

Metagenome of the kidney following transplantation

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Following kidney transplantation, graft survival can be decreased by infections including the BK polyoma virus. However, the effects of various genotypes of the BK virus, as well as the effect of other viruses remain poorly understood. We postulated that the metagenome would become more abundant and more diverse following transplantation due to the effects of stress, injury and immunosuppression. To determine the complete metagenome of viruses, phage and bacteria following transplantation, we purified DNA from the urine of transplant patients and performed deep sequencing with an Illumina HiSeq 2000. We generated 6-18 x 10⁶ reads per sample. The sequence reads were blasted against the NCBI database to remove human sequence contamination and then assembled into contigs. Our results identified multiple genotypes of the BK virus. Interestingly, several patients were infected with multiple strains of the virus simultaneously. In addition, we identified additional polyoma viruses including JC virus, as well as low numbers of reads of numerous viruses and phage.

To determine the biological functions of the complete virome, we analyzed the biological functions at the level of specific genes using MG-RAST. The functional analysis quantitated key biologic functions including virulence, antibiotic resistance and an oxidative stress response. For example, we identified a subset of virulence genes that conveyed resistance to antibiotics and toxic compounds that mediated methicillin-resistance. We are currently correlating the viral genotypes and biological functions with clinical outcomes.

Biography

David Perkins, M.D., Ph.D. is a professor of Medicine & Surgery at University of Illinois at Chicago. He completed a Nephrology Fellowship at Boston University, a Ph.D. in immunology followed by a Postdoctoral Fellowship at Massachusetts Institute of Technology. He developed his research program in the Center for Immunogenetics & Transplantation at Brigham & Women's Hospital, Harvard Medical School. He then transferred to University of California San Diego and in July 2012 moved to University of Illinois. He is currently Director of Transplantation Research and his research focus is systems biology and the microbiome.

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