NOVEL *alternatives to* ANTIBIOTICS

Lay Summary

The world is populated by billions of living organisms which are too small for the naked eye to see (microorganisms). This unseen world includes a class of microorganisms called bacteria. Although the vast majority of bacteria are either essential to our survival or at least cause us no harm, a small percentage can cause serious or life-threatening illness. For more than 50 years antibiotics have been successfully used to cure bacterial infections, but bacteria are extremely adaptable and responsive to change, able to rapidly transform (mutate) to overcome external threats to their survival. The widespread use of antibiotics in health care and agriculture has produced antibiotic resistant bacteria and as resistance can be rapidly passed from one bacterium to another, "super bugs" now exist that are resistant to many, if not all current antibiotics.

In the last decade, the large pharmaceutical companies that produced antibiotics have turned their attention instead to more lucrative markets such as drugs for chronic diseases (heart disease, high blood pressure, high cholesterol, arthritis) or those that improve quality of life. We are now at a crossroads where the antibiotics that we have relied on for half a century are becoming less effective and there are few new products on the horizon to replace them.

Antibiotics have been the biggest therapeutic success in history and continue to save millions of lives, but resistance has and always will be a problem with any new antibiotic. Canada's health research community is exploring ways to preserve the effectiveness of existing antibiotics through more prudent use and better infection control practices, such as improved cleanliness, hand hygiene and isolation procedures. Despite these measures however, it may eventually prove necessary to find alternative ways to prevent and treat bacterial infections. In March 2005, the Canadian Institutes of Health Research, in partnership with nine other organizations, organized a workshop entitled "Novel Alternatives to Antibiotics". This workshop brought together more than 40 Canadian researchers to discuss novel alternative therapies.

The outcome of the workshop will be the development of a research initiative that will promote research into a variety of alternative therapies to protect Canadians from the increasing threat of antibiotic resistant bacteria.

Innovative ideas arising from the workshop discussions included:

- taking advantage of our own immune system, which is designed, in part, to kill "bad bugs" and protect us from infection. Boosting our natural immune response could improve our ability to fight bacterial infections "on our own" without the need for antibiotics.
- revisiting a class of naturally occurring bacterial predators, called bacteriophages (phages) that were essentially abandoned following the discovery of antibiotics. New research suggests that phage therapy might be a viable alternative to antibiotics in some cases.
- treating some infections with "good" bacteria (probiotics) which would interfere with the action of pathogenic "bad" bacteria.
- reducing the risk of infection during medical procedures by using materials such as stitches, catheters and prostheses designed to inhibit bacterial growth.

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