The SmartToilet: “Dr. John” is the gateway to personalized medicine

by Eric W. Jones

for the SFU Postdoc Research Day *Writing for the Public Contest*

The year is 2050. You stumble out of bed and hurry to the toilet to begin your morning routine. After flushing, the toilet whirs: within the unassuming porcelain your excreta is being analyzed. A personalized briefing replete with diet recommendations, hormone levels, and other health diagnostics is sent to you before you finish brushing your teeth. You feel healthier already!

My research goal is to develop the ecological theory underlying the software of the SmartToilet.

Despite its unappetizing nature, our poo is full of chemical and microbial clues that reveal information about our health. Measuring the bacteria in our stool-- a proxy for the composition of our gut microbiome-- can already be done with portable sequencing technologies; meanwhile, a prototype SmartToilet at Stanford uses “dipstick” tests, similar to pregnancy tests, that measure protein or metabolite levels.

But what if we go one step further, from microbiome measurement to microbiome engineering? For example, what if your toilet could remedy your food allergies by prescribing probiotics? While scientists are learning how fecal microbiota transplantation (FMT) can cure some gastrointestinal illnesses, it remains unclear what specific steps should be taken to address generic microbiome-associated maladies.

My research is directed at this final challenge: the development of ecological theories that prescribe optimal direct interventions (FMT) and indirect interventions (diet changes) that can deliberately alter a microbiome’s composition. Intensive experimental and theoretical challenges loom before “medicine for the microbiome” is widespread, but having a SmartToilet in your home might happen sooner than you think.