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Red blood cells do more than just carry oxygen

New findings by NUS team show they aggressively attack bacteria too

By Shobana Kesava

RED blood cells - our oxygen-carriers - are also 'fighters', taking on marauding bacteria when under attack.

This new finding, by scientists at the National University of Singapore (NUS), was published in scientific journal Nature last month.

Research carried out since 2004 by NUS scientists, led by molecular biologist Ding Jeak Ling and microbiologist Ho Bao with Dr Tan Nguan Soon and Ms Jiang Naxin, showed red blood cells respond aggressively when bacteria breach their cell walls.

'In the last few decades, we understood only that red blood cells carry oxygen to all parts of the body. Now, this opens up new ways of thinking,' said Professor Ho.

Red blood cells carry the protein haemoglobin, which gives them their characteristic red colour when they pick up oxygen from the lungs.

The scientists found that when bacteria such as acnecausing staphylococcus aureus break open a red blood cell, the haemoglobin molecule brandishes unstable chemicals called free radicals.

These latch on to the bacteria in their path, breaking the invaders' cell walls, effectively destroying them.

Professor Ding said the free radicals tend to destroy anything in their wake but since the bacteria are encountered first, human tissues are left unharmed.

'We first saw this in our studies on horseshoe crabs. These are so primitive that their respiratory protein, haemocyanin, is carried freely in the blood, not inside cells.

'When invaded by bacteria, the haemocyanin releases free radicals aggressively. So, we wanted to study how haemoglobin in humans respond too.'

The findings may lead to a new short-cut to fighting infections. Better understanding of basic biology could lead to more ways to treat infection.

Dr Laurent Renia, principal investigator with the Agency for Science, Technology and Research's (A*Star) Singapore Immunology Network at the Biopolis, said the finding reveals a very speedy innate response.

'If this is consistently happening from horseshoe crabs to humans, this means it is a very old defence mechanism,' he said.

'Once we understand the mechanism, we want to learn how to trigger it, so that if a parasite is resistant to antibiotics, this could be a way to develop a new line of drugs.'

Already, the process has begun at the lab of husband and wife team, Professors Ho and Ding.

'We aim to identify the hot spots in haemoglobin where bacteria bind,' said Prof Ding, 'to help us come up with novel strategies and drugs to fight microbes.'

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