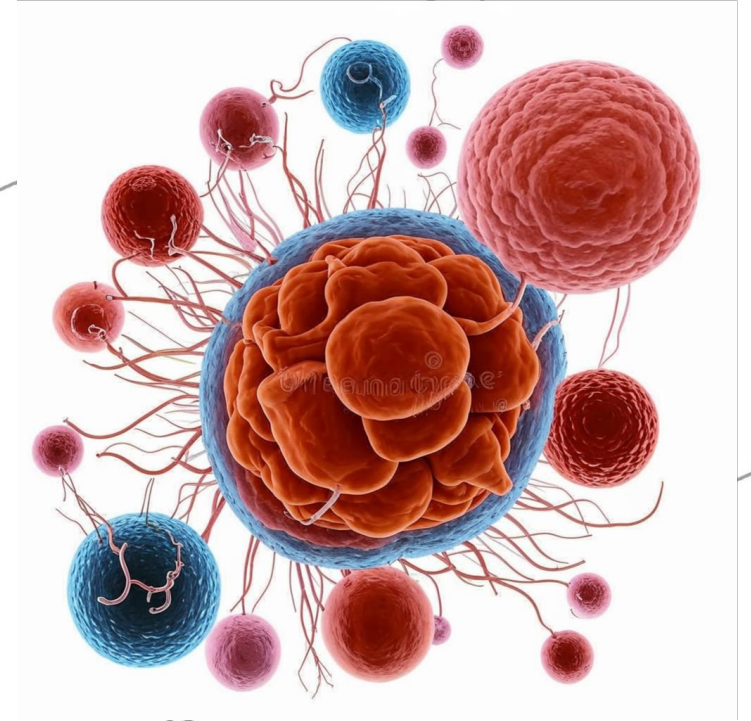
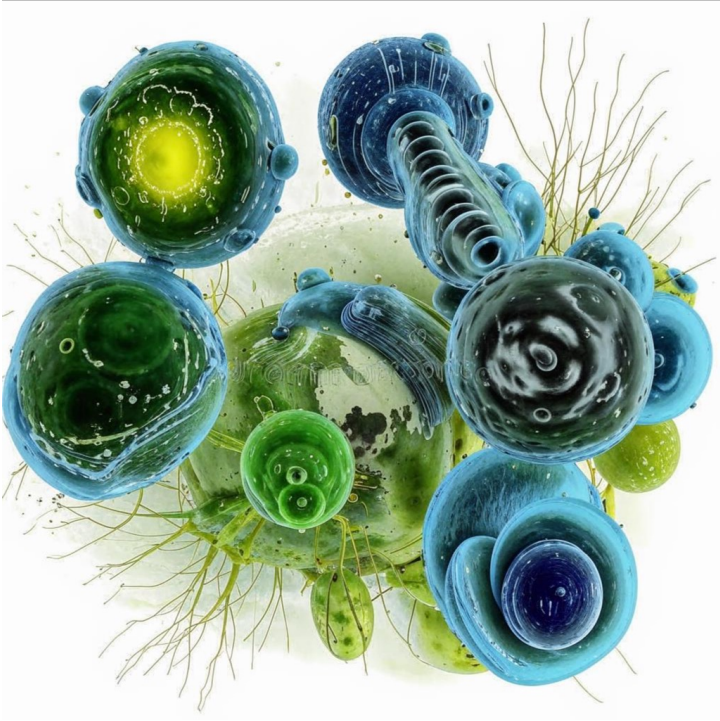




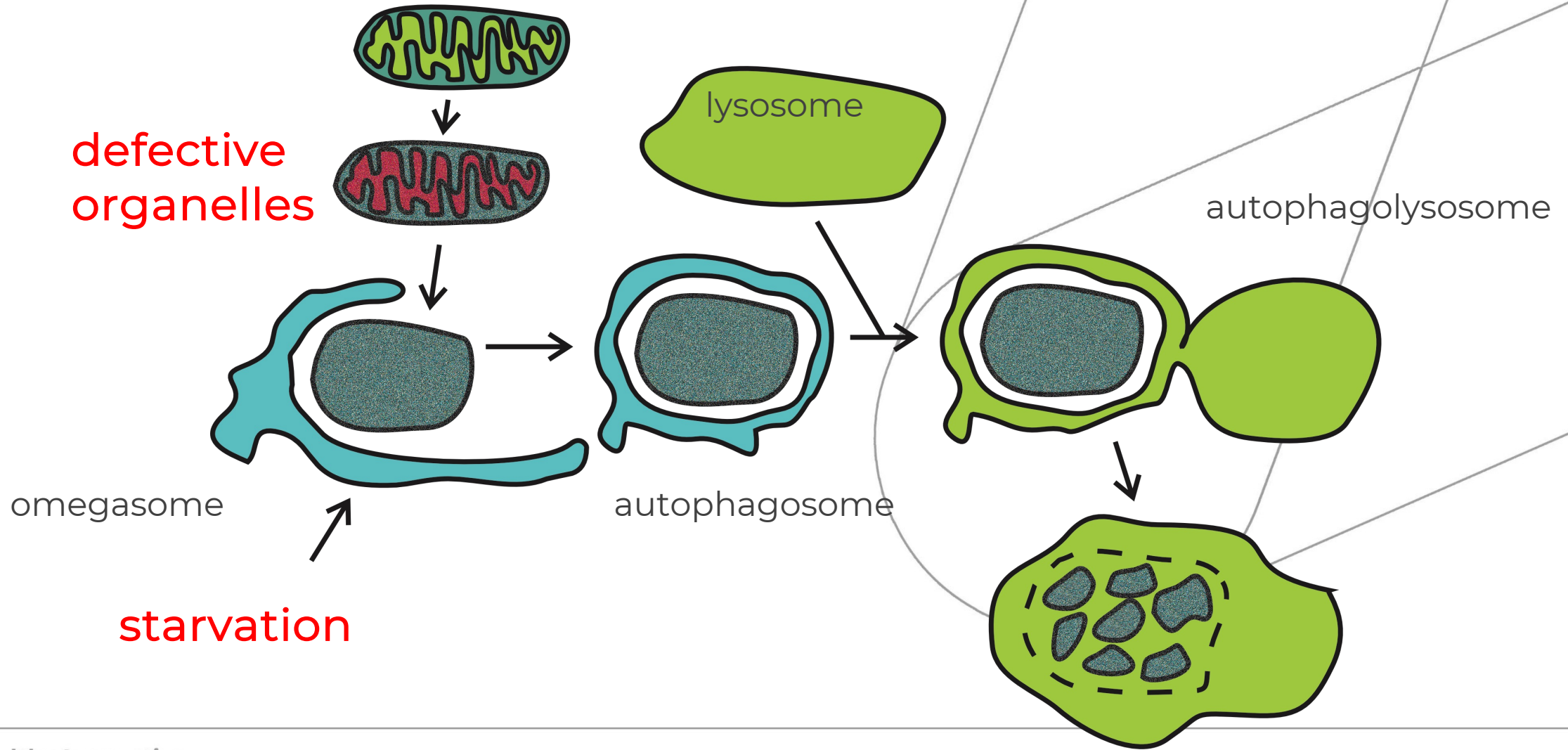
An Update on Cellular Nutrition

Petr Sergiev
Lomonosov Moscow State University,
Skoltech

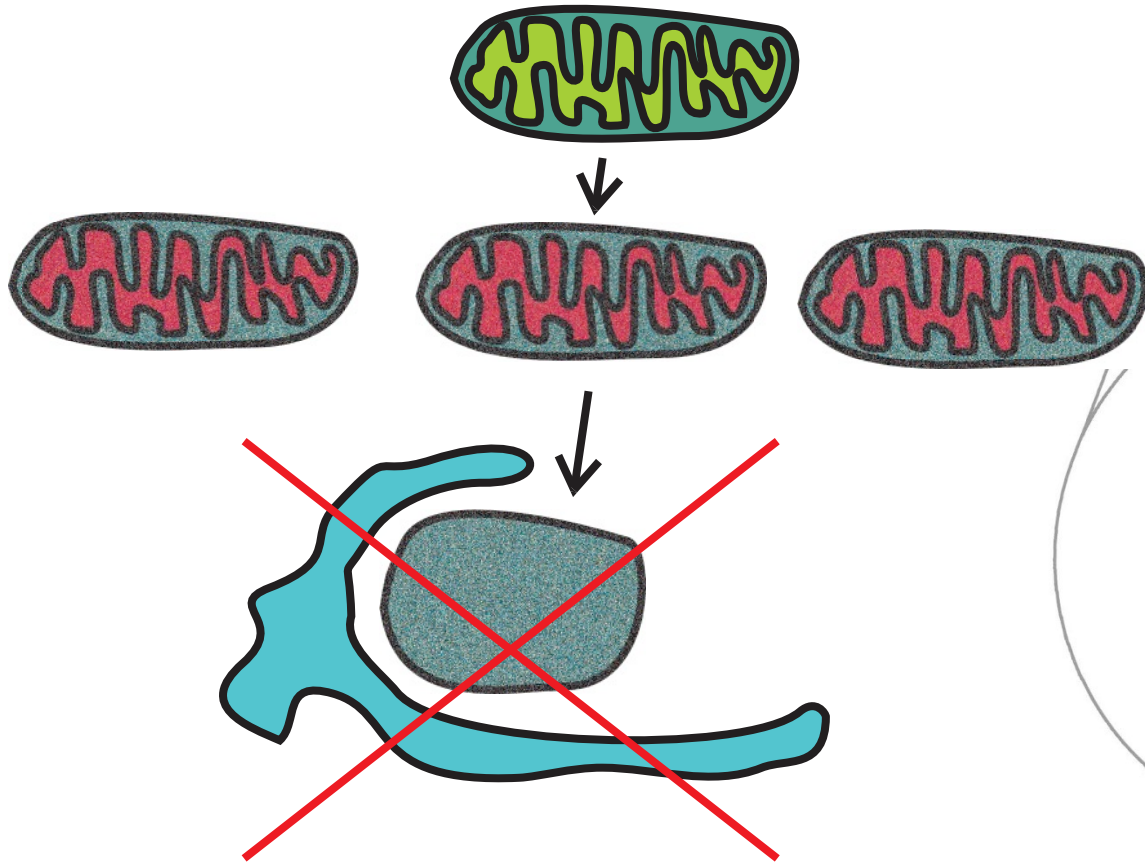
Autophagy is cellular recycling



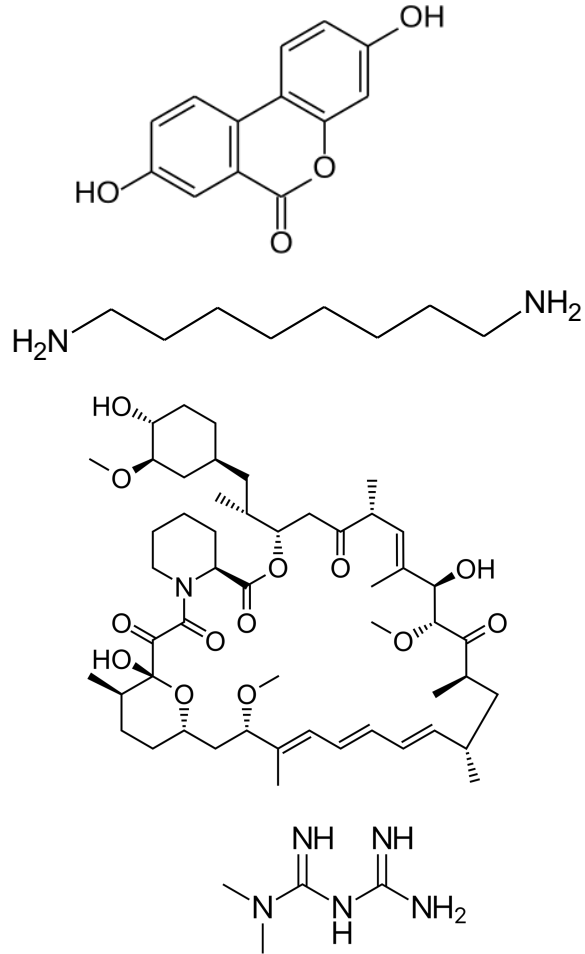
Autophagy



Autophagy is needed for health



A lot of efforts aims at searching for activators of autophagy



Cellular Strength Capsules

★★★★★ 2 (5.0)



Celltrient™ Cellular Strength capsules contain Mitopure™ Urolithin A (UA) which is clinically shown to support mitochondrial health in muscles.† Mitochondria are the powerhouses of the cell producing more than 90% of the cellular energy needed each day. Efficient mitochondrial function is important for muscle strength and stamina as you age.



Spin out company Vitalunga to develop mitophagy-activating compounds that rejuvenate cells, and extend lifespan and healthspan in worm models.

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Less is more: early short-course rapamycin effective in sustained anti-aging effects

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By Dr. Liji Thomas, MD
Reviewed by Danielle Ellis, B.Sc.

Sep 1 2022

Technology Networks Drug Discovery

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Metformin Could Help To Promote Healthy Aging

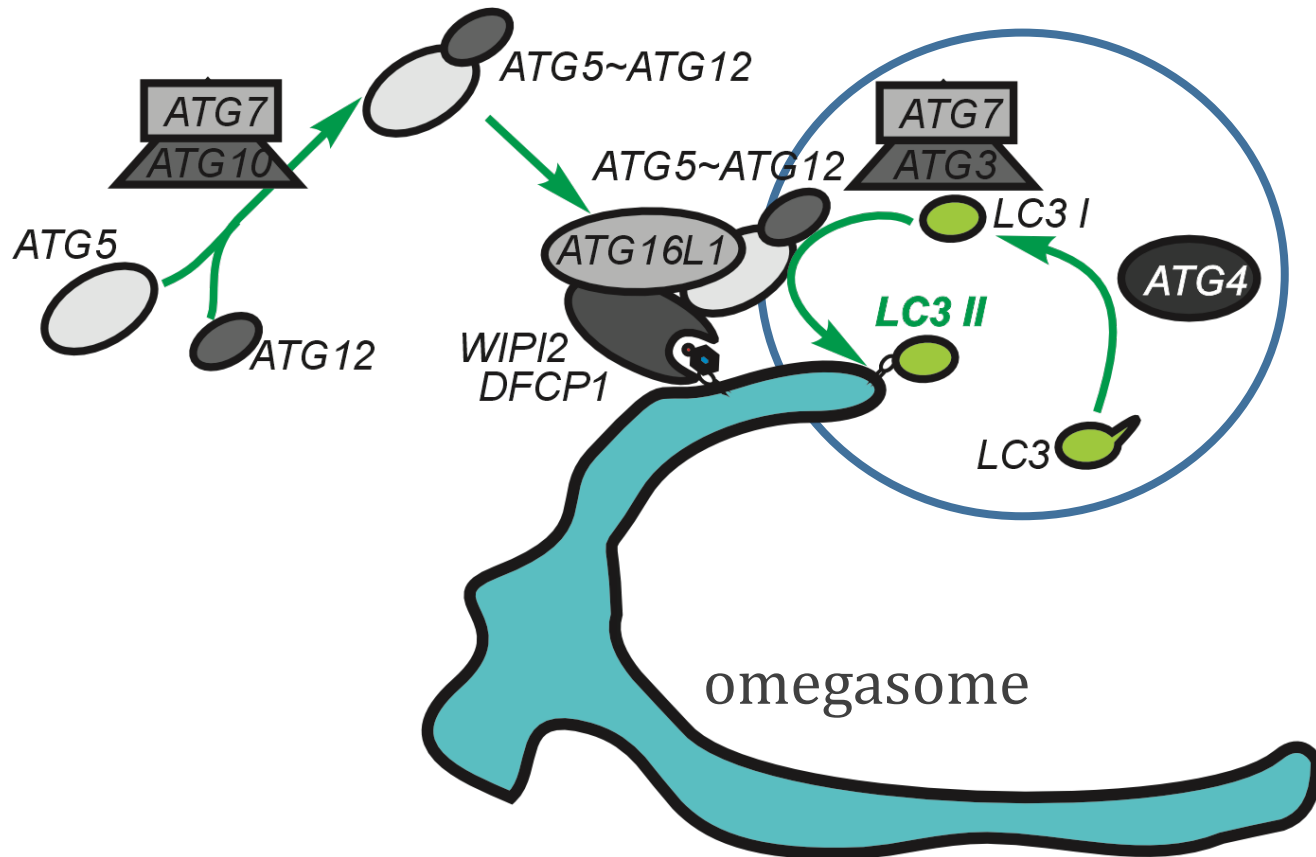
News Published: July 25, 2023 | Sarah Whelan, PhD

We set up a new search for autophagy boost



How could we understand that autophagy is effective?

A specific protein, LC3 is modified to mediate recognition of autophagy targets

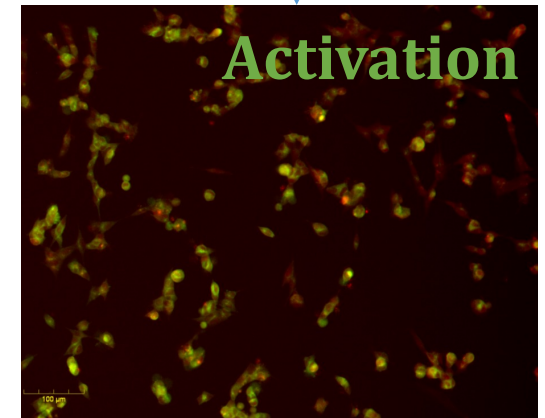
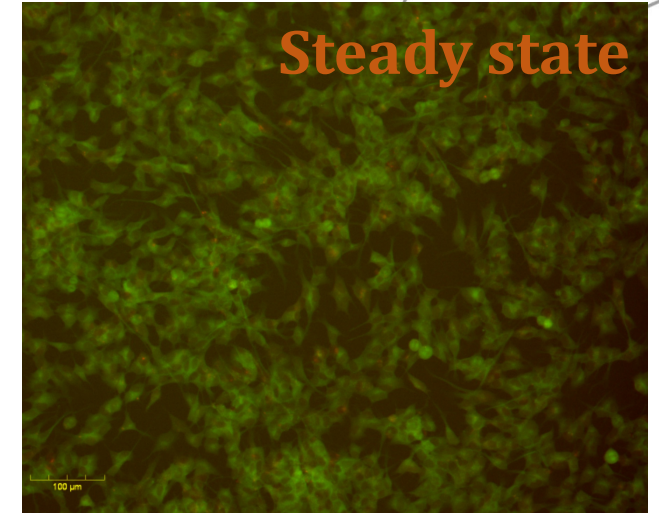
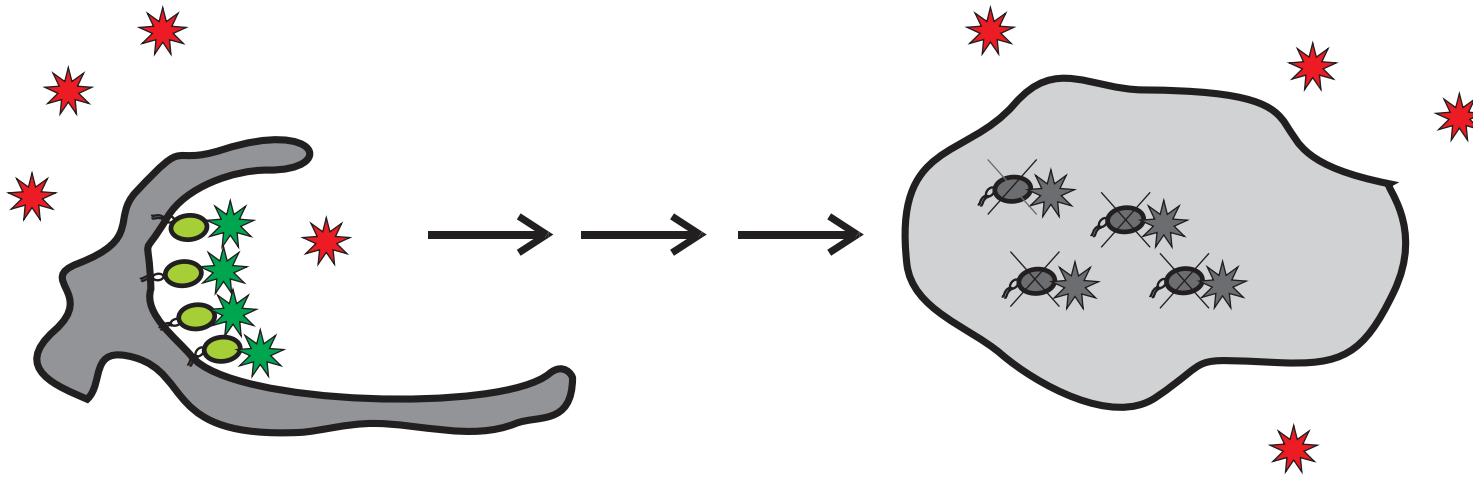


Activation Steady state

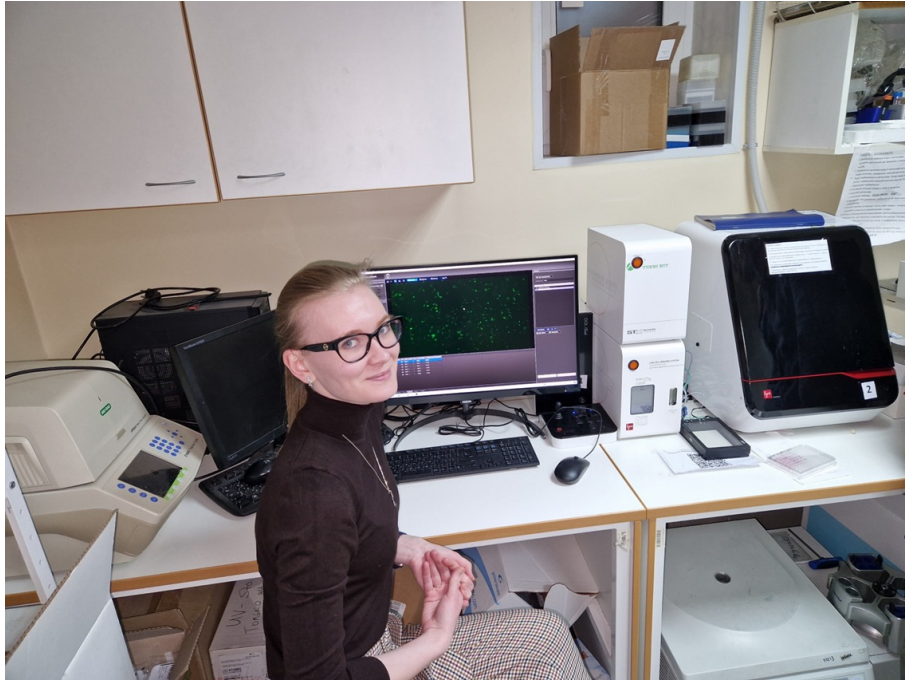


How could we understand that autophagy is effective?

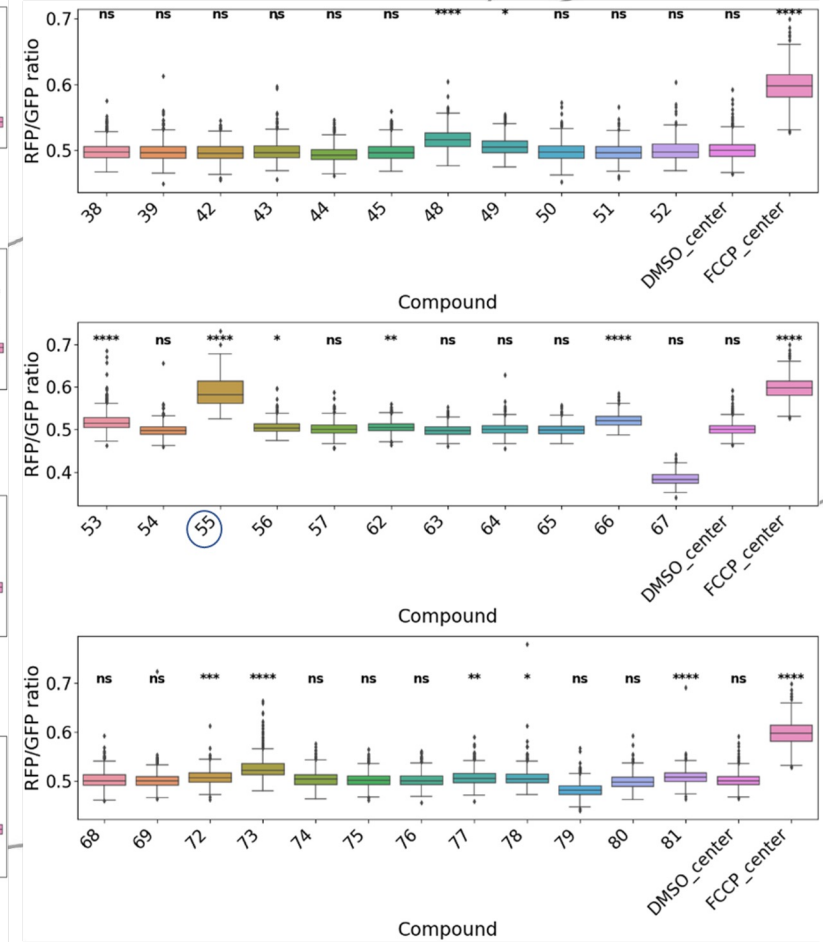
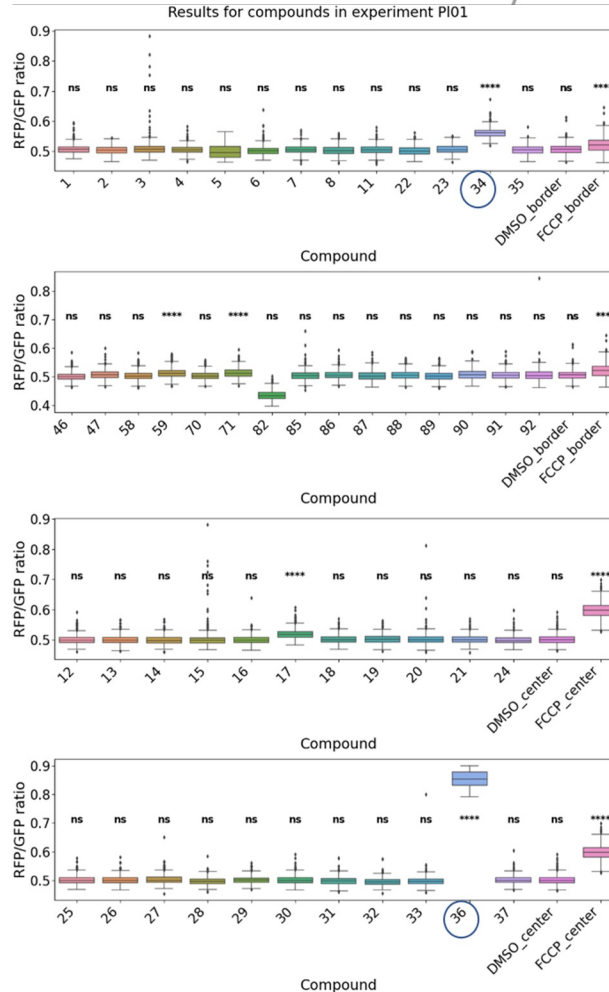
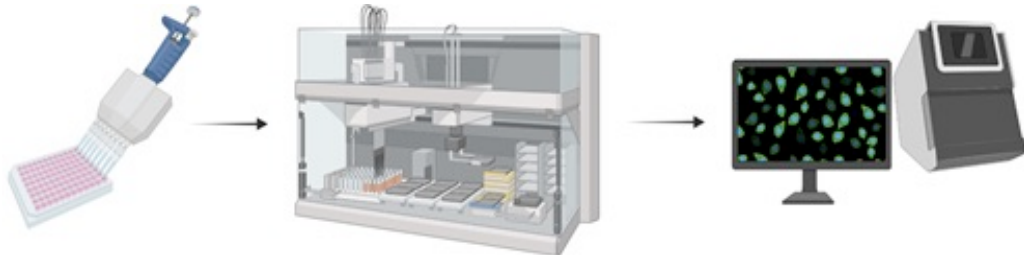
Fluorescent microscopy assay



Chemical library screening

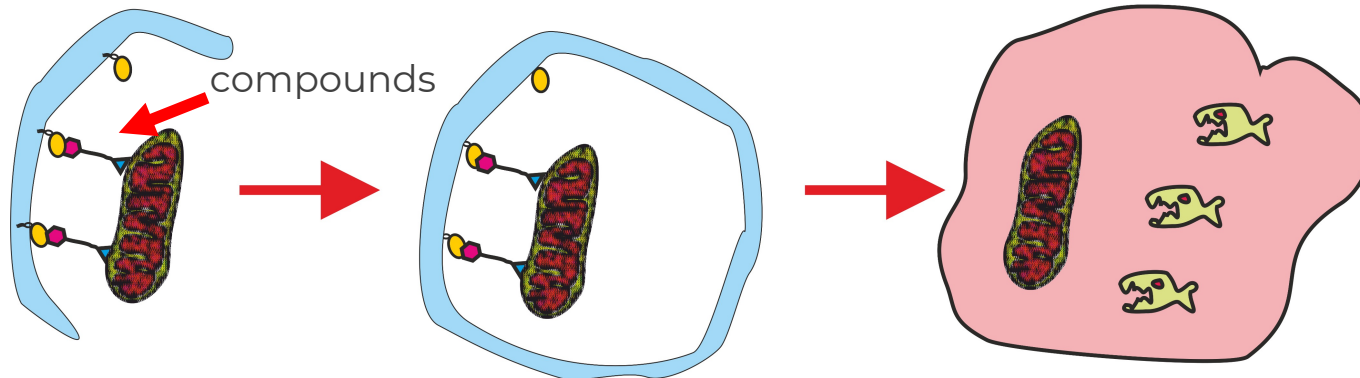
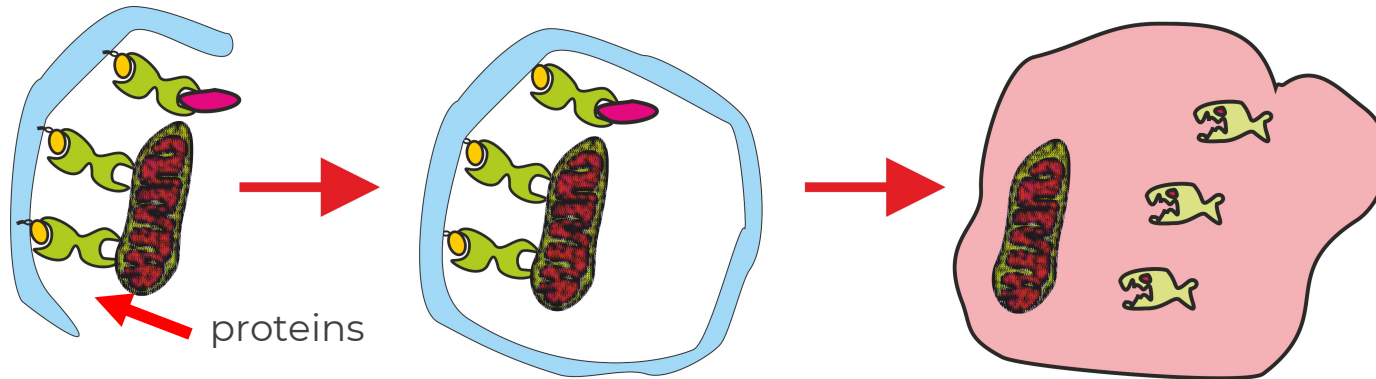


>30 000 compounds



Bifunctional compounds - AUTACs

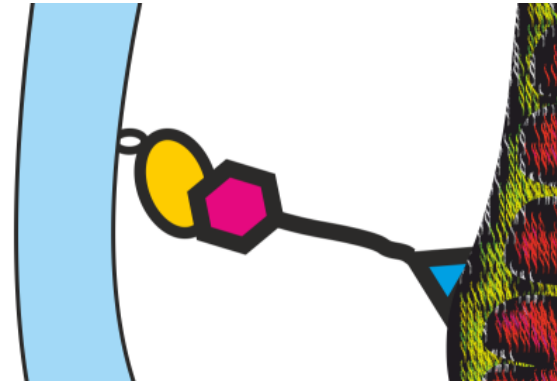
Standard mitophagy



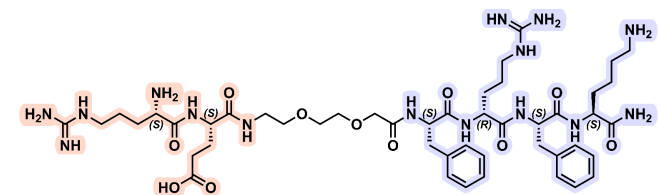
Mitophagy mediated by chimeric compounds

omegasome

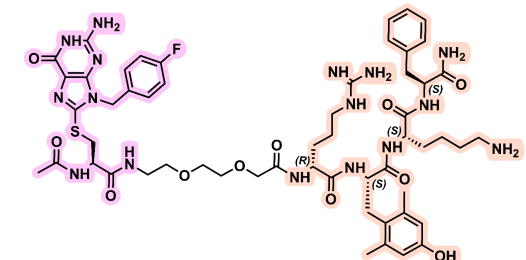
mitochondria



AUTACs



MitoG-EA



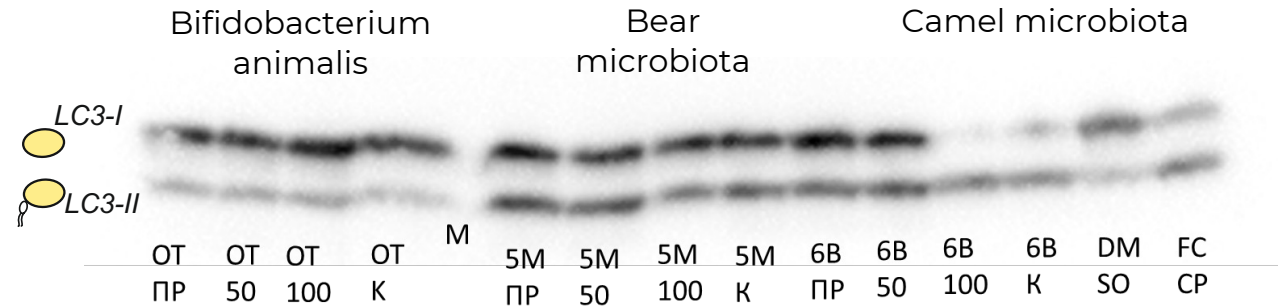
MitoG-2

>50 variants tested

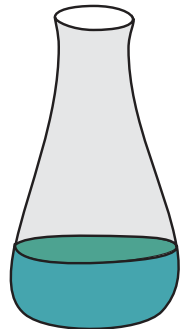


Animals naturally resistant to long starvation

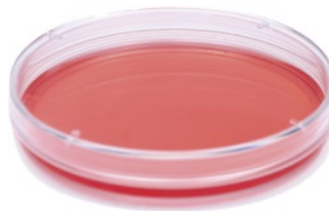
Microbiota



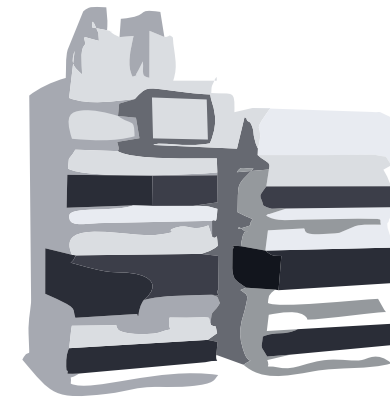
Sample collection



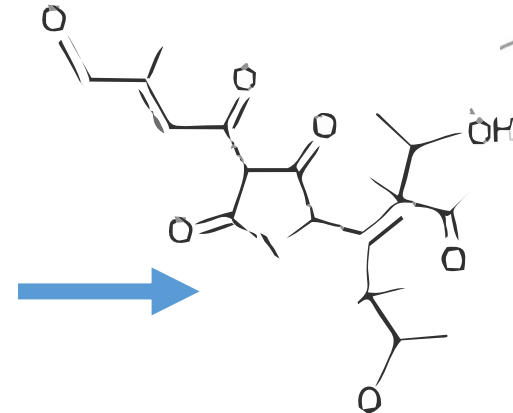
Cultivation and extraction



Testing



Purification and identification of active compound





270 medicinal plants

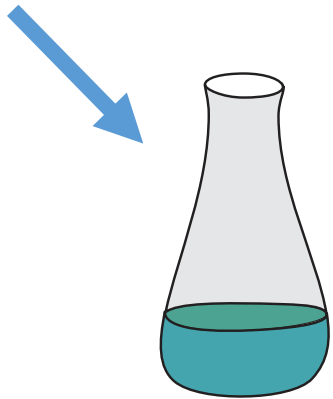


25 plant cell cultures



Spices

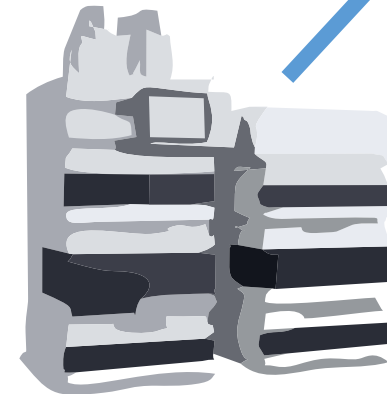
Medicinal plants and spices



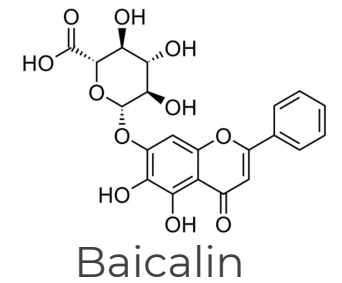
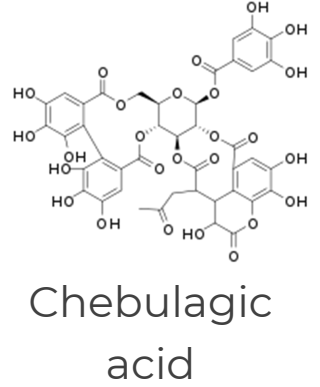
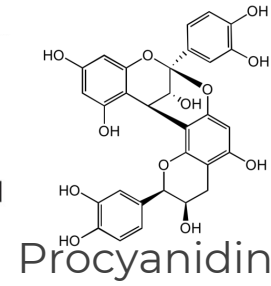
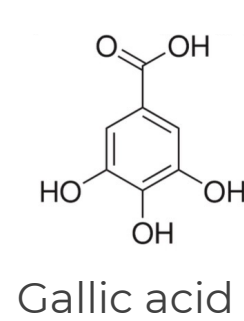
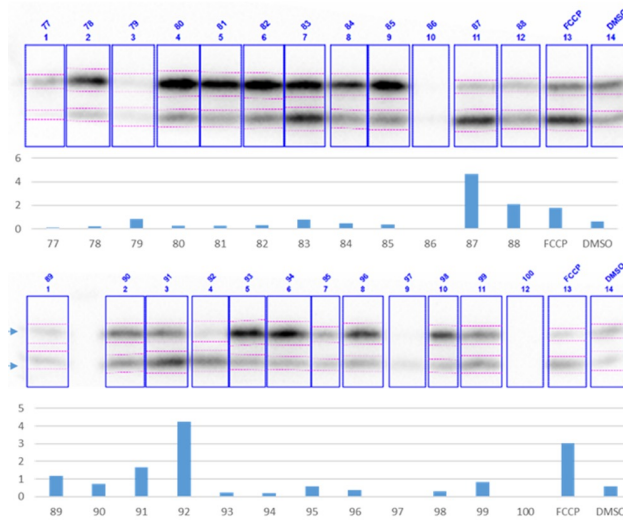
Extraction



Testing

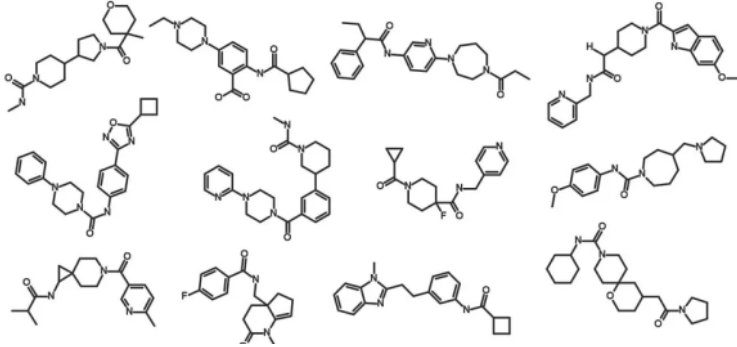


Purification and identification of active compound



And several NEW compounds

A set of autophagy activators



Chemical library

Selected set of
activators
~50 chemicals



Microbiome products

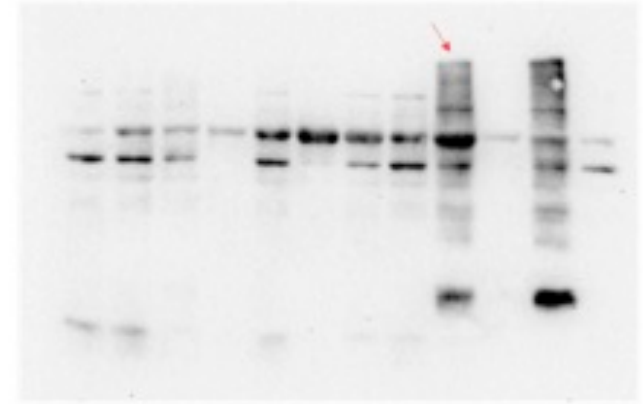
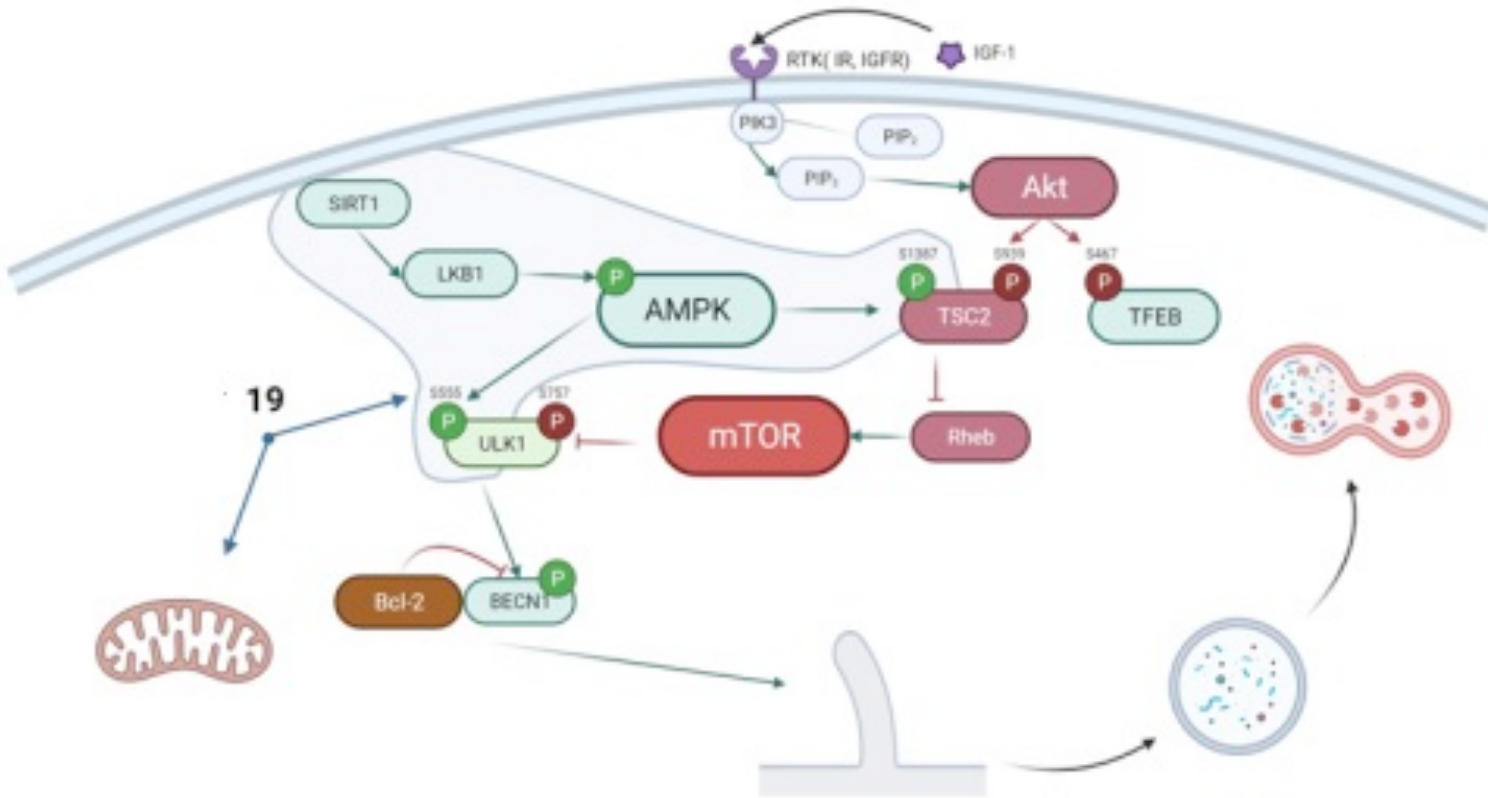


Bifunctional compounds



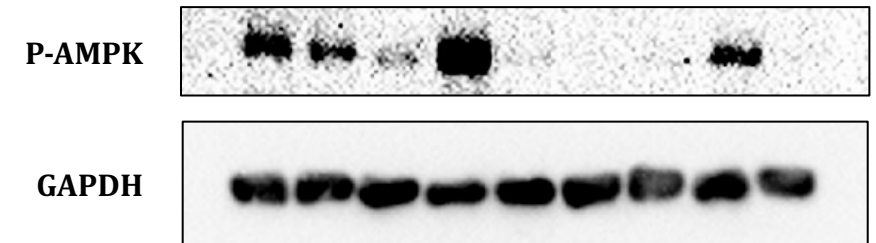
Medicinal plants

Mechanism



11 12 13 14 15 16 17 18 19 20 FCCP DMSO

phospho-ubiquitin



C, $\mu\text{g}/\mu\text{l}$ 50 25 10 F7,5 D 25 10 F D

WT

dSIRT1

Animal model testing

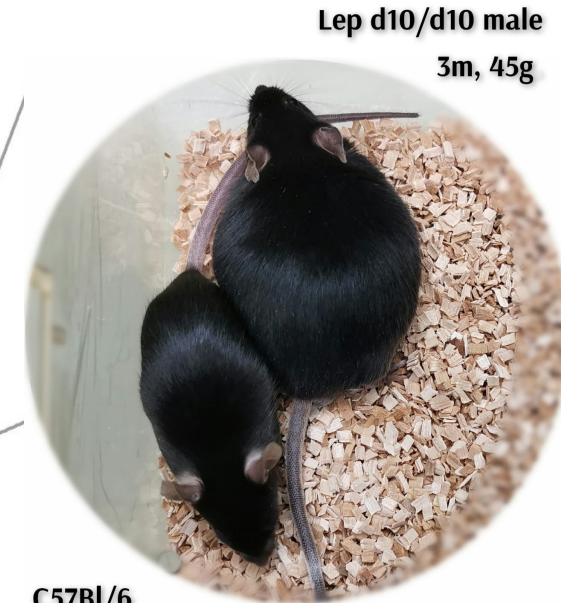
- T2D, obesity model

LEP KO mice (homemade at Lomonosov Moscow State University)

- High fat diet mice

- Chemically induced Parkinson disease model

Brachyodanio rerio + MPTP



Lep d10/d10 male
3m, 45g

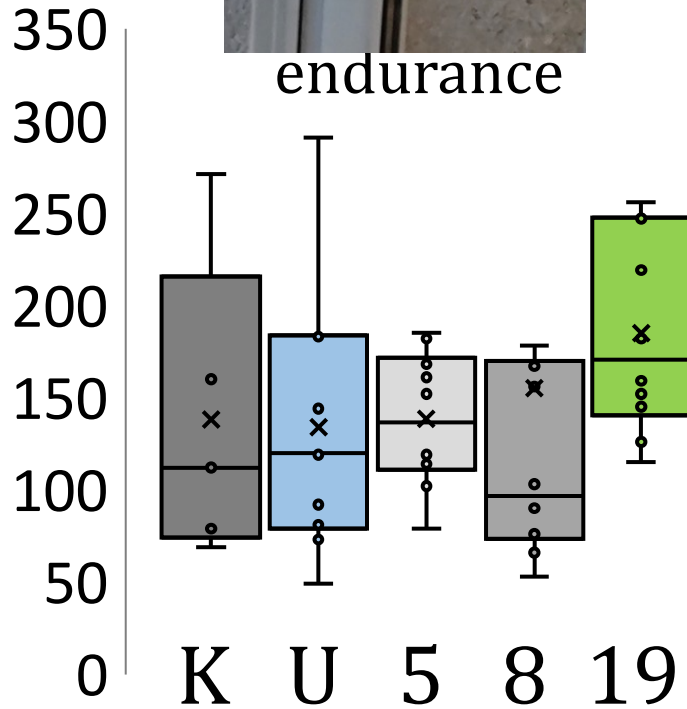
C57Bl/6
male 3m, 22-24g



Animal model testing



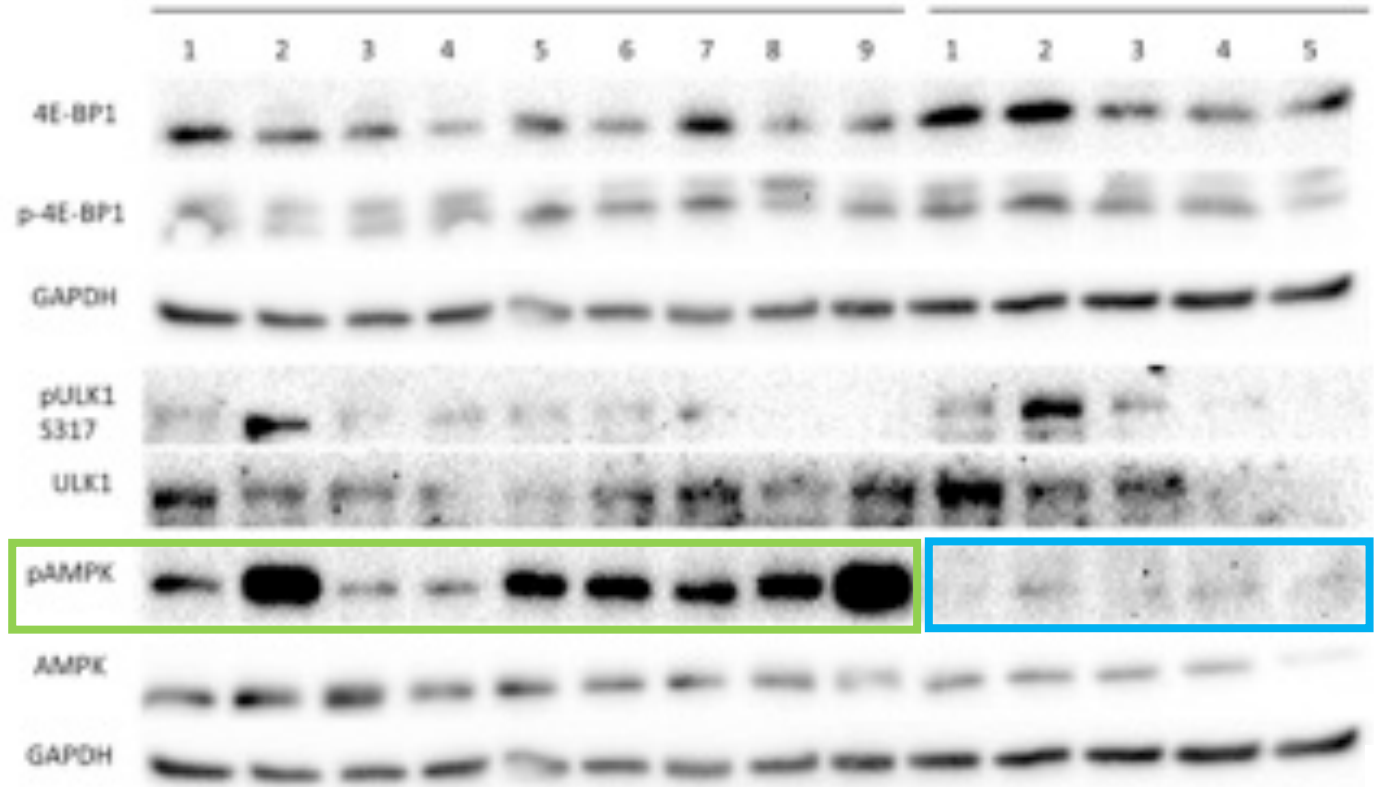
endurance



19



K



No detected acute toxicity up to

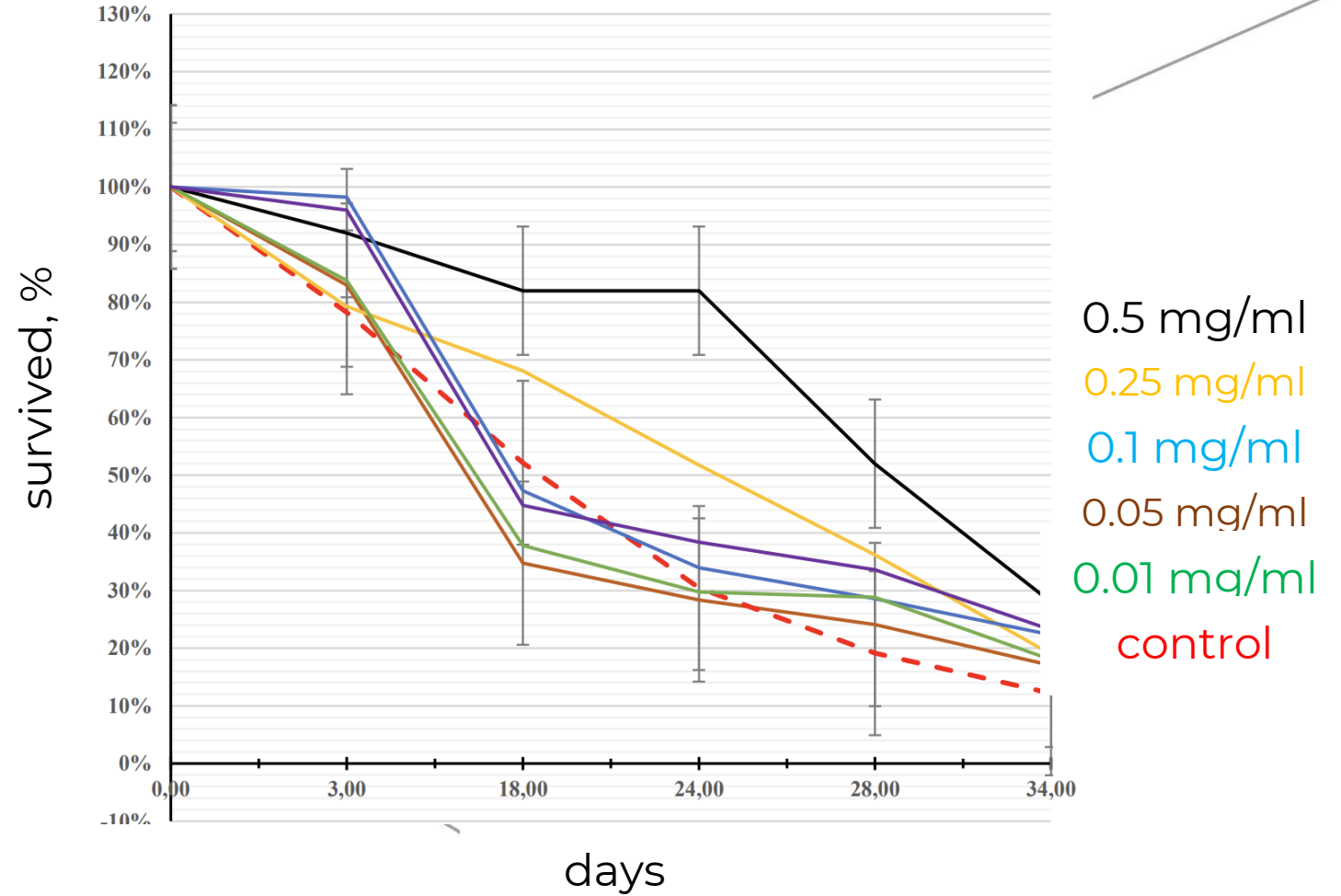
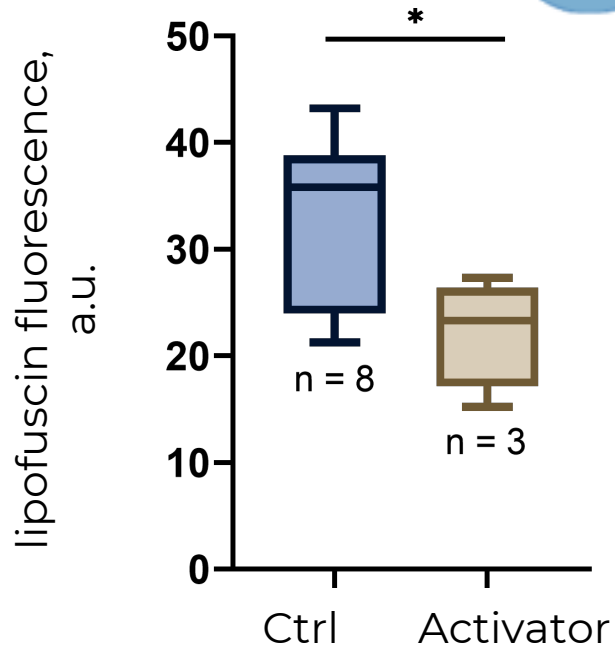
19

>2 g/kg

other
compounds
ongoing...

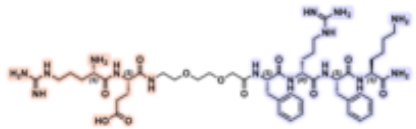
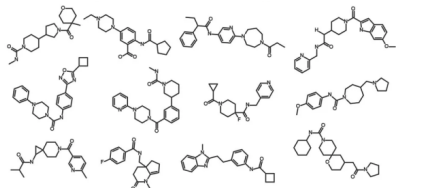


Toxicity screening in worms *C. elegans*

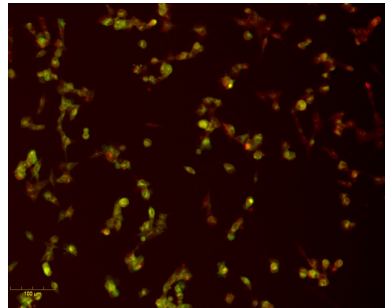


Summary

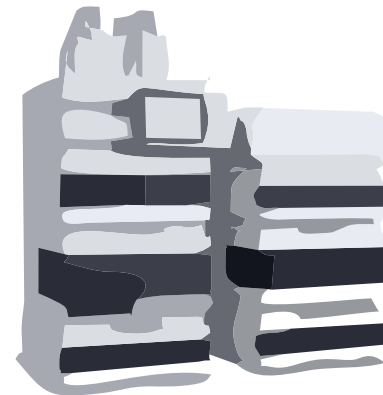
Different sources
of activators



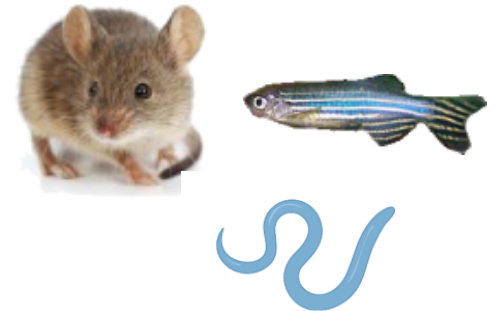
Activity assays



Purification
identification



Animal testing



Molecular
mechanism



Thank you



Petr Sergiev
Lomonosov Moscow State
University, Skoltech

