

New therapeutic approach for pulmonary fibrosis

Pulmonary fibrosis is a severe and chronic lung disease that predominantly affects older adults. With no specific treatments currently available, lung transplantation often remains the only option to extend patients' lives. A research team from CeMM and MedUni Vienna has now uncovered that the aging immune system plays a crucial role in the onset and progression of the disease. Their study, published in the leading journal *Science Immunology* (DOI: [10.1126/sciimmunol.adk5041](https://doi.org/10.1126/sciimmunol.adk5041)), lays the groundwork for developing new immune-based therapies.

In their investigation, the team led by Sylvia Knapp and Riem Gawish (Department of Medicine I, MedUni Vienna) demonstrated for the first time how the age of specific immune cells contributes to the development of idiopathic pulmonary fibrosis (IPF). IPF is characterized by excessive deposition of connective tissue in the lungs, leading to progressive stiffening of lung tissue, difficulty breathing, and ultimately, death. Until now, this age-related disease was primarily attributed to changes in lung structural cells. However, the new findings challenge this assumption.

Rejuvenating the Immune System: A Promising Therapeutic Strategy

As shown in the study, first-authored by CeMM PhD student Asma Farhat, it is not the aging lung tissue itself, but rather the aging immune system that drives the increased risk of IPF over time. Using a mouse model, the researchers found that transplanting aged immune cells into young animals aggravated fibrosis. In contrast, targeted rejuvenation of the immune system prevented disease onset in older animals.

The reason lies in a shift within the immune landscape: with age, certain immune cells—specifically profibrotic macrophages—accumulate in the lungs and promote pathological connective tissue formation. At the same time, the regulatory T cells that typically counteract inflammation become less active. These aging T cells produce less interleukin-10, a key anti-inflammatory molecule. “The interleukin-10 produced by T cells is important for suppressing the profibrotic effects of macrophages, and it is precisely this important mechanism that appears to no longer function in old age,” explains first author Asma Farhat.

These findings pave the way for a novel therapeutic approach focused on modulating immune cell function—offering a potential alternative to lung transplantation. Further studies will be necessary to validate the results and explore this promising path toward treatment.

Pictures attached

Photo: The authors of the study Sylvia Knapp, Asma Farhat and Riem Gawish (f.l.t.r.) © Wolfgang Däubler/CeMM

The Study “An aging bone marrow exacerbates lung fibrosis by fueling profibrotic macrophage persistence” was published in *Science Immunology* on 28 March 2025 . DOI: 10.1126/sciimmunol.adk5041

Authors: Asma Farhat, Mariem Radhouani, Florian Deckert, Sophie Zahalka, Lisabeth Pimenov, Alina Fokina, Anna Hakobyan, Felicitas Oberndorfer, Jessica Brösamlen, Anastasiya Hladik, Karin Lakovits, Fanzhe Meng, Federica Quattrone, Louis Boon, Cornelia Vesely, Philipp Starkl, Nicole Boucheron, Jörg Menche, Joris van der Veeken, Wilfried Ellmeier, Anna-Dorothea Gorki, Clarissa Campbell, Riem Gawish, Sylvia Knapp.

Funding: This Study was supported by the Austrian Science Fund FWF.

The **CeMM Research Center for Molecular Medicine of the Austrian Academy of Sciences** is an international, independent and interdisciplinary research institution for molecular medicine under the scientific direction of Giulio Superti-Furga. CeMM is oriented towards medical needs and integrates basic research and clinical expertise to develop innovative diagnostic and therapeutic approaches for precision medicine. Research focuses on cancer, inflammation, metabolic and immune disorders, rare diseases and aging. The Institute's research building is located on the campus of the Medical University and the Vienna General Hospital.

www.cemm.at

The **Medical University of Vienna (MedUni Vienna)** is one of the longest-established medical education and research facilities in Europe. With almost 8,600 students, it is currently the largest medical training centre in the German-speaking countries. With more than 6,500 employees, 30 departments and two clinical institutes, twelve medical theory centres and numerous highly specialised laboratories, it is one of Europe's leading research establishments in the biomedical sector. MedUni Vienna also has a medical history museum, the Josephinum.

For further information please contact:

Mag. Johannes Angerer

Communication and Public Relations Manager

Tel.: +431/ 40 160-11501

E-mail: presse@meduniwien.ac.at

Spitalgasse 23, 1090 Vienna

www.meduniwien.ac.at/pr

Mag. Karin Kirschbichler

Communications and Public Relations

Tel.: +431/ 40 160-11505

E-mail: presse@meduniwien.ac.at

Spitalgasse 23, 1090 Vienna

www.meduniwien.ac.at/pr