnet Oration this week in Melbourne.



Earlier days: Nossal, right, with Sir Macfarlane Burnet



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Call to action: Gustav Nossal says Australia must do its part to improve health standards in the developing world

Picture: Gary Ramage