

A leopard can't change its spots, but this bacteria can

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My work aims to investigate why genetically identical bacteria only cause severe disease in a small number of cases.

Streptococcus pneumoniae is a bacteria that can often be found living in your nose and throat.

Most of the time it doesn't cause disease (carriage), however it can and some people are more susceptible than others, these include:

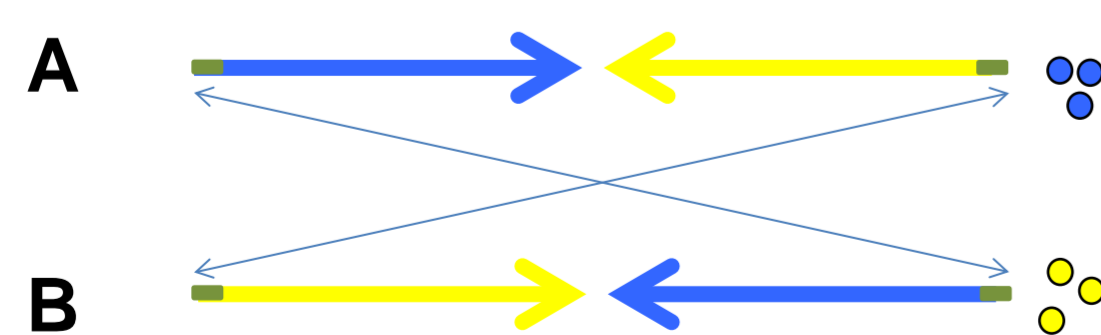
- The very young (under 2 years old)
- The elderly
- Those with a weak immune system
- Smokers



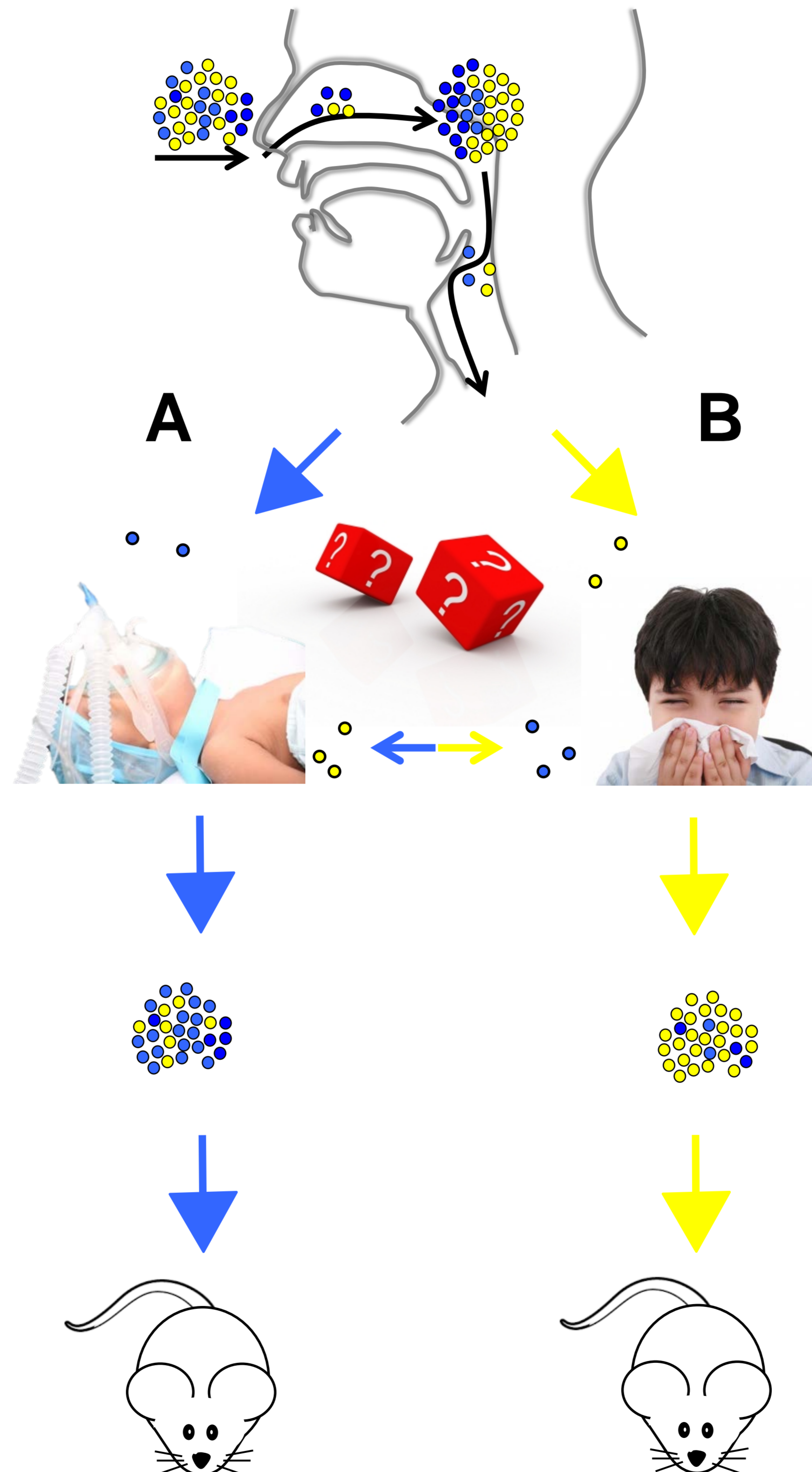
What diseases can *S. pneumoniae* cause?

- | | |
|-----------------------|--|
| • Meningitis (Brain) | } Invasive
(within the major organs) |
| • Pneumonia (Lungs) | |
| • Septicaemia (Blood) | |
| • Otitis media (Ear) | } Non-Invasive
(mild/outside the organs) |
| • Sinusitis (Sinuses) | |
| • Bronchitis (Lungs) | |

What am I investigating?

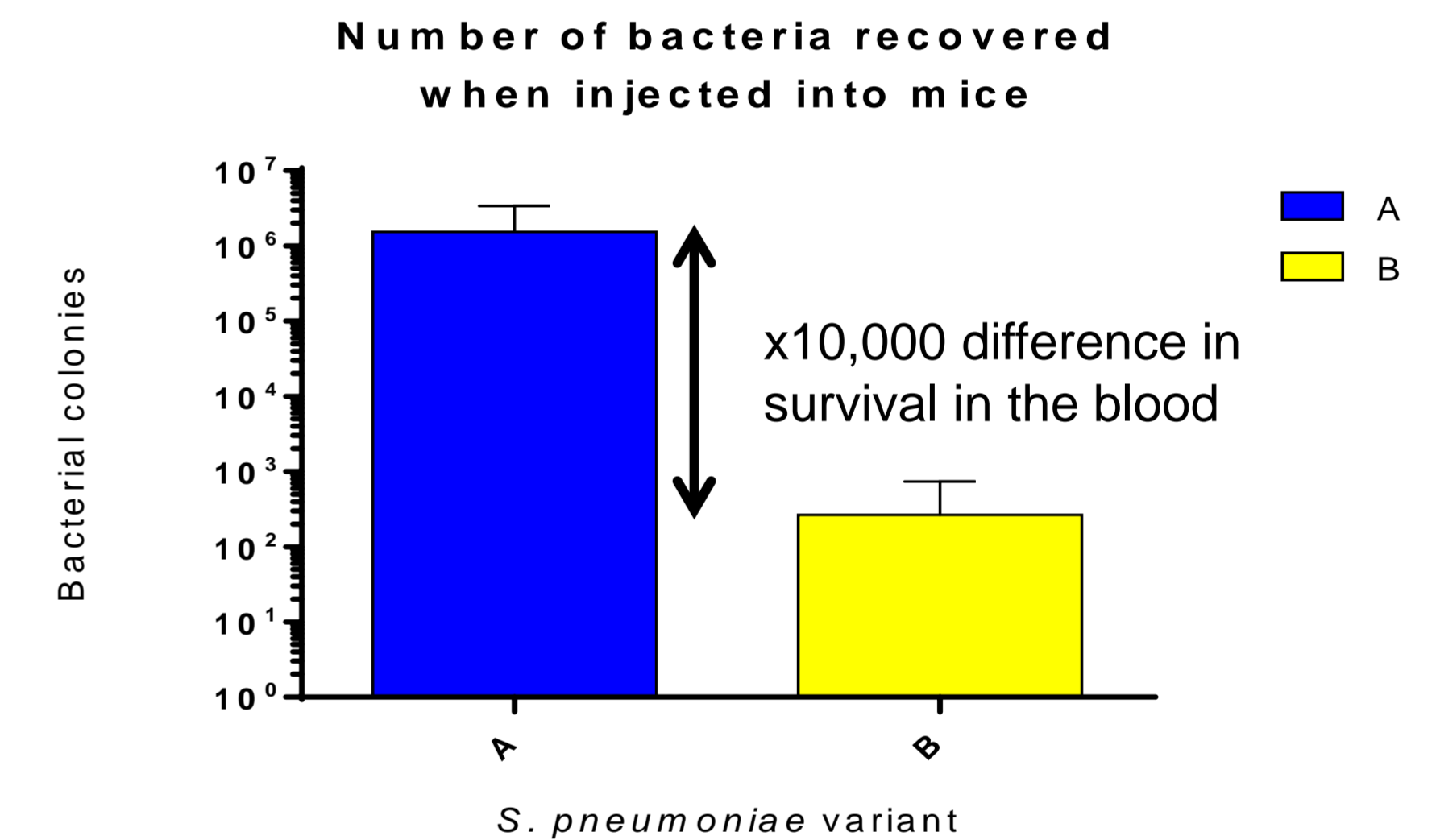


A system, called SpnIII, that can reversibly change either an A or a B gene. It does this with mirror patterns of DNA (shown in green) that mean the two genes can be traded with each other, this makes one gene active and one silent.



Why am I investigating it?

- Our current vaccine is **ineffective**.
- There are **>5,000 cases** of invasive pneumococcal disease in the UK every year.
- This is a genetic system that is found in **all strains** of *S. pneumoniae*.
- SpnIII regulates the expression of other genes, so A and B strains **behave differently**, this influences their ability to survive the **human immune system**.



What have I found?

- When mice are infected through the nose B strains survive and colonise, while A strains are killed.
- When mice are infected via the blood A strains survive and go on to cause disease, while B strains are killed.

What impact does this have?

- We now understand why strains may only cause invasive disease in a small number of cases.

What next?

- How often does this switch happen and what conditions influence the rate of switching?