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Release of miRNA from dietary bacteria stimulates mucosal immunity to viral pathogens

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We present a new paradigm that describes how naturally-grown, harmless micro-organisms in the diet can interact with the oral mucosal immune system to enhance its ability to ward off viral infections. This paradigm has evolved from two key observations: (1) Bacteria or yeast grown at natural rates retain miRNA that are released when encountering stressful environments, e.g., saliva, and (2) Highly stressed animals fed bacteria with a high content of releasable miRNAs are significantly more resistant to infections and toxicants. Our working hypothesis is that the release of miRNA is an adaptive response of bacteria to stressful environmental conditions, e.g. saliva, which the oral mucosal immune systems of animals have learned to recognize and respond to through co-evolution. We have characterized miRNA released from *Lactobacillus casei* by Next Generation Sequencing and have shown that they are derived from a limited set of genomic loci and stimulate the release of low levels of inflammatory cytokines from peripheral blood mononuclear cells while preventing the release of high levels associated with chronic inflammatory diseases. *In vivo* experiments in farm animals showed that feeding miRNA-releasing bacteria (not commercial probiotics) prior to exposure to pathogens or stressors significantly reduced animal morbidity and mortality and maintained weight gain. Feeding or injecting mice with miRNAs protected them from the lethality of a subsequent injection of LPS. Supplementing human and animal diets with generally regarded as safe miRNA-releasing bacteria may activate protective innate immune responses resulting in overall health benefits for populations under physical or parasitic stress.

Biography

Carl V Hamby has completed his PhD from the University of Missouri-Columbia and conducted his Post-doctoral studies at the New York Medical College School of Medicine, USA. He is an Associate Professor in the Department of Microbiology and Immunology at New York Medical College and served as Graduate Program Director in the department from 1989-2000. He is a Member of the American Association for Cancer Research and has published more than 30 papers in peer-reviewed journals. He has been a Principal Investigator on NIH and private research foundation grants and is an ad hoc Reviewer for well-respected international journals.

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