Health Promoting Materials to Manage Urban Pollution and Immune-mediated Diseases

Marja Roslund (presenting)1, Heikki Hyöty2, Juho Rajaniemi3, Riikka Puhakka1, Mira Grönroos1, Anirudra Parajuli1, Nathan Siter3, Noora Nurminen2, Jake Lin2, Sami Oikarinen2, Olli Laitinen2, Aki Sinkkonen1

1 University of Helsinki, Ecology and Environment Research Programme, Lahti, Finland

2 University of Tampere, Faculty of Medicine and Life Sciences, Tampere, Finland

3 Tampere University of Technology, Urban Planning Research Group, Tampere, Finland

As urban populations grow, the quality of the urban environment will play an essential role in public health. Now, more than half of the human population lives in urban areas with little green space and exposes to harmful pollutants. Indeed, two of the greatest challenges of urban societies are the control of urban pollution and rapidly increasing prevalence of immune-mediated diseases among urban dwellers.

Our research group has been investigating how environmental pollutants degrade in commonly used urban landscaping materials and how pollution alters the abundance of health-associated bacteria. We further designed novel materials that induce beneficial effects on functioning of the immune system. Finally, we tested our hypothesis in real urban environment by greening of urban daycare yards.

Our study indicates that in commonly used landscaping materials even slight pollution level may alter microbial communities associated with the human health, and exposure to potentially pathogenic bacteria might even increase in urban areas. In contrast, exposure to our novel material and greening of urban daycare yards changes human commensal microbiota and increases the abundance of microbiota that are beneficial to immunoregulation.