

**GEnBMT (Genomics and Engineering for BMT) Project
Vancouver General Hospital
Vancouver, British Columbia, Canada
May 29, 2015**

Purpose:

The purpose of this proof of concept study is to evaluate the bacterial communities of bone marrow transplant patients, their health care workers and their environment. This will be compared between two different types of rooms: regular patient rooms vs. rooms that have been engineered with the following:

- Self-sanitizing surfaces (e.g. copper nickel alloys) on high touch surfaces,
- Titanium dioxide coating on the walls (low touch surfaces and to act as a reflection medium of UV light cleaning systems)
- No touch fixtures (faucet and towel, soap and gel dispensers),
- Installation of fixed UV light cleaning systems in the patient bathroom

Bone Marrow Transplant Unit:

One of the highest risk groups for infection in the hospital settings are the Bone Marrow Transplant (BMT) patients. Therapy removes their innate, humoral and cellular immunity that leaves them highly vulnerable to infections until the immune system recovers. Therefore monitoring of the microbiome and BMT patients and their primary care givers as well as the immediate environment can inform and improve infection control practice, ultimately reducing healthcare acquired infections (HAI's). In addition, because the patients are in a highly controlled environment, it is an ideal opportunity to manipulate cleaning systems and assess the impact on microbiome populations.

Research Process:

During the year-long study, frequent sampling from high touch surfaces, water and the air will be performed. The microbiota will be assessed using traditional microbiological cultures, ATP sampling and DNA sequencing of bacteria to track the various microbes as they fluctuate and move between the environment and people. Key bacteria that are of interest in this study are as follows

- Staphylococcus aureus (methicillin sensitive and resistant)
- Enterococcus (vancomycin sensitive and resistant)
- Pseudomonas aeruginosa
- Escherichia coli
- Aspergillus species
- Clostridium difficile

The samples will also be used to extract and sequence DNA to examine both the bacterial communities that cannot be grown using traditional microbiology as well as those that can be routinely cultured in the critical laboratory

Outcome Strategies:

- Determine if the re-engineered rooms alter and/or reduce the microbial
- Determine if the better and earlier detection of potential pathogens reduces the risk of transmitting and/or acquiring infections
- Determine the durability of products such as the copper nickel alloys and titanium dioxide
- Determine the cost effectiveness and potential return on investment of the products and processes

Major partners in the GEnBMT (Genomics and Engineering for BMT) Project:

- Vancouver General Hospital
- Vancouver General Hospital Foundation
- BC Genomics
- CHAIR (Coalition Healthcare Acquired Infection Reduction) Canada - engineered systems
- Trimco, Los Angeles, CA – copper nickel touch surface alloy fixtures
- Aereus Technology, Burlington, ON - copper nickel touch surface alloy fixtures
- Class 1 Inc., Cambridge, ON – UV light systems
- CDC Construction, Vancouver, BC – installation of engineered products

