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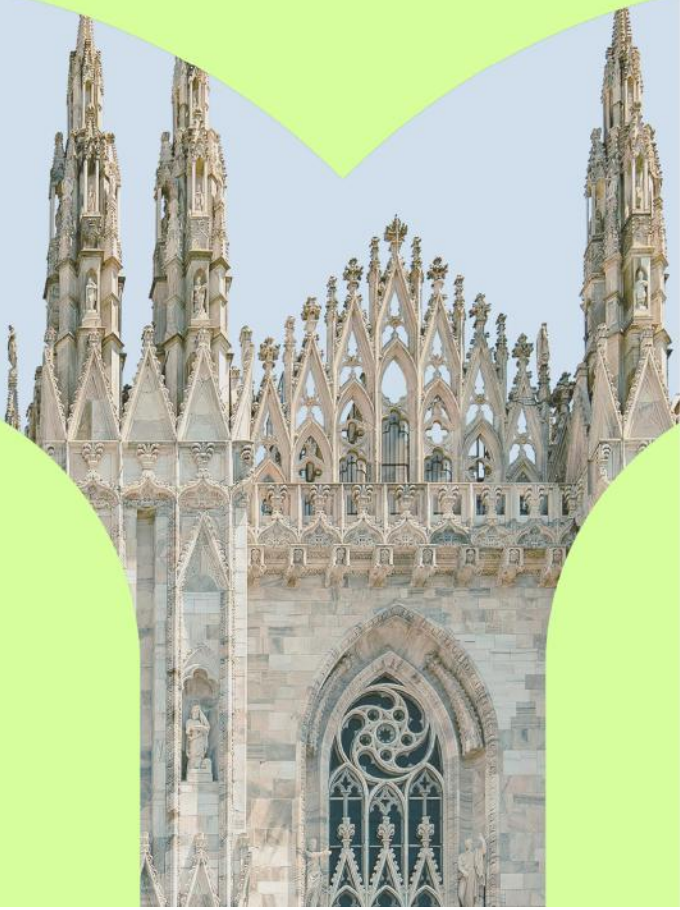

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Harnessing the gut microbiome for personalized treatment of lymphoma and leukemia

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Allogeneic hematopoietic cell transplantation (allo-HCT) is one of the few curative treatments for hematologic malignancies such as lymphoma and leukemia. While life-saving, it is also a dangerous procedure associated with significant adverse effects, such as graft-versus-host disease (GVHD), increased infection susceptibility, disease relapse, and many other complications that reduce the patients' quality of life. Several factors can influence the effectiveness of allo-HCT, including the microbiome composition and its impact on metabolism as a strong modulator of immune function. Yet, critical knowledge gaps remain in understanding how the microbiota and its interplay with the host can influence the development of GVHD and the severity of adverse outcomes. To address these gaps, we aim to characterize a cohort of 100 allo-HCT patients enrolled in a single-center prospective cohort study at the University Hospital Basel with an immediate 180-day follow-up after allo-HCT. Using a multi-omic approach, we aim to characterize the temporal dynamics of the microbiome and metabolome, integrating these data with clinical and laboratory measurements to identify associations that could be used to predict risks for GHVD and other complications. This will also enable the discovery of potential biomarkers, an important step toward improving the personalized management and care of patients with hematological malignancies. By elucidating the complex interactions between the microbiota, immune system, and the host, this research has the potential to translate into novel interventions, ultimately improving the quality of care and reducing the risk of complications in patients following allo-HCT.

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Harnessing the potential of natural antimicrobials: oregano and cinnamon essential oils vs. Listeria monocytogenes

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The growing consumer demand for safe, minimally processed foods free from chemical additives has driven increased research into green and innovative solutions utilizing natural antimicrobials. Plants serve as a valuable source of bioactive compounds able to prevent or reduce the growth of food-borne pathogens and spoilage microorganisms. Among these, essential oils (EOs), characterized by a promising antimicrobial potential, can ensure the safety and quality of fresh products, reducing the environmental impacts of agro-food sector. In this context, different EOs obtained from Mediterranean and medicinal plants were investigated for their chemical composition through chromatographic techniques and tested in vitro against food-borne pathogens to assess their Minimum Inhibitory Concentration (MIC) in different conditions. Based on these findings, oregano and cinnamon EOs, characterized by the higher antimicrobial activity, were selected to assess their effect when used at MIC, halved MIC and double MIC on Listeria monocytogenes Scott A. In particular, both culture-dependent (plate counting) and culture-independent (flow cytometry) methods were used to evaluate the physiological state of the target microorganism during EO exposure and the cell recovery potential after EO removal. When cells of L. monocytogenes were exposed to a concentration of 0.25 mg/ml (MIC value) of oregano EO, mainly constituted of carvacrol, a loss of culturability, already after 30 min of exposure, was observed. However, after 24 h from EO removal, culturability was restored. On the other hand, in the presence of a double MIC concentration (0.50 mg/ml), culturability was always below the detection limit (< 1 log CFU/ml), even after the removal of the natural preservative. The study of the relative frequency of the different cell sub-populations (live, injured and dead) assessed with a dual staining (SYBR Green I and propidium iodide) flow cytometric procedure, showed a slight increase in viable cells already after 2 h of recovery in the sample exposed to 0.25 mg/ml of oregano EO. On the contrary, 0.50 mg/ml of oregano EO exerted a bactericidal effect under all conditions considered (more than 99% of the total cells were recognized as dead). Cinnamon EO exhibited a different behavior. In particular, its activity exerted a bacteriostatic effect, resulting in an inhibition of L. monocytogenes growth detected with culture-dependent methods. In this case, in the sample treated