

# NUTRACEUTICAL APPROACH TO IMPROVE ELDERLY HEALTH: AGING PHENOTYPES CHARACTERIZATION IN *Caenorhabditis elegans*

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## Aging & Nutrition

Humans are gradually moving towards an aging society: by 2050, one in four people in Europe will be aged 65 or over<sup>1</sup>. Aging is a process of gradual physiological decline<sup>2</sup>. Understanding the mechanisms underlying aging is fundamental to promote healthy aging, but it is complicated by its multifactorial nature, in which environmental factors (e.g. nutrition) play an important role<sup>3,4</sup>. In particular, natural extracts can be used as functional food to ameliorate aging and to prevent related pathologies. Hence the interest in studying *Cinnamomum cassia* buds extract: this extract, enriched in polyphenols and mainly procyanidins, showed a high antioxidant activity *in vitro*<sup>5</sup>. The employment of *C. elegans* as a model organism for aging research is due to its short life cycle, ease manipulation and conserved signaling pathways<sup>6</sup>.

1. UNDESA Population Division (2015).

2. Huang et al., *Proceedings of the National Academy of Sciences* 101.21 (2004).

3. Dabrowska et al., *Cells* 11.9 (2022): 1568.

4. Okoro et al., *Molecules* 26.23 (2021): 7323.

5. Ciaramelli et al., *Frontiers in chemistry* (2022): 553.

6. Zhang et al., *Frontiers in Endocrinology* 11 (2020): 554994.

## *C. elegans* maintenance

- N2 WT strain maintained at 20°C
- NGM plates seeded with alive *E. coli* OP50 strain
- 5-Fluoro-2-deoxyuridine (FuDR) added during the first week
- Day 0 = 1<sup>st</sup> day of adulthood

## Healthspan parameters during *C. elegans* aging



Lifespan

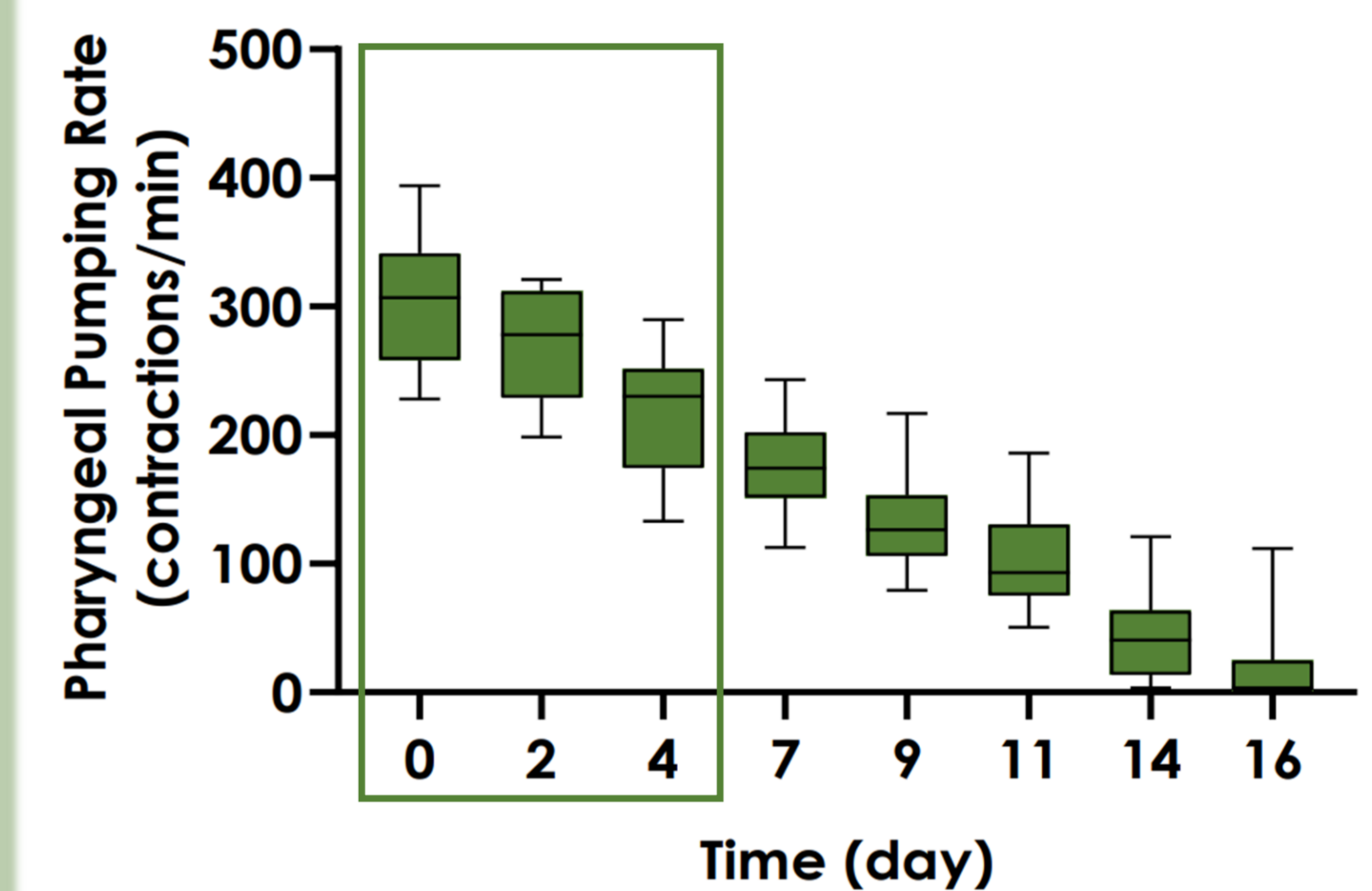
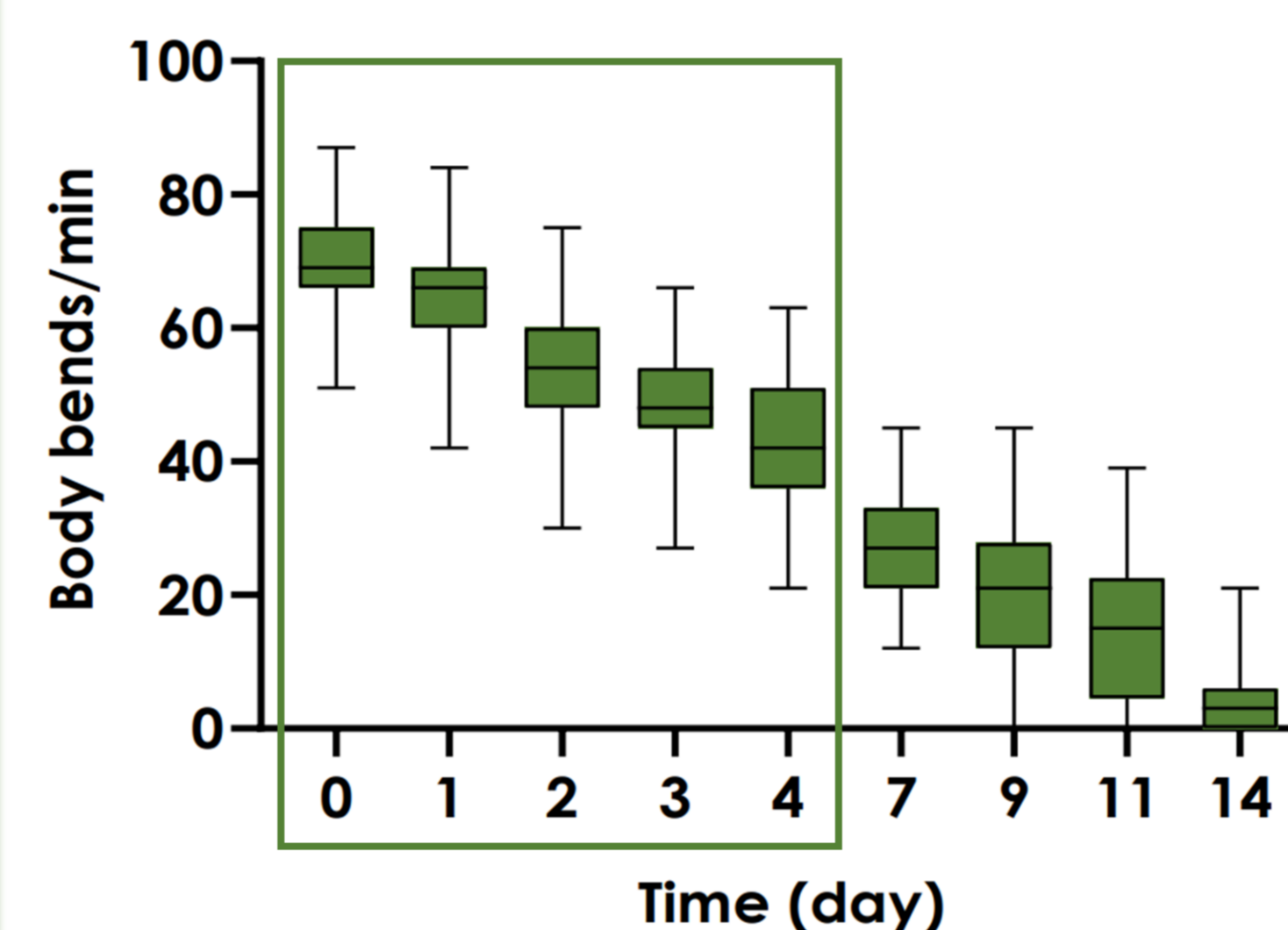
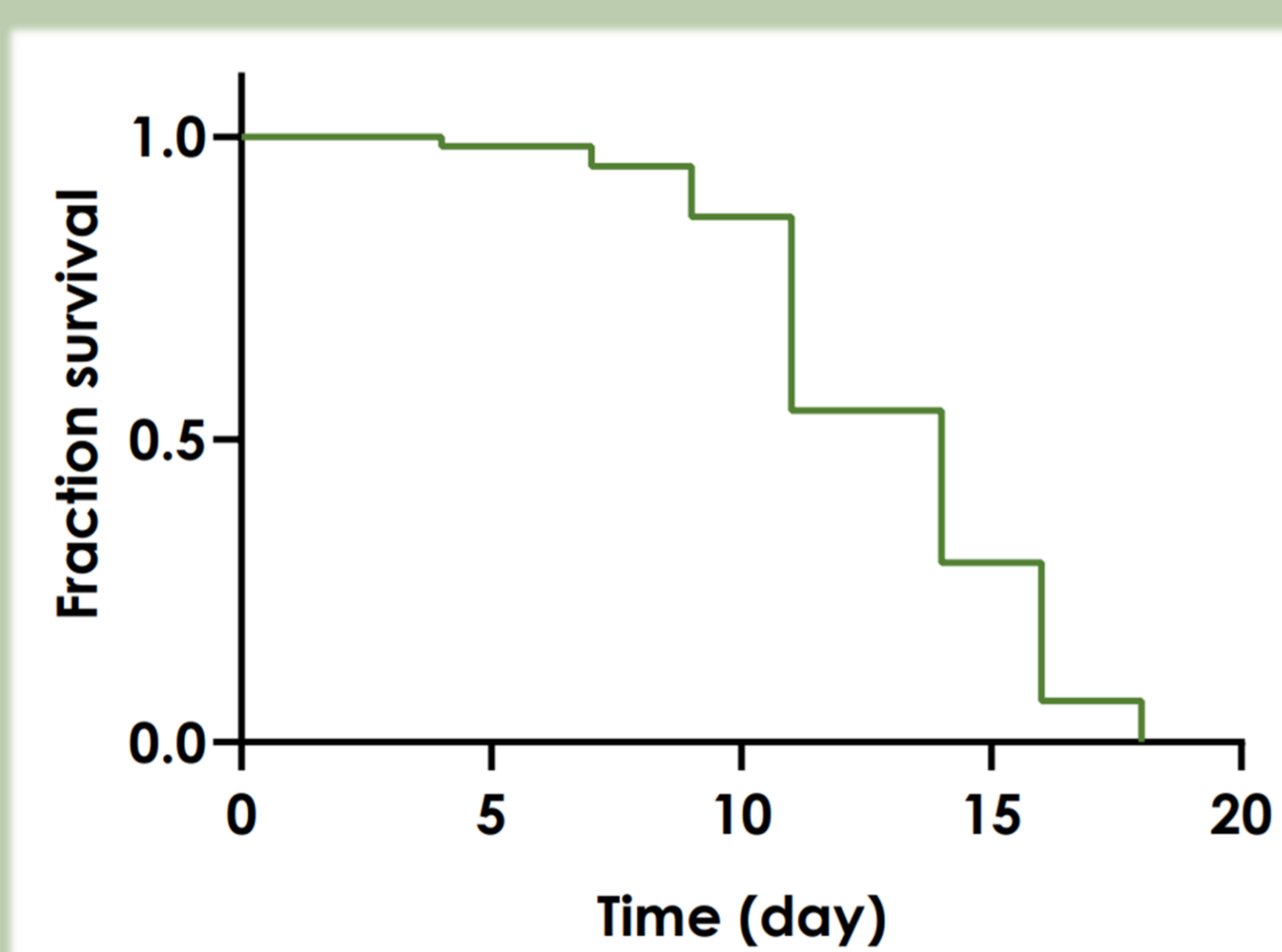
Heat stress resistance

Movement

Pharyngeal pumping rate

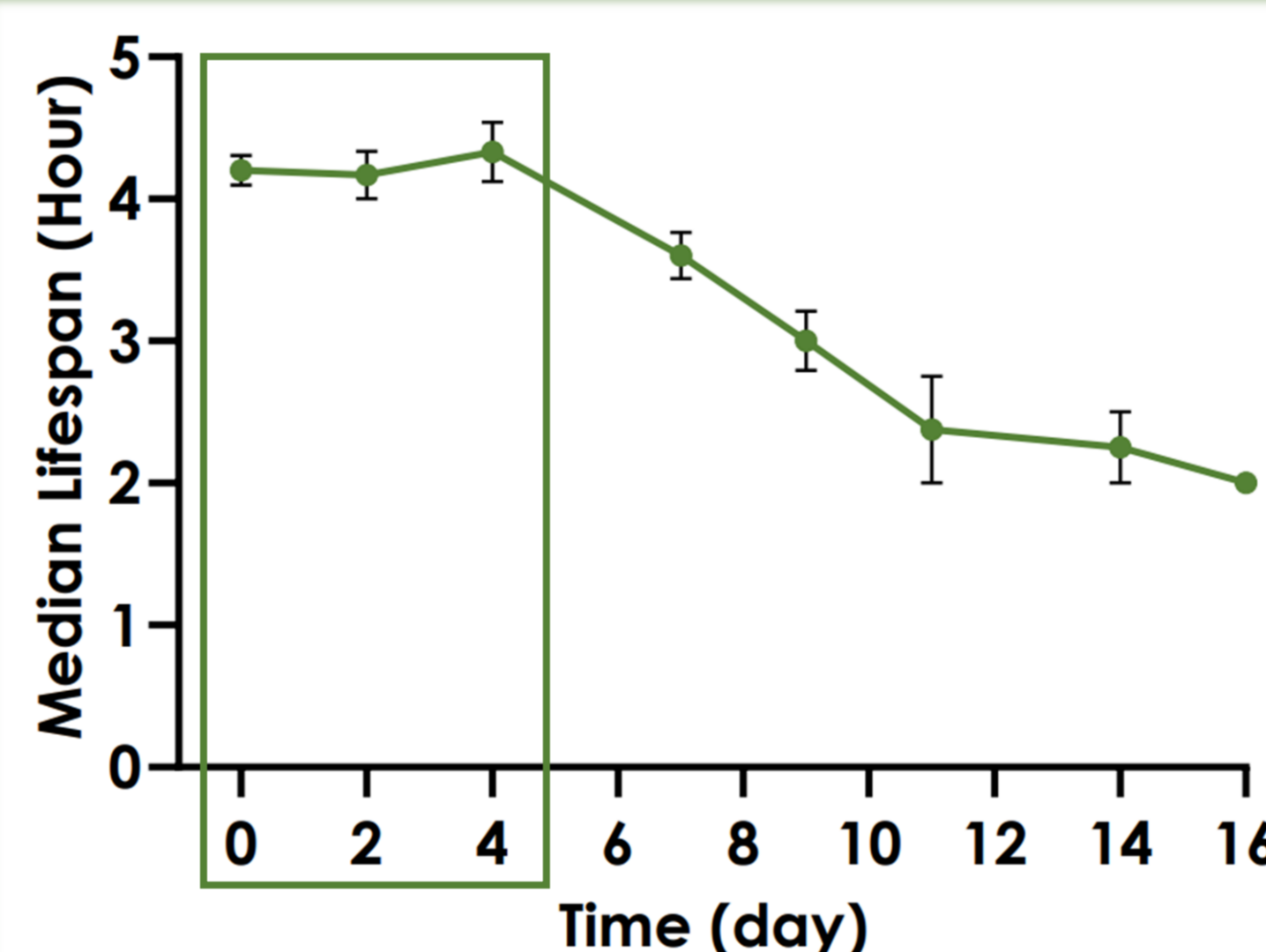
TO DO NEXT:

ROS    Oxidative stress resistance    Antioxidant enzymes activity



Count of the body bends and pharyngeal pumps over lifespan.

A progressive linear decrease of both parameters is observed since the early adulthood.



Heat stress resistance (37°C) over lifespan.

The heat stress resistance decreases only in the second week and it is slightly maintained in the oldest animals.

WE CAN CONCLUDE THAT...

Physiological parameters decline starting from different aging time points.



They are regulated by different pathways.

## Cinnamon buds extract activity

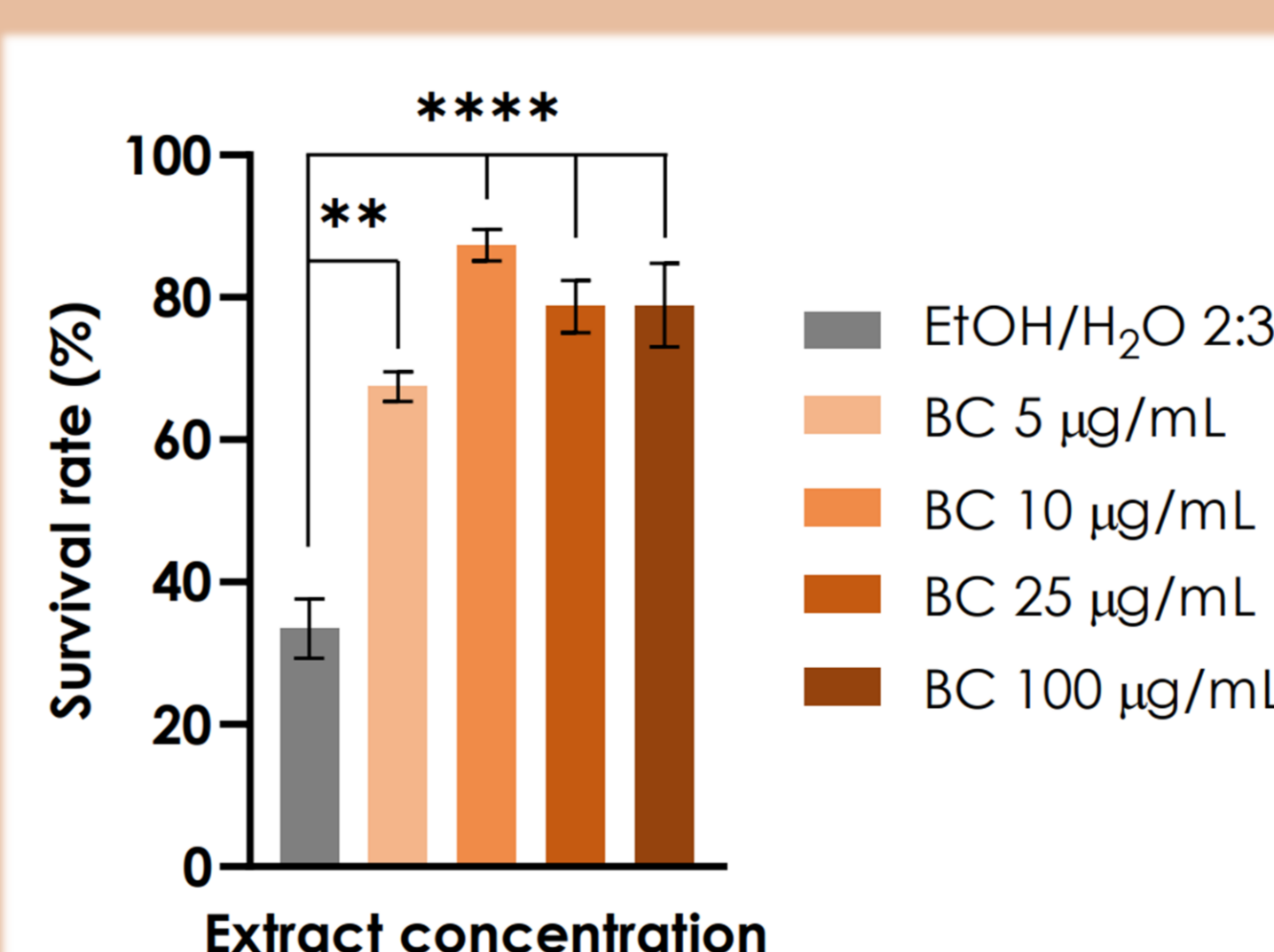


***Cinnamomum cassia* buds extract (BC):** hydroalcoholic extract (water 60%, EtOH 40%) containing mainly cinnamaldehyde and procyanidins<sup>5</sup>.

**Effect of BC extract treatment in heat stress resistance.**

The treatment for 48 h with different BC concentrations induces a significant increase in the heat stress resistance, with a maximum rise of 54% survival with 10 µg/mL dose.

➔ BC treatment protects worms from thermal stress, making its employment promising for healthy aging improvement.



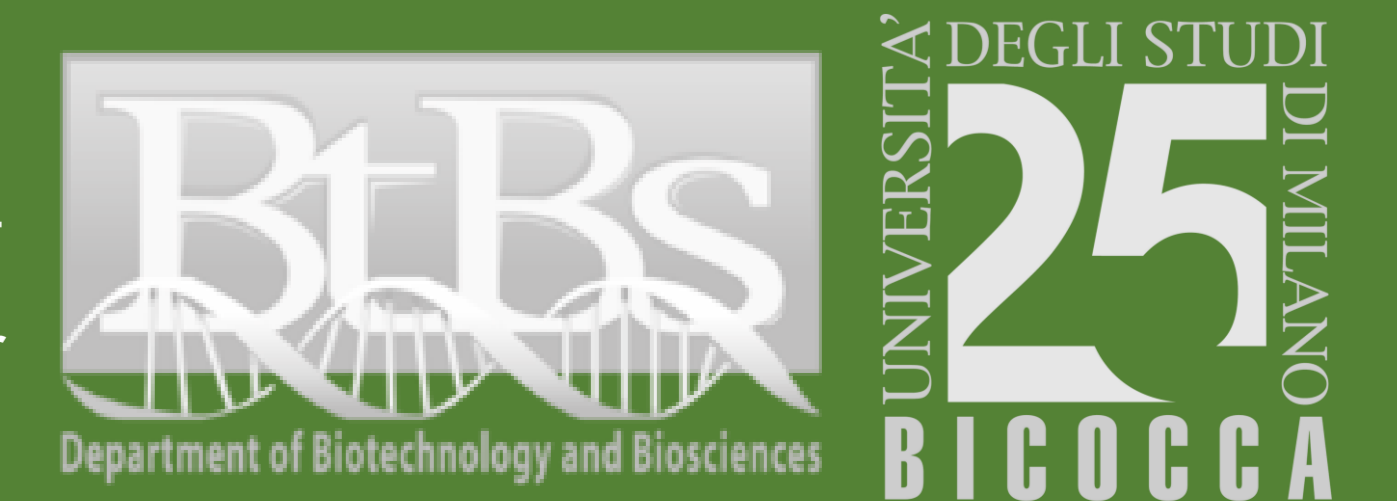
TO DO NEXT:

1. Lifespan
2. Healthspan parameters detection
3. Aging pathways (mutant strains)



2<sup>nd</sup> MICeRCo Meeting  
Naples, 2-3 March 2023

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1998 | 2023