Effects of adenine auxotrophy in *S. cerevisiae* strain W303-1A on the anti-aging properties of phycocyanin extract from A. platensis

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Spirulina is a dietary supplement made from blue-green algae (cyanobacteria: *Arthrospira platensis*), which is particularly rich in phycocyanin (PC), a phycobiliprotein, which accounts for up to 20% of this cyanobacterium's dry weight and is considered responsible for its anti-cancer, anti-inflammatory and antioxidant activities. Although the anti-aging activity of PC has been investigated, how exactly this compound works against aging remains elusive [Bannu et al., Current Drug Metabolism, 2019, 20, 967-976]. In our laboratory, we are using the yeast *Saccharomyces cerevisiae* as a model organism to investigate the anti-aging properties of PC from *A. platensis*. Our results show that PC revealed a powerful anti-aging effect, greatly extending the chronological life span (CLS) of yeast cells in a dose-dependent way, both under caloric restriction (CR) conditions (0.2% glucose) or under non-CR conditions (2% glucose). Moreover, it is known that not only glucose, but also the abundance with which metabolites or metabolic intermediates (for example amino acids or nitrogenous bases) are present in the medium can influence longevity. In particular, Kokina et al. [FEMS Yeast Res 14, 2014, 697–707] showed that under adenine starvation, long-term survival of W303-1A (which is an adenine auxotroph) is lower than during glucose starvation, but higher than during leucine starvation. In addition, adenine starvation increased the trehalose content and stress resistance. In our conditions we found that the absence of adenine in the growth medium increased yeast life span, both when this microorganism was grown under CR conditions (0.2% glucose) or under non-CR conditions (2% glucose). With the aim to investigate the anti-aging properties of PC in the presence or absence of adenine in the culture medium, we performed CLS experiments of yeast cells grown in synthetic medium under CR conditions (0.2% glucose) or under non-CR conditions (2% glucose), in either the presence or absence of adenine. Preliminary results showed that PC extended the CLS of yeast cells grown under non-CR conditions (2% glucose), regardless the presence or absence of adenine in the medium. Surprisingly, under CR conditions (0.2% glucose) PC had an opposite effect, depending on the presence or absence of adenine in the culture medium. In particular, PC extended the CLS of yeast cells when adenine was present in the culture medium, while it shortened the life span when cells were grown in the absence of adenine. Further experiments will be necessary to clear the role of adenine autotrophy in both growth and aging.