Vancomycin

Vancomycin: Antibiotic of Last Resort Antibiotics and the infections they fight have gone through countless changes in the hundred years since ErnestDuchesne, a French medical student, discovered penicillin. When Fleming rediscovered penicillin in 1928, it was developed into a major component used to fight disease-causing bacteria. It was a major life saving drug used in World War II and was responsible for saving untold numbers of wounded veterans who would have succumb to infection just 10 years earlier. But by 1943, just 4 years after its introduction, bacteria were showing signs of becoming resistant. New antibiotics were introduced to fight the ever changing and more resistant strains. Vancomycin, the antibiotic of last resort, has been used to fight infections when all other drugs fail, but has recently met its match with strains that have become resistant to this last line of defense.

Methicillin-resistant Staphylococcus aureus (MRSA) is a highly virulent infection that has become resistant to most antibiotics. MRSA is a bacteria that is normally found in healthy people and usually is merely a passive bystander. However, it can cause skin infections and can occasionally be quite severe. By 1987 hospitals in Europe were reporting the first cases of vancomycin resistant Enterococcus. Between 1987 and 1993 the problem was escalating and had resulted in a 20 fold increase in the number of cases of vancomycin resistant enterococcus reported by intensive care units in hospitals in the United States. It was reported in 1992 that the vancomycin resistant gene from Enterococcus had been transferred to Staphylococcus aureus in a laboratory in England. The researchers were alarmed and destroyed the bacteria.

According to Dr. Ricki Lewis reporting in the FDA Consumer magazine in

1995, "... bacteria swap resistance genes like teenagers swap T-shirts". At that time, Lewis theorized that it would only be a matter of time until Staphylococcus aureus acquired the resistant gene from enterococcus and correctly predicted the looming crisis. In 1997 MRSA with heightened resistance to vancomycin was discovered. The online magazine New Scientist reported in 2004 that the problem was far more serious than previously thought as resistant strains were found from multiple types of MSRA. Further use of vancomycin would only continue to generate more vancomycin resistant strains.

Researchers are focusing on developing a strategy to make vancomycin more effective against the resistant strains. Vancomycin works by interfering with the cell membrane formation and causing cell lysis. Resistant strains have developed a cell wall that vancomycin can not adhere to. Research at Rice University has reported that buckyballs, " tiny cage-shaped molecules of pure carbon', in combination with vancomycin can reinvigorate the antibiotic and has been shown to be more effective against resistant strains. Additional research into glycopeptide resistance works to stay ahead of the bacteria's ability to evolve.

Bacteria will continue to become resistant through natural selection, evolution, or gene swapping. The fear is that the bacteria's rate of change will outstrip our ability to combat it. The last 15 years have seen MRSA go from a laboratory phenomena to a widespread health crisis. As more resistant strains are generated and the forms become more virulent, the use of vancomycin will increase and perpetuate an even greater crisis. Scientific research is continually looking for new and novel approaches to make sure the antibiotic of last resort does not become just another ineffective drug in

the war on infectious disease.

Works Consulted

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