The Role of Zombie Cells on Skeletal Muscle with Aging

04/10/2024
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Key Points:

- **Adult aging is associated with reduced muscle size and function.**
- **The accumulation of zombie cells could be contributing to the detrimental changes we see in our muscles as we age.**
- **Removing zombie cells using drug therapies could lessen the effects of aging on the body.**

The older adult population includes those 65 years and older and is currently the fastest-growing age demographic worldwide[1]. Aging is accompanied by a progressive loss in skeletal muscle size (termed sarcopenia) and function, which includes strength and power[2]. The ability of older adults to generate the power necessary to perform activities of daily living is compromised by factors such as the loss of muscle size. However, the underlying causes for the loss in muscle size with aging are not well understood.

Senescent cells, nicknamed zombie cells due to their "undead" nature, are characterized by an inability of a cell to divide. Zombie cells secrete a mixture of signaling molecules known as the senescence-associated secretory phenotype (SASP). In skeletal muscle, the SASP may be a stress response associated with the aging process or due to temporary muscle damage from activities such as injury or rigorous exercise[3]. Recently, zombie cells and the SASP have emerged as potential contributing factors to age-related losses in muscle size and function in older adults[3].

Zombie cells are identified by detecting the presence of various chemical markers in the muscle. Figure 1 shows a skeletal muscle nucleus stained for γH2AX, a marker of DNA damage, revealing elevated levels in older mice compared to young[3].

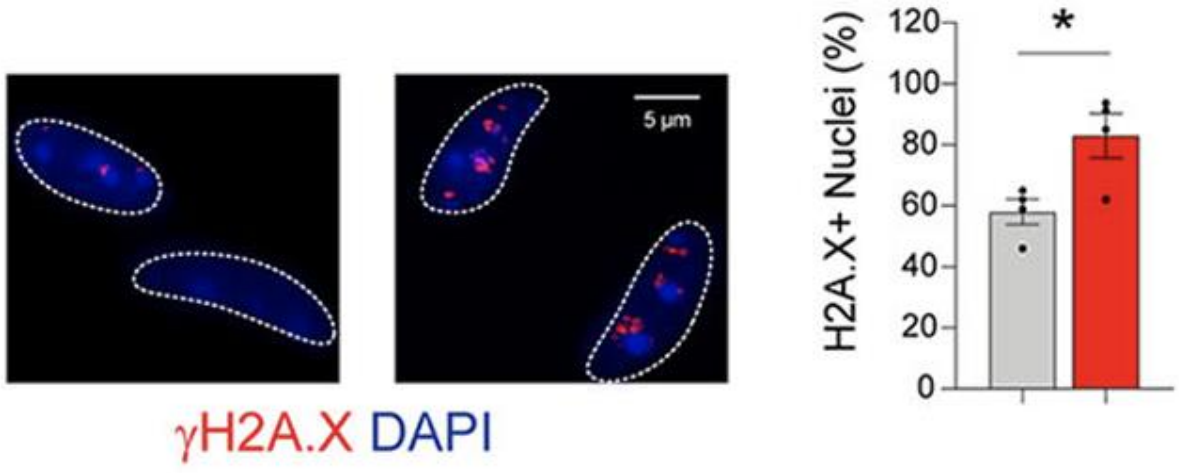

Figure 1: Elevated levels of γH2AX in nuclei of older mice (red) compared to young mice (grey) suggests a larger presence of senescent cells, which could be linked to age-related declines in muscle mass and function in older adults [3].

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While the consequences of zombie cells within skeletal muscle are not fully understood, evidence suggests that the removal of the cells can help improve muscle function with aging[4]. These data have the potential to inform clinical interventions aimed at reducing the severity of the age-related decline in muscle size and function.

Senolytic treatments are emerging drug therapies designed to kill zombie cells. This type of treatment is an example of a promising therapeutic strategy to remove zombie cells with the hope of restoring muscle growth in older adults[4].The clearance of zombie cells within muscle may lead to a decrease of the unfavorable SASP, ultimately enhancing the ability of the muscle to repair itself and aiding in preserving muscle size[3]. If senolytic treatments prove to be successful, they have the potential to enhance the quality of life in many individuals.

References

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