CD4 and B-Calmette-Guerin

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The prevalence of malarial infection among Mideast populations has been increasing during the last two decades and it continues to rise, particularly in Africa. Tuberculosis mortality is close to 150 000 per year in many countries in South and Central America, Africa and Asia.

One class of bacteria known as Bacillus Calmette-Guerin (BCG) is implicated in most of these endemic diseases (90 percent). BCG is also present in the environment and is thought to be a carrier of several diseases, including meningitis, cervical cancer, AIDS and hypertension.

Furthermore, the recent resurgence of tuberculosis due to persistent environmental conditions that require dietary controls, urbanization and increasing population density, also suggest that there may be a role for BCG in these diseases. BCG is also involved in the prevention of major human diseases, such as age-related vision loss and neurological illnesses.

The BCG bacteria is of interest to scientists for the reason that it is a naturally occurring bacterium. BCG produces a kind of immune system-stimulating antibody called neutrophil-related activity (NRA) that can be identified and cultivated through the use of bacteriophage, viruses which kill bacteria.

By manipulating the growth state of bacteriophage (in other words by reducing the levels of certain receptors on the bacteriophage, which are then detectable in a rat olfactory gland), a bacteriophage can be designed to target and kill the B. Calmette-Guerin bacteria. In this way, bacteriophage can prevent and/or clear malarial and other parasitic infections, and confer immunity to other types of bacteria. These results have been proposed in several studies and experimental trials.

The majority of the interest with bacteriophage comes from the belief that they can potentially confer immunity to other bacteria. This concept is based on an important precedent set by the bacteriophage drug meticillin, which was not shown to be effective against bacterial infections in humans until several years later, when it was discovered that some strains of bacteria could not be exposed to the drug and remained highly susceptible to it. If bacteriophage were found to have additional therapeutic or immune effect on some types of bacteria, it would be of great therapeutic interest.

In this context, some researchers have discussed the possibility of using bacteriophage in areas with chronic and/or severe transmission of malaria. It is important to stress that these two major infectious diseases are bacteria, not viruses.

In this review, we highlight the major potential of bacteriophage for the prevention and treatment of Malaria. The most important limitation to the bacteriophage approach is the low rate of immunity to and sensitivity to bacteriophage genes in infecting malaria-infected animals.

Based on these limitations, most of the bacteriophage-based approaches have already not been further investigated. We make the following recommendations for further bacteriophage research:

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