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Spingolipids Control Dermal Fibroblast Heterogeneity

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ABSTRACT: Human cells produce thousands of lipids that change during cell differentiation and can vary across individual cells of the same type. Yet, we are only starting to characterize the function of these cell-to-cell differences in lipid composition. Here we measured the lipidomes and transcriptomes of individual human dermal fibroblasts by coupling high-resolution mass spectrometry imaging to single-cell transcriptomics. We find that the cell-to-cell variation of specific lipid metabolic pathways contributes to the establishment of cell states involved in the organization of skin architecture. Sphingolipid composition is shown to define fibroblast subpopulations with sphingolipid metabolic rewiring driving cell state transitions. Thus cell-to-cell lipid heterogeneity affects the determination of cell states adding a new regulatory component to the self-organization of multicellular systems.

Short BIO: Giovanni D'Angelo graduated in 2003 with a MSc in Medical Biotechnology from the University of Naples, Italy and obtained his PhD in Cell Biology in 2008 from the Consorzio 'Mario Negri' SUD, Santa Maria Imbaro, Italy. For his postdoctoral training, he moved to the Telethon Institute for Genetics and Medicine in Naples, Italy to study sphingolipid metabolism and intracellular lipid trafficking. In 2012, Giovanni moved to the Institute of Protein Biochemistry, at the National Research Council of Italy in Naples as a principal investigator. In 2018 Giovanni moved to the Swiss Federal Institute of Technology in Lausanne (EPFL) where he is now Assistant Professor and Kristian Gerhard Jebsen Chair on Metabolism, Giovanni's main interest is understanding the meaning of compositional variability in cell membranes by studying the mechanisms by which the lipid composition is determined.



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