

Immune system flaw linked to soil disease in diabetics

Scientists find patients with Type 2 diabetes lack a molecule, impairing efforts to kill unwanted bacteria

By JUDITH TAN

DIABETICS have a higher risk of getting melioidosis – better known as soil disease – because of a deficiency in their immune systems, Singapore researchers have found.

The scientists discovered that patients with Type 2 diabetes have a deficiency of a kind of molecule – glutathione – and this lack impairs the work of cells which kill unwanted bacteria.

This makes sufferers particularly susceptible to soil disease, which is potentially deadly and is found throughout South-east Asia and northern Australia.

The illness is caused by bacteria which live in soil and water that are highly resistant to antibiotics. This makes it difficult to treat, and it often results in blood infections and pneumonia. Melioidosis was made notifiable in 1989 when three seemingly healthy young men died from it.

In 2000, it was a serious concern to the Ministry of Defence as there were infected soldiers in the field. A 2004 outbreak in Singapore also killed 15 people. “The fact that melioidosis is endemic in this region, coupled with the fast growing Type 2 diabetics in Asia, is worrying,” said Associate Professor Gan Yunn Hwen, who led the latest research effort.

Eleven per cent of adults in Singapore suffer from diabetes, according to figures published last November by the International Diabetes Federation.

Those with the illness also find it harder to stave off tuberculosis, although the defect does not mean their immune systems are useless in the fight against all bacteria, said Prof Gan.

Her team’s findings, which were published in *The Journal of Clinical Investigations*, came from a study



A foreign worker suffering from diabetes contracted melioidosis, or soil disease, while digging trenches at a construction site and had to have all 10 toes amputated. Researchers have found that Type 2 diabetics suffer from a lack of an antioxidant called glutathione, making them more susceptible to the bacteria that causes melioidosis. NP FILE PHOTO

of 99 people. Of these, 45 were healthy, 45 were diabetics whose condition was poorly controlled, and nine suffered from diabetes but had it under control.

“We found that diabetics are under oxidative stress and this caused the blood cells to be deficient in an antioxidant called glutathione,” said Prof Gan. “This in turn impairs the body’s fight against melioidosis.”

The project was started in 2007 and received a total of more than \$300,000 in research grants – \$260,000 from the National Medical Research Council and another \$50,000 from the Mindef-NUS Joint

Applied R&D Co-operation Programme.

The next step for the scientists is to look for a treatment. Previous research in Britain, led by Singapore infectious disease doctor Gavin Koh, found that the diabetes drug glibenclamide could halve the death rate from soil disease. However, giving it to someone who does not have diabetes may not be safe as it reduces blood sugar levels.

Prof Gan and her team found that Flumucil, a drug that thins mucus in the airways, has the potential to help reduce the risk of soil disease among diabetics. But to be absolutely sure, they must first conduct a clinical trial.

“We have received a grant of \$100,000 from the National Kidney Foundation last year and have started to look into the mechanisms of the drug and its antioxidant properties,” she said.

They are awaiting the green light from the Health Sciences Authority before they embark on the trial.

✉ juditht@sph.com.sg

What is melioidosis?

MELIOIDOSIS is a disease that infects both humans or animals.

It is found mostly in contaminated water and soil, and can cause swelling, fever, coughing, ulcer, headache, joint pain, weight loss or seizure.

Commonly known as soil disease, it mainly affects people in South-east Asia and northern Australia, where it is widespread. The bacterium that causes it, *Burkholderia pseudomallei*, is spread to humans and animals through direct contact with the contaminated source.

Healthy people can contract melioidosis, but those with diabetes, liver and kidney diseases, and cancer are at higher risk.

The type of treatment given can depend on when the infection is diagnosed. It generally starts with intravenous antimicrobial therapy, for example a 10- to 14-day course of a drug called Ceftazidime, which is administered every six to eight hours. This is followed by three to six months of oral antimicrobial therapy, using Trimethoprim-sulfamethoxazole or Doxycycline every 12 hours.

Patients with penicillin allergies should notify their doctor, who can prescribe an alternative treatment course.

In places where the disease is found, people who are at increased risk should avoid contact with soil and standing water. Those who carry out agricultural work should wear gloves and boots.

SOURCE: US CENTERS FOR DISEASE CONTROL AND PREVENTION