MARIANTHI SAKELLARI was born in Athens in 1987. She received her Bachelor of Science from the Department of Molecular Biology and Genetics of Democritus University of Thrace, in 2009. In 2012, she graduated with a Master of Science Degree in Molecular and Applied Physiology from the Medical School of National and Kapodistrian University of Athens. Afterwards, she enrolled as a PhD student at the School of Health and Medical Sciences, in Örebro University of Sweden. Her PhD studies were performed in collaboration with the Institute of Biology, Medicinal Chemistry and Biotechnology of National Hellenic Research Foundation of Greece.

Proteasome is a multi-subunit complex involved in degradation of a huge variety of proteins in eukaryotes, thus regulating multiple biological processes. Aging is a natural biological process that is characterized by reduced proteasome function that leads to proteotoxicity. Various compounds have been found to ameliorate proteasome system collapse and retard aging. In the present thesis, 18α-glycyrrhetinic acid (18α-GA), a natural compound with known proteasome activating properties in cells, was indicated to activate proteasome also in the multicellular organism *Caenorhabditis elegans* (*C. elegans*). Evaluation of the anti-aging and anti-aggregation properties of the compound showed that 18α-GA promoted longevity in nematodes through proteasome- and SKN-1-mediated activation and ameliorated Alzheimer's disease progression and neuropathology in nematodes and neuronal cells. Additionally, the crosstalk between protein synthesis and proteasome-mediated protein degradation was analyzed in eukaryotic organisms under various cellular conditions. Protein synthesis inhibition was found to induce proteasome function and assembly in human primary embryonic fibroblasts, with heat shock protein chaperone machinery to contribute to the elevated proteasome assembly. Notably, protein synthesis inhibition increased the protein levels of specific proteasome subunits without affecting the proteasome activity in *C. elegans*. Furthermore, proteasome activation by means which have also pro-longevity effects decreased the protein synthesis rate both in fibroblast cells and nematodes.

This thesis suggests: 1) that a diet-derived compound could act as a pro-longevity and anti-aggregation agent in a multicellular organism and 2) the existence of a complex interplay between anabolic and catabolic processes under different cellular conditions, across species.

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