An Alternate Approach to Antibiotic Use for Swine Health

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Background:

The global concern around the antibiotic resistance crisis has led to the decreased use of antibiotics in the swine industry and tighter regulation of antibiotic use in Canadian agriculture. To date there have been few antibiotic alternatives to control bacterial infection in livestock. *Streptococcus suis* and enterotoxigenic *Escherichia coli* (ETEC) are two of the leading bacterial diseases affecting the swine industry, contributing to high swine mortality and contamination of pork products. These pathogens are responsible for significant economic losses in the industry. Cytophage Technologies Inc. proposes using tailor-made bacteriophages (phages) as alternatives to antibiotics to prevent and treat bacterial infections. Phages are highly specific viruses that infect and destroy bacterial cells without disturbing the existing commensal bacterial gut flora.

Our goal is to isolate natural phages from environmental samples and create modified phages that target disease-causing *S. suis* and ETEC isolates from Manitoban swine farms. The efficacy of the modified phages will be evaluated compared to that of the natural phages *in vitro* and *in vivo*.

Results and discussion:

Phages will be isolated from environmental samples from local farms enriched with isolates of *S. suis* or ETEC. Once the phages have been isolated, they will be sequenced, and the genetic information will be used to develop a strategy for genetic modification. Genetic modification will be used to increase the efficacy and broaden the host range of these phages. The efficacy of the modified phages will be evaluated *in vivo* first using a *Galleria mellonella* (wax worm) model of infection and promising candidates will be selected for animal trials.

Conclusions:

The isolation of natural phages is the first step in a process to acquire genetic material which will contribute to the development of targeted synthetic phages. The follow up testing will involve an *in vivo* wax worm model that will provide proof of concept for safety and efficacy before the commencement of an animal trial.

Take home message:

Antibiotic resistance is a serious global threat to human health and new legislation is enforcing the decreased use of antibiotics in agriculture. Bacteriophages present a safe alternative to antibiotics to help prevent and treat bacterial infections keeping livestock healthy and profitable.

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