

Media Release

**Embargoed: 00:01 CEST, Monday, 20 April 2026**

ESCMID Global 2026

## **HIV treatment reduces accelerated biological ageing by nearly four years, landmark study shows**

**(Monday, 20 April 2026, Munich, Germany) A major study presented today at ESCMID Global 2026 has found that antiretroviral therapy (ART) reduces accelerated biological ageing in people with HIV (PWH) by nearly four years, a finding that could transform how clinicians monitor HIV treatment and long-term health outcomes.<sup>1</sup>**

Researchers developed a plasma proteomic ageing clock (PAC) – a tool that estimates biological age, reflecting physiological ageing rather than chronological age – using patterns across hundreds of blood proteins. The model was applied to participants in the Swiss HIV Cohort Study (SHCS).

The PAC was trained on 941 plasma samples from PWH receiving successful ART and then evaluated in an independent cohort of 80 participants who contributed 294 longitudinal samples spanning viraemic pre-ART infection (when HIV was detectable in the blood) and suppressive post-ART phases.

During untreated HIV infection, the PAC estimated that participants' biological age was accelerated by a median of 10 years. After a median duration of 1.55 years of ART, researchers observed a statistically significant mean reduction of 3.7 years in proteomic age (95% CI 2.7 to 4.7;  $p = 0.0001$  – see Figure 1). Trajectory analyses showed that proteomic age continued to move closer to chronological age with longer ART exposure, suggesting ongoing biological recovery with sustained treatment.

Previous research suggests that PWH may experience accelerated biological ageing, which is linked to chronic inflammation and a higher risk of age-related conditions including coronary disease,<sup>2,3</sup> underscoring the clinical urgency of these findings.

“This research demonstrates the importance of early start and optimal adherence to ART,” commented lead study author Dr Barry Ryan, a postdoctoral researcher at EPFL, Switzerland. “We’re extremely fortunate to have a unique group from the SHCS who had samples collected for up to eight years before they started ART. With this group, we have measured the effect of untreated HIV infection and successful ART on telomere shortening, epigenetic ageing and now proteomic ageing. In each case we have shown that uncontrolled HIV infection is linked to faster ageing and that ART significantly slows this.”

The PAC primarily captures changes in inflammatory signalling and drug metabolomic pathways. When compared with the team's previously published epigenetic ageing clock (EAC) in the same cohort, both clocks showed similar overall trends.<sup>4</sup> However, the PAC was more sensitive to short-term immune changes, showing a faster increase

during untreated infection and a more rapid decline once detectable HIV in the blood (viraemia) was suppressed with ART.

Importantly, the reversal of proteomic age acceleration after ART was not significantly associated with CD4+ or CD8+ T-cell count recovery, suggesting that the reversal reflects broader inflammatory and innate immune remodelling rather than T-cell reconstitution alone.

“Our findings support the current consensus for starting ART promptly after HIV diagnosis,” explained Dr Ryan. “The participants were closely monitored pre-ART, including CD4 and CD8 T-cell counts. Nonetheless, we observed accelerated proteomic ageing irrespective of T-cell homeostasis, with acceleration already occurring nearest the time of HIV diagnosis.”

The authors call for external validation of the PAC in more diverse global populations and for proteome-wide feature attribution studies to pinpoint the specific pathways driving HIV-related ageing biology.

“While specific pathways of reversal may vary by ancestry and population, the global trend of accelerated ageing with untreated HIV and its attenuation after virological suppression is likely to generalise,” Dr Ryan added.

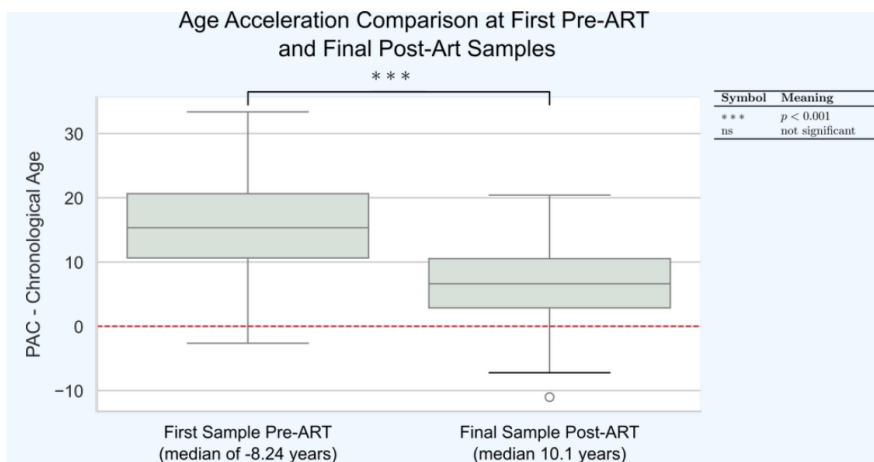
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**Notes to editors:**

A reference to ESCMID Global must be included in all coverage and/or articles associated with this study.

For more information or to arrange an expert interview, please contact the ESCMID Press Office at: [communication@escmid.org](mailto:communication@escmid.org)

**Figure 1:**



**About the study author:**

Dr Ryan joined the Professor Jacques Fellay's Lab of Human Genomics of Infection and Immunity in October 2025, after completing his PhD at the University of Edinburgh under Professor Ian Simpson in the area of Biomedical Artificial Intelligence. Dr Ryan comes from a computational background, having studied Electrical and Electronic Engineering in University College Cork (UCC), Ireland. He first began to train in Machine Learning (ML) and Artificial Intelligence (AI) during a master's year in Trinity College Dublin, Ireland. This was where he first developed an interest in interdisciplinary biomedical applications of ML and AI. Ever since, he has enjoyed tackling problems of biological data integrations, characterising Parkinson's Disease phenotypes, and now, identifying clinical insights for HIV disease research.

**About the European Society of Clinical Microbiology and Infectious Diseases:**

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Website: [www.escmid.org/](http://www.escmid.org/)

**References:**

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