Unraveling the anti-aging properties of phycocyanin extract from the cyanobacterium Spirulina (*Arthrospira platensis*).

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Keywords: phycocyanin, *Arthrospira platensis*, aging, cell death, oxidative stress, *Saccharomyces cerevisiae*

In recent years, marine natural products have become one of the most important resources of novel lead compounds for critical diseases associated with age and obesity. Spirulina, a dietary supplement made from blue-green algae (cyanobacteria: *Arthrospira platensis*), 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]. Aim of this research is to use the yeast *Saccharomyces cerevisiae* as a model organism to investigate the anti-aging properties of PC from *A. platensis*. First, we compared the molecular weight and purity of the phycocyanin extract used in our study (kindly provided by Algavista Greentech Pvt Ltd, Chennai, India) with that of a commercial standard (Sigma- Aldrich, St. Louis, MO, USA), using SDS-PAGE and absorbance spectra. Identical patterns were observed for both samples, confirming the quality of the phycocyanin extract used. We also determined the stability of phycocyanin by analysing the absorbance spectrum after preparation (0 h) and after 10 days at 30° C, both in water and SD medium containing glucose as a carbon source. The similar spectra confirmed the stability of the phycocyanin. Next, we studied the ability of PC to extend chronological life span (CLS) of yeast cells grown in SD medium under caloric restriction (CR) conditions (0.2% glucose) or under non-CR conditions (2% glucose). In particular, we cultivated the W303-1A wild type strain in the presence and absence of PC and we measured its ability to form colonies over the time, till 50 days after growth arrest. Our results show that PC revealed a powerful anti-aging effect, greatly extending the CLS of yeast cells in a dose-dependent way, being the effect more pronounced when cells were grown in SD medium containing low glucose. Finally, both ROS and accumulation of dead cells were followed by staining chronologically aged cells with dihydrorhodamine 123 (DHR123) and propidium iodide (PI). Surprisingly, we found that aged PC treated cells, which were unable to form colonies, were actually ROS+/PI–. We are currently monitoring the effect of glutathione supply to aged PC treated cells to investigate the ability of this compound to revert their dead phenotype.