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Report of KU - UZH Joint Research Project

Section 1

Project title:	Synergistic joint research to regulate mitochondrial function and control inflammation associated with aging of skin cells
Project coordinator (KU) **Name** **Position** **Faculty, department**	Ganesh Pandian NAMASIVAYAM Junior Associate Professor Graduate School of Engineering/Department of Molecular Engineering/ Institute for Integrated Cell Material Sciences (iCeMS)/Kyoto/Japan
Project coordinator (UZH) **Name** **Position** **Faculty, department**	Marie-Charlotte Brüggen Assistant Professor Department of Dermatology, University Hospital Zurich, Switzerland Faculty of Medicine, University Zurich, Zurich, Christine Kühne Foundation of Allergy Research and Education (CK CARE), Davos, Switzerland
Period of project	From: 1 April 2022 To: 31 March 2023
Project location	Zurich University and Kyoto University
No. of participants	[KU] Faculty members: Hiroshi Sugiyama Students: Katsuhiko Abe Others: [UZH] Faculty members: Reihane Ziadlou Students: Danielle Céline Fehr Others: *A participant list can be attached instead of completing the above section. The list should include the details above.
URL at which project outcomes can be viewed (e.g. workshop notifications/programs/reports, evidence of academic papers published or otherwise made available, etc.)	Ganesh Namasivayam presented in UZH Skintegrity symposium on `Frontiers in Skin Aging Research`. https://www.linkedin.com/posts/skintegrity-ch_symposium-skin-agingactivity-7023624713767677952-yHK_?utm_source=share&utm_medium=member_desktop Our collaborative article is accepted with minor revision in Allergy Journal (Impact Factor: 14.7) and below is the link to pre-print. https://www.authorea.com/users/621641/articles/645152-nucleic-acidbased-small-molecules-as-targeted-transcription-therapeutics-forimmunoregulation

Photographs with captions	 Please submit digital files (such as JPEG or GIF files) of the photographs used in your report as attachments. The size of each image should be 4MB, so that it can be used for printed materials. Please ensure that none of the photographs submitted will cause any issues relating to portrait rights.

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Section 2

Summary of the project (approx. 200 words)
*Please submit a summary of the project in Japanese in addition to the English summary (approx. 400 characters).

Excessive reactive oxygen species (ROS) production due to chronological and UV-induced skin aging leads to mitochondrial dysfunction and skin disorders. Despite the accumulated knowledge about ROS and skin health, therapeutic targeting of ROS has yet to be achieved. In FY 2022, KU synthesized artificial genetic switches capable of activating collagen expression and controlling ROS expression in 97-year-old human skin cells and UZH validated them in human adipocytes. A manuscript was accepted with minor revisions in Allergy Journal and two manuscripts are in review. Dr. Namasivayam visited and successfully fostered the KU-UZH relationship with the extended network. Dr. Namasivayam joined the `Skintegrity community of UZH` and delivered a lecture at 1) a mini-symposium on Skin Aging Research in Zurich, 2) UZH (Davos) and AO Research Institute in Davos. Mr. Katushiko Abe from KU also visited UZH using the JSPS Young Researcher Grant and Dr. Reihane visited KU using her grant. Director Prof. Cezmi Akdis of SIAF, UZH, has joined as a project coordinator for the FY2023 KU-UZH general grant. The KU project leader received the JSPS Kiban B grant (FY2023-2026) with the UZH project leader as a research collaborator. The teams expect to sustain the collaborative activities with further grant applications.

加齢や紫外線による皮膚の老化によって活性酸素種（ROS）が過剰に産生されることで、ミトコンドリアの機能障害や皮膚障害が引き起こされる。活性酸素と皮膚の健康に関する研究は進んでいるものの、活性酸素の治療標的化はまだ達成されていない。2022 年度、KU は 97 歳のヒト皮膚細胞において、コラーゲン発現を活性化し、活性酸素発現を制御できる人工遺伝子スイッチを合成し、UZH はヒト脂肪細胞においてそれを検証した。論文 1 本が Allergy Journal に受理され、2 本が査読中である。加えて、Namasivayam 博士が KU-UZH を訪問し、両研究室の関係性の強化に努めた。UZH の Skintegrity コミュニティに参加し、1)チューリッヒでの皮膚老化研究に関するミニシンポジウム、2)UZH(ダボス)と AO 研究所(ダボス)で講演を行った。また、日本学術振興会若手研究グラントで KU の安倍克彦氏が UZH を訪問し、同グラントで Reihane 博士が KU を訪問した。更に、UZH の SIAF の Director Prof. Cezmi Akdis が 2023 年度 KU-UZH 一般助成のプロジェクトコーディネーターとして参加した。KU のプロジェクトリーダーは、UZH のプロジェクトリーダーを研究協力者として、JSPS 基盤研究(B)（2023-2026 年度）に採択された。両チームは、さらなる助成金申請により共同研究を継続する予定である。