Green walls in offices have a positive impact on skin microbiota and enhance immune regulation

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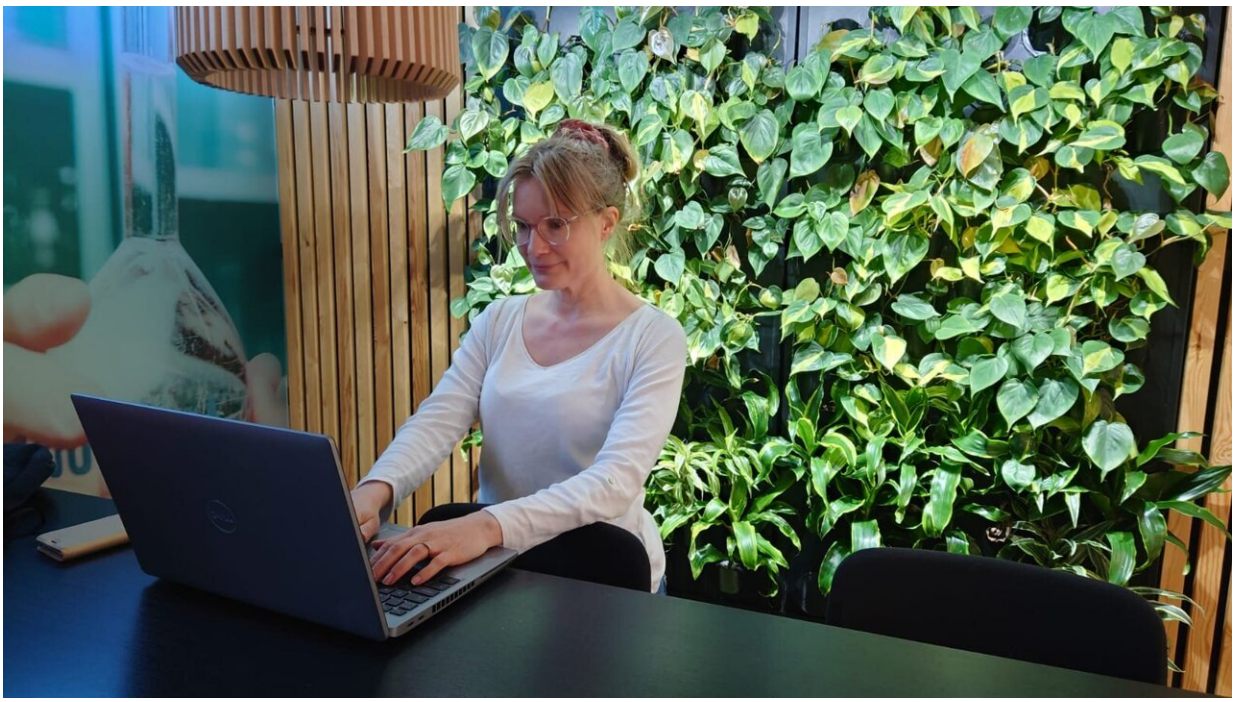

A recent study shows that green walls installed inside offices diversify employees' skin microbiota that offer protection against autoimmune disorders. The picture shows research scientist Marja Roslund. Credit: Aki Sinkkonen

An experimental study led by the Natural Resources Institute Finland (Luke) showed that air-circulating green walls installed inside offices

modified microbiota affecting employees' skin health and enhanced the immune system's regulation. Effects could already be seen during one month.

It is estimated that one out of five people living in the developed countries suffers from autoimmune disorders, such as allergies, atopy, type 1 diabetes and inflammatory bowel diseases. The resulting costs for society are estimated at more than a hundred billion euros per year.

A recent study shows that green walls installed inside offices diversify employees' skin microbiota that offer protection against autoimmune disorders. "Based on our results, green walls offer ideal solutions in workplaces and other indoor areas to balance people's regular microbiota. Even though it is often necessary to medically treat autoimmune disorders, it would be important to enhance the prevention of these disorders and alleviate symptoms through contact with nature. This is the first study in which the addition of plants indoors is shown to be linked not only to microbiota, but also to immune regulation," says Laura Soininen, a doctoral researcher at the University of Helsinki, commenting on the study published in *Scientific Reports*.

Green walls supporting health

In the study, volunteering employees were randomly divided into two groups, one of which received a water-circulating green wall in their rooms and the other acted as a control group without any green wall installed. The green walls were installed in conventional office buildings and a hospital area. The green walls were built by Finnish Naava Group Oy and included heartleaf philodendron (Philodendron scandens), dragon tree (Dracaena sp.) and bird's nest fern (Asplenium antiquum).

Already in two weeks, an increase in the relative abundance of lactobacilli was identified on the skin of the employees whose offices

had green walls installed. In previous studies, skin lactobacilli have been found to prevent pathogens and skin infections. During a month, an increase in the diversity of gammaproteobacteria was identified in employees working in offices with green walls installed compared with the control group. Diverse gammaproteobacteria on skin were linked to a decrease in the concentration of IL-17A cytokine that contributes to inflammations. In Luke's previous greening study concerning outdoor areas of day-care centers, gammaproteobacteria were linked to effective immune regulation in children.

In the study, the level of TGF-β1 cytokine, linked to effective immune regulation, increased in the blood of those who worked in rooms with green walls installed during a month compared with the control group. Changes in blood cytokine concentrations were identified in the employees who worked in the office buildings participating in the study.

Solutions are needed to maintain contact with nature

Nature's diverse microbes help the immune system develop and operate normally. In urban societies, people are less in contact with nature, which is why we need innovative nature-based solutions to maintain nature contact and reduce autoimmune disorders. "The results indicate that we can support people's health with relatively easy nature-based solutions. However, urban societies need, in addition to these types of solutions, broader societal changes to maintain and increase healthy and useful contact with nature," says Marja Roslund, research scientist at Luke. "These results encourage us to investigate this further."

More information: L. Soininen et al, Indoor green wall affects health-associated commensal skin microbiota and enhances immune regulation: a randomized trial among urban office workers, *Scientific Reports* (2022). DOI: 10.1038/s41598-022-10432-4

Provided by Natural Resources Institute Finland (Luke)