MORAL DILEMMA: WHAT ABOUT DISEASE BACTERIA?

Many people ask: if bacteria were created, why would God make them to cause disease? Charles Darwin finally abandoned any Christian faith he may have had after his beloved daughter Annie died of a bacterial disease. (Ref. 11)

Would it surprise you to know that bacteria only cause disease when they get into the wrong place? We have many bacteria living on our external and internal body surfaces, such as the lining of the mouth and bowel, that do us no harm. These are called "normal flora" and are actually good for us. They help maintain the right chemical environment on our body surfaces. Some even make vitamins we can use. Our bodies have many built-in ways of keeping them in their place. However, if bacteria get into the blood, body fluids or body tissues, they can cause much trouble and our bodies also have many methods of hunting down and killing bacteria if they get in the wrong place.

The Skin Barrier

Intact skin is the best way of keeping bacteria out of harm's way. Most skin surfaces are too dry and acidic for bacteria

to grow and multiply and those that can live there cannot penetrate the skin's outer layers. Bacteria like warm, moist environments and will grow on sweaty regions of the skin. To make sure bacteria remain under control, even in these bacteria friendly regions, skin makes a bacteria-killing protein named dermicidin and secretes it in sweat. (Ref. 12) Skin also produces nitric oxide, which kills bacteria. But when we put our feet into the man-made environment of socks and shoes, our skin cannot produce enough nitric oxide to cope with the bacteria that thrive in the hot, wet microclimate created around shoe encased feet. The result is smelly feet, and even worse smelling socks and shoes. Some enterprising scientists are hoping to develop a deodorising box that uses nitric oxide to kill bacteria residing in sweaty running shoes, and therefore remove the smell. (Ref. 13)

Malodorous feet may seem a trivial problem compared with pneumonia or a golden staph wound infection but they do remind us that bacteria are wonderful opportunists. They will take advantage of any situation where human beings are out of sorts with their environment, and this is the underlying cause of most of our problems with bacteria.

Internal Controls

Bacteria also live on internal body surfaces without causing harm because a healthy body can keep them under control. The most effective way of keeping them under control is the constant movement of fluid across the surface. Many bacterial infections occur because the flow of fluid secretions has stopped, and the bacteria are allowed to build up. Body secretions such as saliva, tears, mucus and digestive fluids also contain substances that kill some bacteria and prevent others from reproducing or forming biofilms. (Ref. 14)

Normally, any bacteria that penetrate into the blood or body tissues are hunted down and killed by the immune system - an army of cells that constantly surveys the internal body fluids for foreign invaders. If, for any reason, our bodies become less efficient at keeping bacteria in their rightful place, the bacteria are quick to move in and grow. For bacteria our bodies are the equivalent of a five-star hotel, and once established in the body, they will not move out without a fight. We see this happening most obviously in people whose internal body surfaces have been damaged by diseases such as cystic fibrosis, or whose immune systems are inefficient at recognising or killing invading bacteria.

Medical scientists continue to discover new bacterial diseases resulting from more subtle human degeneration. A bacterium named *Bartonella* is now suspected of causing the sudden unexpected death of some very fit orienteers in Sweden several years ago. Not much is known about *Bartonella* yet, but according to Didier Raoult of the University of the Mediterranean, France, "Every year we are finding two or three new diseases caused by *Bartonella*." (Ref. 15)

An intriguing clue as to how bacteria become pathogenic (disease causing) occurred in the Bosnian war in 1995 when a wounded soldier was found to have an infection caused by *Bacillus thuringiensis*, a bacterium used as a natural pesticide and considered to be harmless to human beings. After microbiologists studied the bacterium in laboratory mice, they found it caused infections only after it had been cultured in a medium containing blood. (Ref. 16) If it can't get into human blood via wounds it will not cause disease.