

Human Brains Shrink. Apes Don't.

Why evolutionary biology matters for AI in nuclear monitoring.

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Brain mass maintained in later life

Ape brain preservation

Unlike humans, great apes retain brain volume into old age, even with advanced age.

This study analyzed 601 great apes across species, revealing that brain mass remains stable well into later life. In contrast, human brains typically begin to atrophy from age 45–50. This biological divergence suggests that aging-related neural decline is not inevitable across primates.

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https://www.nature.com/articles/d41586-026-03158-0?error=cookies_not_supported&code=f7cc9455-92d2-402a-a4b6-7417ad2704ac



01

AI Must Model Biological Resilience

If AI systems are to monitor reactor integrity or predict failure in nuclear facilities, they must account for non-linear aging patterns in complex systems—just as primate brains resist degradation. This insight implies that AI models for nuclear safety should incorporate biological analogs of resilience, not just mechanical wear. The assumption that all systems degrade predictably may be flawed when inspired by human aging, which is not the default in nature.

02

The Safety Case Is Evolutionary, Not Linear

The finding challenges the linear assumption that degradation equals time. In nuclear systems, failure prediction models based on time-based decay may misfire if they mirror human-centric aging patterns. Instead, AI-driven safety frameworks should consider non-linear, resilient architectures—inspired by apes' neural stability—as a benchmark for system robustness. This reframes the safety argument: not just preventing decay, but designing for evolutionary resilience.



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