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Tumour-like tissue environments offer new target for HIV cure research

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Researchers found that persistent viral reservoirs share immune-suppressive features with cold tumours, suggesting that cancer treatment strategies could inform future HIV therapies.

NORTHWESTERN UNIVERSITY

Scientists at Northwestern University have found that tissue environments surrounding persistent viral reservoirs share biological features with immune-suppressive tumours, providing a possible new direction for HIV cure research.

The study used animal models infected with simian immunodeficiency virus, which is commonly used as a proxy for HIV.

Rather than examining only the infected immune cells, the researchers mapped the surrounding viral microenvironment using molecular imaging, spatial transcriptomics and machine-learning techniques.

Persistent reservoirs showed similarities to cold tumour microenvironments, which suppress immune activity and resist clearance by the body's defences.

These reservoirs displayed increased activity in pathways associated with tissue remodelling and immune suppression. Shorter-lived reservoirs more closely resembled hot tumours, which attract stronger immune responses and contain more cells capable of attacking infected tissue.

Regulatory T cells were found to play a central role in communication between cells surrounding the viral reservoirs.

The machine-learning analysis also identified several human genes, including KRT8, EPCAM and RRM2, as contributors to the tumour-like characteristics of persistent reservoirs.

The similarities became apparent when the researchers analysed gut tissue, where much of the persistent virus remains during treatment. Previous HIV reservoir studies have frequently concentrated on blood samples.

Current antiretroviral treatments can suppress HIV but do not remove reservoirs capable of restarting infection when treatment is discontinued.

The study suggests that future cure strategies may need to disrupt the tissue environment protecting the reservoir, alongside therapies designed to eliminate infected cells.