ÖAW AUSTRIAN ACADEMY OF SCIENCES

IST AUSTRIA
*Institute of Science and Technology*



**INVITATION TO THE FIFTH TALK OF THE PUBLIC LECTURE SERIES**
**ÖAW – IST AUSTRIA LECTURES**

# WHY BIG IS BAD

## DECREASE IN DNA : CYTOPLASM RATIO IS A CAUSE OF SENESCENCE

**ANGELIKA AMON**
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**WELCOME**

**THOMAS HENZINGER**
*President, IST Austria*

**ANTON ZEILINGER**
*President, Austrian Academy of Sciences*

**THURSDAY, 17 SEPTEMBER, 2020, 4 – 5 P.M.**
**THIS TALK WILL BE HELD ONLINE VIA ZOOM.**

**PLEASE REGISTER BY 14 SEPTEMBER 2020 HERE**

IST Austria and the Austrian Academy of Sciences have initiated a joint lecture series aiming to bring to Austria speakers of the highest international standing active in fields that are of mutual interest to both institutions and to a wider public. The lecture series will be continued by an online talk of Angelika Amon, Kathleen and Curtis Marble Chair for Cancer Research at the MIT Koch Institute for Integrative Cancer Research and the Department of Biology.

At the Koch Institute Angelika Amon studies the molecular mechanisms that control cell growth and division. Angelika Amon also studies how errors in this process lead to diseases such as cancer and Down Syndrome and how they impact the aging process. She uses the budding yeast S. cerevisiae as a model system to study these questions and probes discoveries made in yeast in the mouse and human cells.
Angelika Amon's honors include the 2008 National Academy of Sciences Molecular Biology Award, the 2013 Ernst Jung Prize for Medicine, the 2018 Breakthrough Prize in Life Science and the 2019 Vilcek Prize in Biomedical Science. Dr. Amon is a Member of the Howard Hughes Medical Institute, the National Academy of Sciences, the Austrian Academy of Science, and a Foreign Associate to EMBO.

*Abstract*[1]*:*
Cellular senescence, a condition where cells lose their ability to proliferate and enter a permanent G1 arrest, is thought to be a cause of organismal aging. Why senescent cells experience functional decline and lose their ability to proliferate is poorly understood. I will discuss our work that could explain cellular senescence. We have known since Hayflick's seminal studies in the 1960s that senescent cells are exceedingly large but their DNA content does not increase. These old observations prompted us to investigate whether a decrease in DNA:cytoplasm ratio causes senescence. We found this to be the case both in yeast and mammalian cells; young cells grown large in the absence of a corresponding increase in DNA copy number exhibit many of the phenotypes observed in senescent cells. These observations lead us to propose a simple model of why eukaryotic cells senesce: It has long been known that when cell cycle progression is halted, cells increase in size because cell growth is not tightly coupled to cell division. As cells experience damage such as DNA damage cell cycle progression is halted to allow for the damage to be repaired before cell division resumes. During this transient arrest cell growth continues and cells increase in size without a corresponding increase in DNA copy number. As cells encounter frequent cellular damage over their lifetime, cells eventually become too large leading to functional decline and senescence due to DNA becoming limiting. More recently we have begun to investigate whether mechanisms are in place to prevent excessive growth during cell cycle arrest. I will discuss these efforts and their implication for the development of anti-aging strategies.

[1] Jette Lengefeld, Gabriel Neurohr, Allegra Terhorst and Angelika Amon
Koch Institute for Integrative Cancer Research
Howard Hughes Medical Institute
Massachusetts Institute of Technology