A New MRSA Defense

Marijuana extracts kill antibiotic-resistant MRSA without a high.

By Nora Schultz on September 12, 2008

Substances harvested from cannabis plants could soon outshine conventional antibiotics in the escalating battle against drug-resistant bacteria. The compounds, called cannabinoids, appear to be unaffected by the mechanism that superbugs like MRSA use to evade existing antibiotics. Scientists from Italy and the United Kingdom, who published their research in the *Journal of Natural Products* last month, say that cannabis-based creams could also be developed to treat persistent skin infections.

Cannabis has long been known to have antibacterial properties and was studied in the 1950s as a treatment for tuberculosis and other diseases. But research into using cannabis as an antibiotic has been limited by poor knowledge of the plant’s active ingredients and by the controversy surrounding its use as a recreational drug.

Now Giovanni Appendino of the Piemonte Orientale University, in Italy, and Simon Gibbons of the School of Pharmacy at the University of London, U.K., have revisited the antibiotic power of marijuana by systematically testing different cannabinoids’ ability to kill MRSA.

MRSA, short for methicillin-resistant *Staphylococcus aureus*, is a bacterium that can cause difficult-to-treat infections since it does not respond to many antibiotics. Many healthy people carry *S. aureus* on their skin, but problems arise when multi-drug-resistant strains infect people with weak immune systems through an open wound. In the worst cases, the bug spreads throughout the body, causing a life-threatening infection.

To make matters worse, resistance to antibiotics is rapidly increasing, and some strains are now even immune to vancomycin, a powerful antibiotic that is normally used only as a last resort when other drugs fail.

But when Appendino, Gibbons, and their colleagues applied extracts from five major cannabinoids to bacterial cultures of six strains of MRSA, they discovered that the cannabinoids were as effective at killing the bugs as vancomycin and other antibiotics.
“The cannabinoids even showed exceptional activity against the MRSA strain that makes extra amounts of the proteins that give the bugs resistance against many antibiotics,” says Gibbons. These proteins, he explains, allow the bacteria to “hoover up unwanted things from inside the cell and spit them out again.”

Conveniently, of the five cannabinoids tested by the researchers, the two most effective ones also happen to be nonpsychoactive, meaning that they cannot cause a high. “What this means is, we could use fiber hemp plants that have no use as recreational drugs to cheaply and easily produce potent antibiotics,” says Appendino.

In an attempt to discover how the cannabinoids kill MRSA, the team manipulated several chemical groups within the compounds. Most of the changes did not affect the antibiotic activity at all, and those that did seemed to influence only how well the cannabinoid is taken up by the bacterial cells.

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