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Age-related Changes in *Drosophila* Midgut are Associated with PVF2, a PDGF/VEGF-like Growth Factor

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Age-related changes in stem cells have been implicated as a cause of age-related diseases including cancer. However, little is currently known regarding the manner in which age affects the modulation of adult stem cells. It has been recently shown that the *Drosophila* midgut constitutes an excellent model system for the study of stem cell renewal and aging. In this study, we demonstrate that the number of proliferating cells and Delta expression in intestinal stem cells (ISCs) of the *Drosophila* midgut increased with age. We determined that oxidative stresses, such as paraquat treatment and the *catalase* mutant allele, also induce phenotypes similar to those of age-related changes, thus bolstering the oxygen free radical theory of aging. Furthermore, we have demonstrated that the age-related upregulation of PVF2, a *Drosophila* homologue of human PDGF/VEGF, is associated with these age-related changes. Our results suggest that PDGF/VEGF may play a role in age-related changes of ISCs that might be involved in the aging process, including the development of cancer stem cells.

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Physical Characteristics of a Gelatin Film Manufactured from the Skin of Yellowfin Tuna (*Thunnus albacares*)

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Gelatin, which is a protein derived from collagen have been widespread used in food, medicine and photographic industries over the years. However, by-products of mammalians are limited in utility of processing in functional food, cosmetic, and pharmaceutical products because frequent occurrences of bovine spongiform encephalopathy (BSE) and foot/mouth diseases are to be serious problems for human health. In this study, we report a production of a gelatin film from the skin of yellowfin tuna and its physical characteristics. In order to analysis the physical characteristic of the film, the tensile strength, elongation, color value, opacity value, water solubility, swelling property, water vapor permeability and oxygen permeability were investigated. The tensile strength and elongation of the gelatin film from yellowfin tuna skin were 499.7 kgf/cm^2 and 15.1%, respectively. The values are higher than those of the porcine gelatin film (461.3 kgf/cm^2 and 9.6%). In case of color value, the film from tuna skin appeared to be the specific yellow with the opacity value due to effect of yellowfin tuna gelatin indicating the specific yellow. The solubility of film against water was lower than the porcine gelatin film in ranging pH 4 to pH 7, however, no significant differences were observed. The swelling property value of film from tuna skin was the lowest at pH 5, though the porcine gelatin film showed the lower value of swelling property in ranging pH 7 to pH 9. Water vapor permeability and oxygen permeability of yellowfin tuna gelatin film was 5.3cm^3/m^2 · day and 110g/m^2 · day, while porcine gelatin film was 7.4cm^3/m^2 · day and 170g/m^2 · day, respectively. Accordingly, gelatin film from tuna skin will be useful to develop a edible food packaging material, and to substitute the mammalian origin gelatin.

Key words: Yellowfin tuna, *Thunnus albacares*, gelatin, film