Identification of Survivin as a Novel Longevity Biomarker: Towards Developing Novel Anti-Aging Therapeutics

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Cells enter the senescence state when aging occurs, an irreversible cell cycle arrest. This exhibits an age-related increase in the levels of Senescence Associated Secretory Phenotype (SASP), resulting in chronic inflammations and age-related diseases. Senolytics, drugs that selectively clear senescent cells, have limited applicability, prompting the need to discover new natural ones. Survivin is an anti-apoptotic crucial for cell cycle regulation. Survivin is over-expressed in cancers and aged fibroblasts, however its role in adipocyte aging is not well understood. This project aimed to study survivin's role in the aging process of breast adipocytes as a potential therapeutic target to treat age-related inflammations. It also aimed to target survivin with a natural compound called Withaferin A, as a novel senolytic to prevent age-related diseases. To achieve these objectives, various biological techniques were utilized. These included oil-red staining, which detects lipid droplets, immunocytochemistry to assess cell proliferation, RT-qPCR to analyze gene expression levels, immunoblotting and ELISA to measure protein levels, and cell transfection. Results indicated that survivin and phospho-survivin increased with age in breast adipocytes leading to a notable elevation in inflammations. Interestingly, treating adipocytes with Withaferin A significantly reduced survivin and phospho-survivin levels, causing a remarkable reduction in inflammations. When survivin was over-expressed in young cells, it led to an increase in inflammations indicating that it is survivin-dependent. This study identifies survivin as a potential therapeutic target for age-related inflammations in breast adipocytes and highlights the efficacy of Withaferin A in mitigating inflammations.

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