Shift in ribosome structure and function in aged muscles

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The heterogeneity of ribosomes is thought to reflect their specialized regulatory function. Using the turquoise killifish, the shortest-living vertebrate model, we demonstrated age-dependent differences in ribosomal proteins (RPs) at mRNA and protein expression levels. Additionally, two specific regions in 18S and 28S rRNAs were distinctly protected by RPs between young and aged muscle. Visualization of ribosomes confirmed structural and dynamic differences between young and aged ribosomes in skeletal muscles. These age-dependent changes in ribosomes had little effect on the translation of foreign mRNA. However, interaction between Ltn1 and uL24 in the large subunit was dramatically increased, and receptor-activated protein C kinase 1 (RACK1) in the small subunit extended in ribosomes from aged muscle. Taken together, the data strongly suggest that the structure and function of aged ribosomes shift towards enhanced ribosome-associated quality control of newly synthesized proteins.

Furthermore, I plan to introduce the turquoise killifish as an effective screening platform for discovering anti-aging medicine

References:

1. Age-associated spinal stenosis in the turquoise killifish. ***iScience***. 2023 Sep 9;26(10):107877.
2. The core circadian component, Bmal1, is maintained in the pineal gland of old killifish brain. ***iScience***. 2020 Dec 9;24(1):101905.
3. The short-lived African turquoise killifish: an emerging experimental model for ageing. ***Dis Model Mech.*** 2016 Feb;9(2):115-29. doi: 10.1242/dmm.023226.

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