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Healthy Aging and Longevity

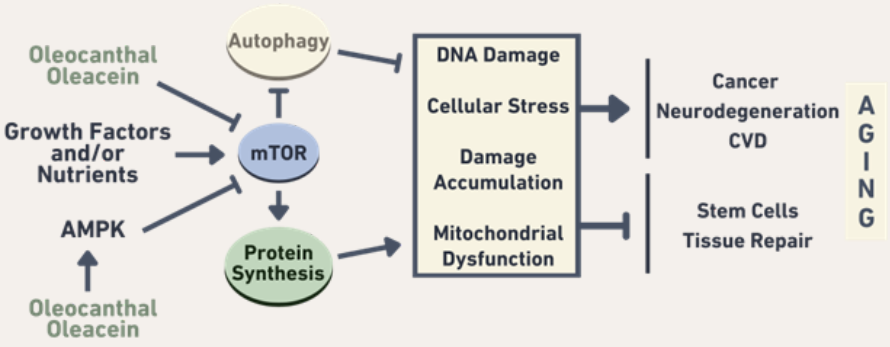
The World Health Organization explicitly defines healthy aging as “the process of developing and maintaining the functional ability that enables well-being in older age.” Aging in a healthy way helps one function and live a life that meets daily needs, maintains relationships and social activities, and helps one contribute to society in a meaningful way for most of ones’ life (1) . The Mediterranean diet (MD), a combination of foods and EVOO, has long been thought to promote longevity and healthy aging. Data from a large, prospective study that followed 40,622 participants aged 29 to 69 for a combined total of over 550,000 person-years highlighted EVOO phenolics and concluded that consumption of at least ½ tablespoon of EVOO resulted in an impressive 19% reduction in all-cause mortality and significant reduction in specific cause mortality among healthy adults compared to non-consumers (2) . The health beneficial properties of EVOO (potent antioxidant and anti-inflammatory activities) are now largely attributed to phenolic compounds, including phenolic alcohols, hydroxytyrosol and tyrosol, as well as secoiridoids such as oleocanthal, oleacein (hydroxy-oleocanthal), oleuropein and others (3).

The pathways targeted by phenolics from EVOO which impact longevity are not entirely known. These pathways can be partially gleaned by the protective effects of EVOO phenolics on the risk and progression of several chronic diseases such as cardiovascular disease, Alzheimer’s disease, cancer, diabetes/metabolic disorders, and others that shorten the lifespan and increase morbidity (4) . These pathologies are driven in part by oxidative stress and inflammation, two processes known to be attenuated by oleocanthal and oleacein (5) .

Furthermore, these two phenolic compounds appear to impact many of the “hallmarks of aging” which contribute to determining lifespan and health. Some of the twelve hallmarks of aging include: genomic instability, telomere shortening, deregulated nutrient-sensing, mitochondrial dysfunction, cellular senescence, stem cell exhaustion, and chronic inflammation to name a few (6) .

As a compelling example, the mammalian/mechanistic target of rapamycin (mTOR) is a complex of proteins and plays an important part in cellular metabolism, connecting nutrient sensing with cellular events that promote growth and proliferation (7) . The mTOR pathway has been strongly tied to aging and longevity, and as predicted, inhibition of this pathway extends lifespan in multiple models (8) .

Significantly, the Interventions Testing Program of the National Institute on Aging has concluded that inhibition of mTOR increases the lifespan of mice by 25% (9) . Consistent with this conclusion, mTOR appears linked to many of the hallmarks promoting aging, including nutrient sensing, autophagy, mitochondrial dysfunction, cellular senescence, inflammation, and stem cell function. Importantly, two recent publications have demonstrated that oleocanthal and oleacein can inactivate mTOR, consistent with the possibility these agents might increase healthy aging and lifespan (10,11) . In addition, another publication has demonstrated that these EVOO phenolics activate and increase levels of AMPK, a kinase that inhibits mTOR signaling (12) . Finally, a recent review article entitled “Olive Oil and the Hallmarks of Aging” summarizes the attenuation of aging related diseases and increase longevity by EVOO phenolics (13) . Consumption of phenolic-rich EVOO will lead to multiple health benefits but does add to the daily caloric burden. An extraction of the active phenolics in a liquid or powder form might be a healthier way to benefit from a key component of the Mediterranean Diet.



mTOR is a key regulator of the aging and longevity pathways and OL and OLC impact the activity of this protein complex. Arrows represent activation and symbol (---I) represents inhibition.

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