



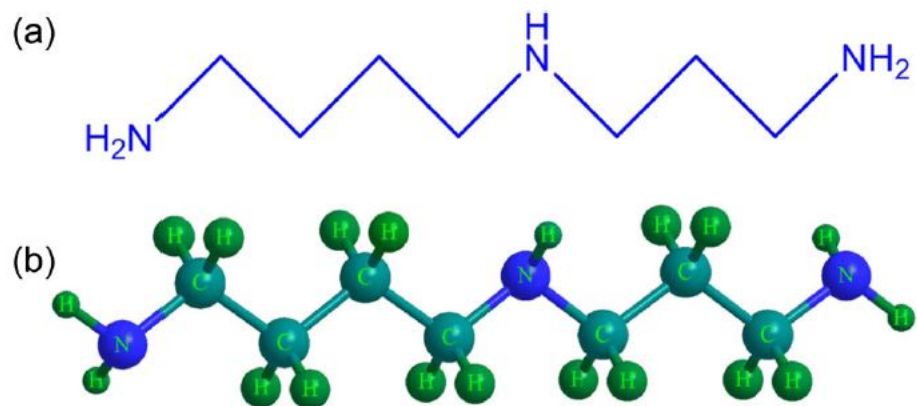
Ubigel Inperio



What is
spermidine?






What is spermidine?



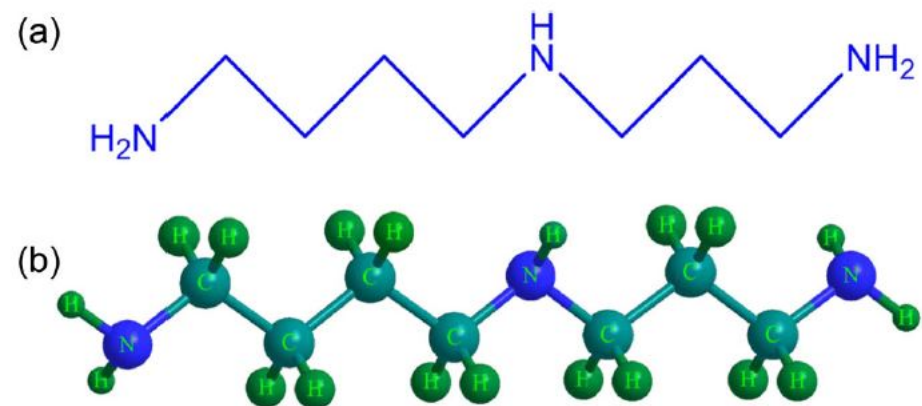
Spermidine is a low-molecular-weight natural polyamine widely distributed in various organisms

A comprehensive review of spermidine: Safety, health effects, absorption and metabolism, food materials evaluation, physical and chemical processing, and bioprocessing




Dian Zou¹ | Ziyue Zhao¹ | Lu Li²  | Yu Min¹ | Daiyuan Zhang¹ |
Anying Ji¹ | Cong Jiang¹ | Xuetuan Wei¹  | Xian Wu³ 

The structural characteristic is crucial for its functions, which include stabilizing DNA, promoting cell growth, and inducing autophagy

What is spermidine?

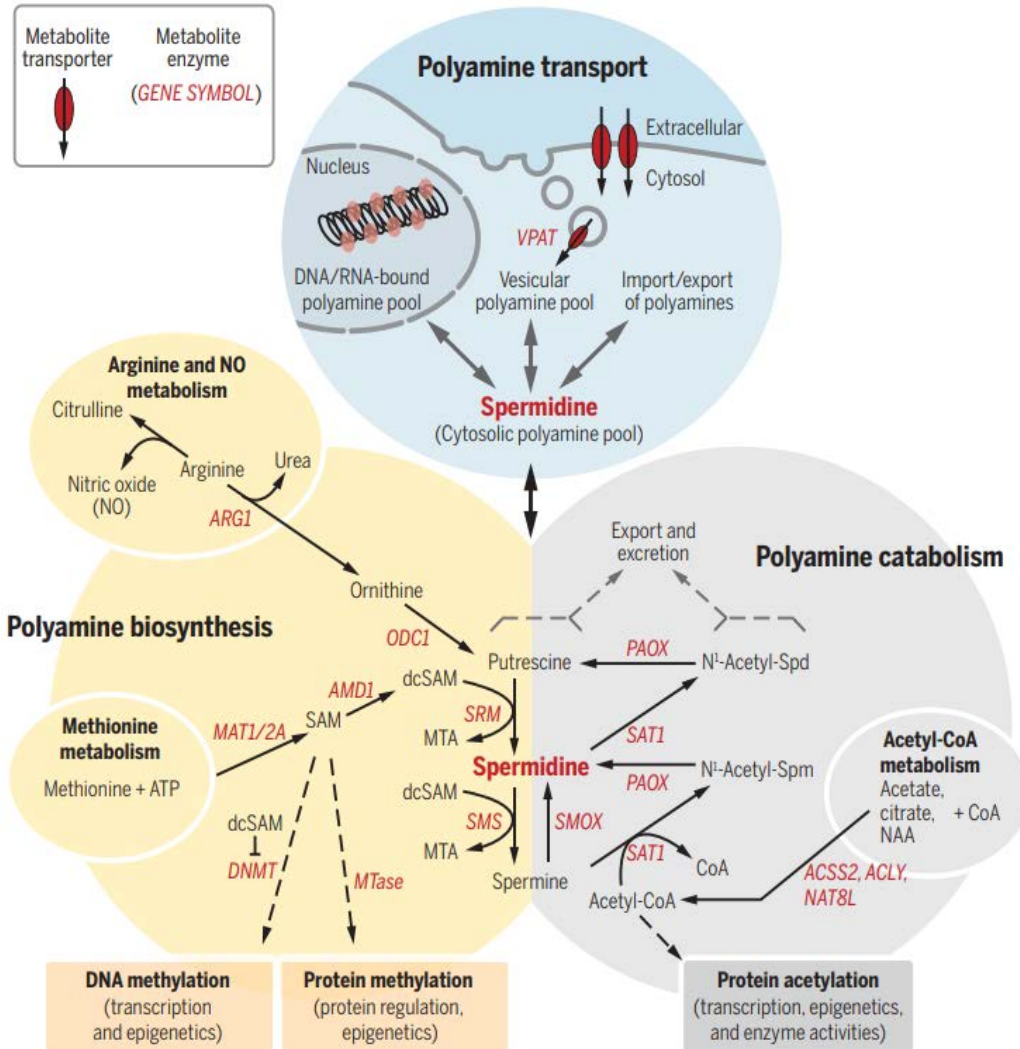


A comprehensive review of spermidine: Safety, health effects, absorption and metabolism, food materials evaluation, physical and chemical processing, and bioprocessing

Dian Zou¹ | Ziyue Zhao¹ | Lu Li²  | Yu Min¹ | Daiyuan Zhang¹ |
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“Spermidine has also a high capacity to favour the reparative effect of the periodontal, bone and dental tissue damaged by the erosive effects of periodontitis”

What is spermidine?



REVIEW SUMMARY

AGING

Spermidine in health and disease

Frank Madeo,*† Tobias Eisenberg,† Federico Pietrocola, Guido Kroemer*

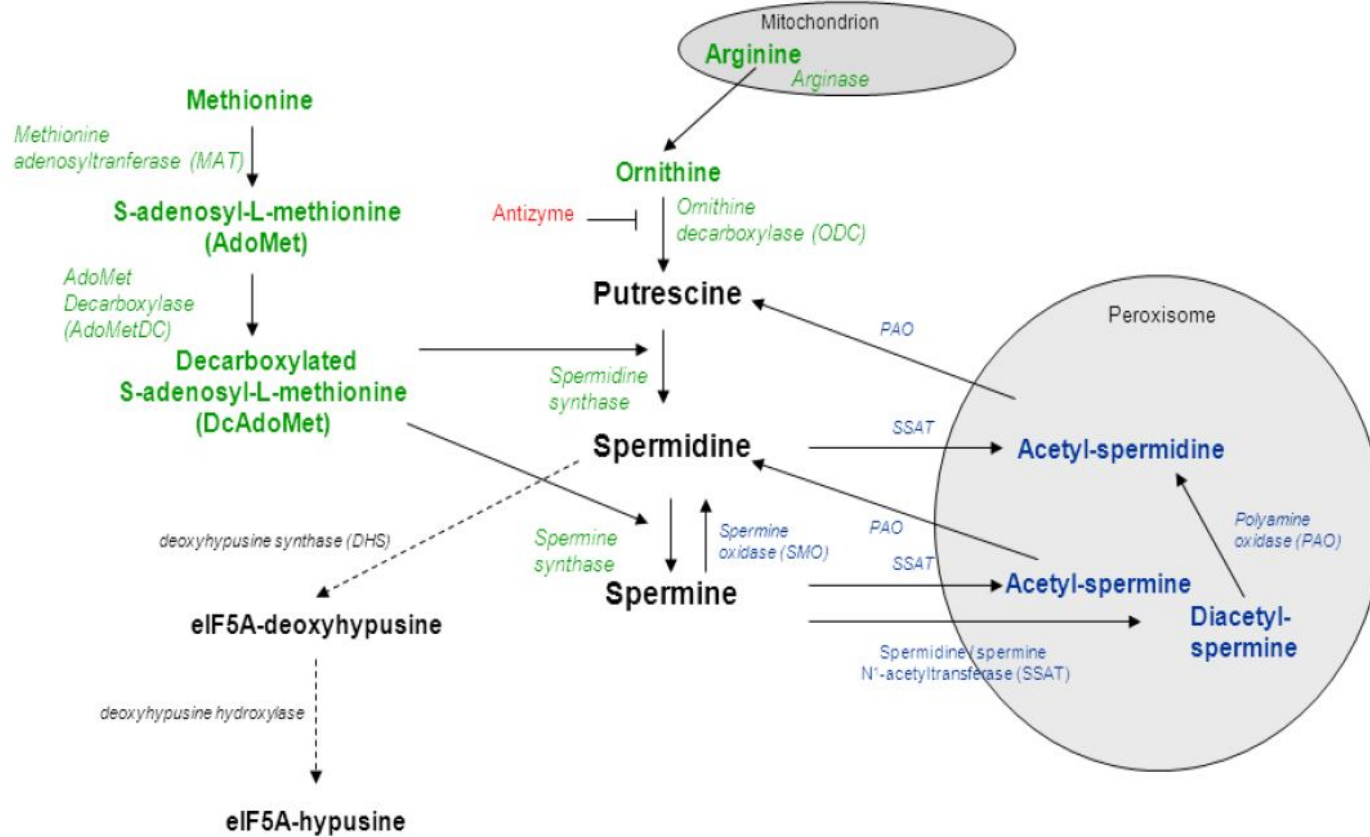
Spermidine is formed from its precursor putrescine or by degradation from spermine. The cytosolic spermidine pool results from uptake, biosynthesis, catabolism, and transport

What is spermidine?

Review

Decarboxylases involved in polyamine biosynthesis and their inactivation by nitric oxide

Rebecca A. Hillary^a, Anthony E. Pegg^{a,b,*}



1. L-Ornithine from L-Arginine
2. Acetylation (SSAT)
3. Oxidation (PAO)

Green: biosynthesis; blue: catabolism; red: inhibitory protein; black: eIF5A synthesis from spermidine

What is spermidine?

Activation of nuclear factor kappaB by polyamines in breast cancer cells

N Shah ¹, T Thomas, A Shirahata, L H Sigal, T J Thomas

Shah, 1999

The natural polyamines spermidine and spermine prevent bone loss through preferential disruption of osteoclastic activation in ovariectomized mice

Tomomi Yamamoto, Eiichi Hinoi, Hiroyuki Fujita, Takashi Iezaki, Yoshifumi Takahata, Misa Takamori, Yukio Yoneda ✉

Yamamoto, 2012



“The estrogenic amplification of spermidine contributes to restore a healthy periodontum, acting on cementum-forming cells (cementoblasts)”

“Spermidine prevents OVX-induced bone loss through the disruption of differentiation and maturation of osteoclasts”

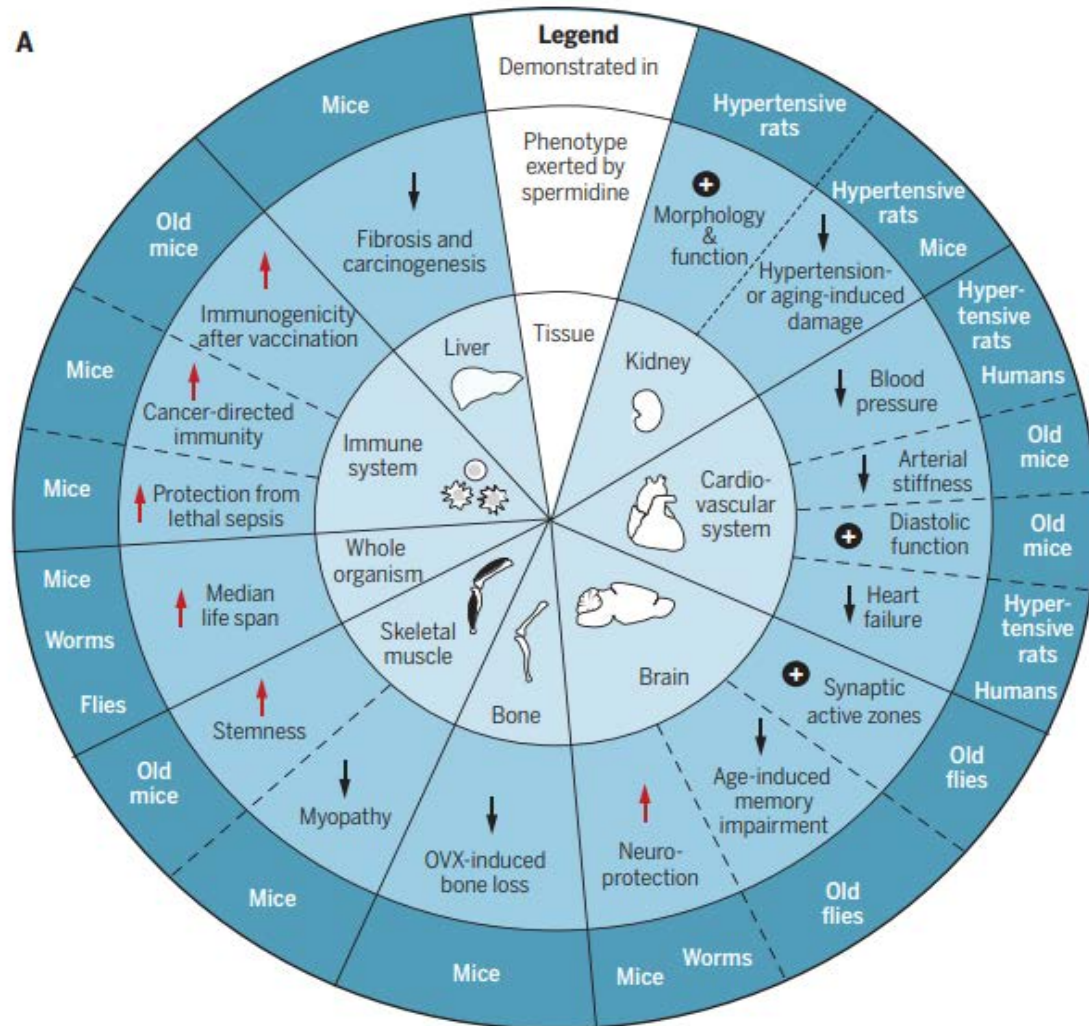
What is spermidine?

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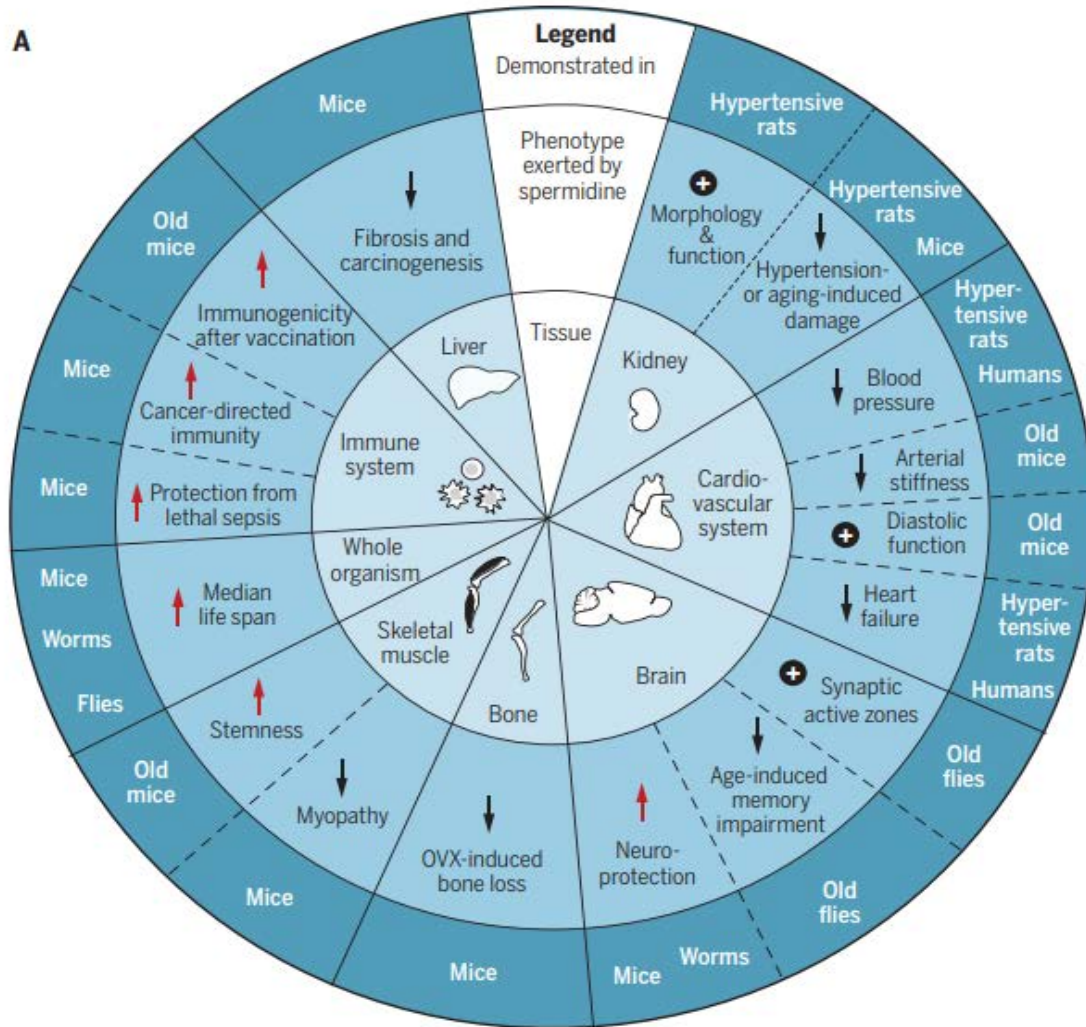
Spermidine in health and disease

Frank Madeo,*† Tobias Eisenberg,† Federico Pietrocola, Guido Kroemer*



A. Effects elicited by spermidine in different organ systems

What is spermidine?



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B

B: Spermidine-enhanced autophagy is required for several of the health-promoting effects presented in (A)

What is spermidine?

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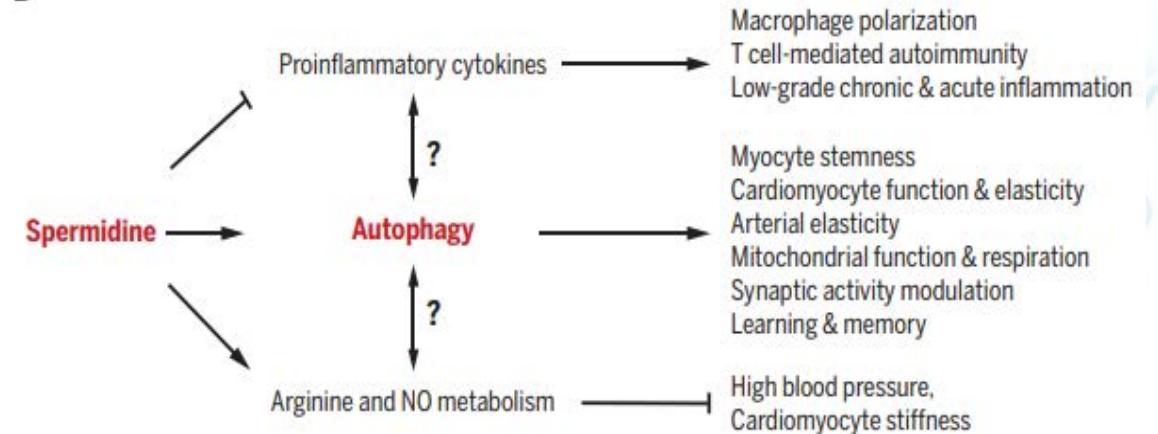
AGING

Spermidine in health and disease

Frank Madeo,*† Tobias Eisenberg,† Federico Pietrocola, Guido Kroemer*

“Spermidine also suppresses proinflammatory cytokines, improves the bioavailability of arginine, mediating immunomodulatory and antihypertensive effects”

B



B: Spermidine-enhanced autophagy is required for several of the health-promoting effects presented in (A)

What is spermidine?

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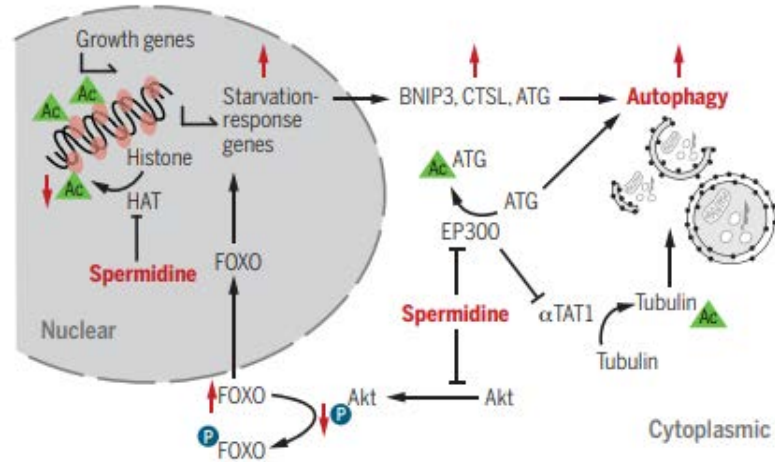
Spermidine in health and disease

Frank Madeo,*† Tobias Eisenberg,† Federico Pietrocola, Guido Kroemer*

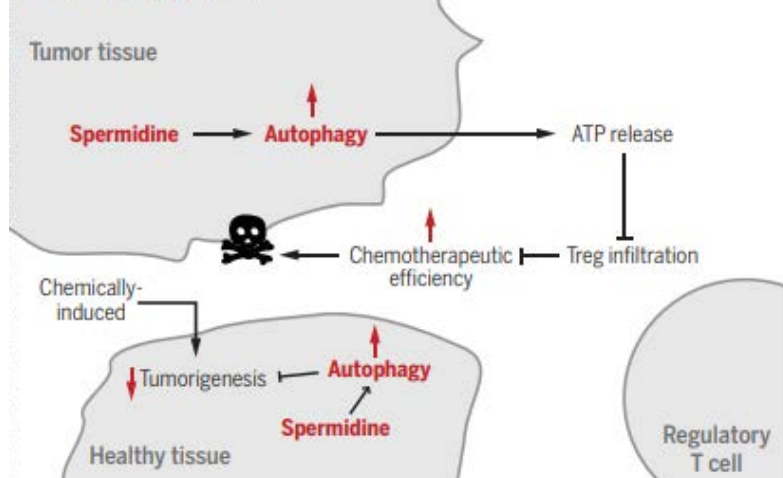
- A. Autophagy induction
- B. Tumor suppression
- C. Immune modulation
- D. Cardioprotection
- E. Neuroprotection
- F. Stem cell function

What is spermidine?

A. Autophagy induction



B. Tumor suppression



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Spermidine in health and disease

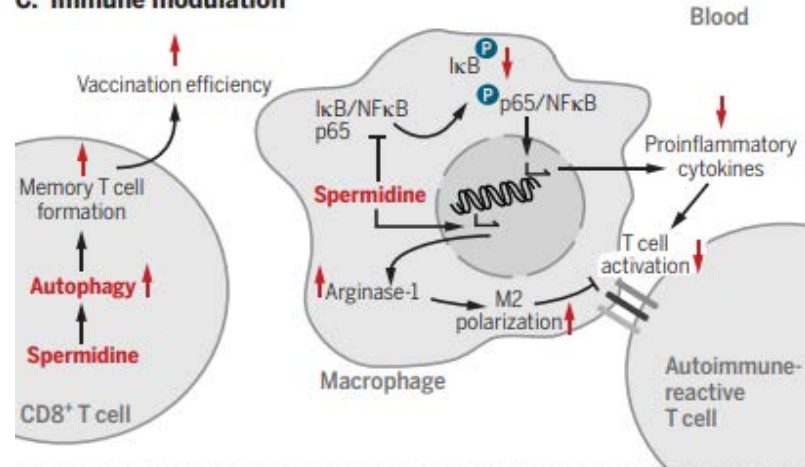
Frank Madeo,*† Tobias Eisenberg,† Federico Pietrocola, Guido Kroemer*

A: Inhibition of the acetyl transferase EP300. Sustained autophagic control is mediated through the regulation of FOXO transcription factor

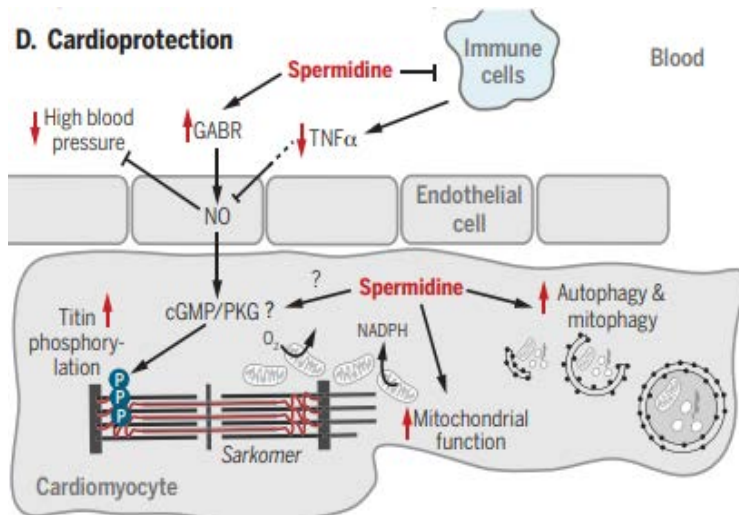
B: Spermidine favors the autophagy-dependent release of ATP, which in turn favors immunosurveillance

What is spermidine?

C. Immune modulation



D. Cardioprotection



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Spermidine in health and disease

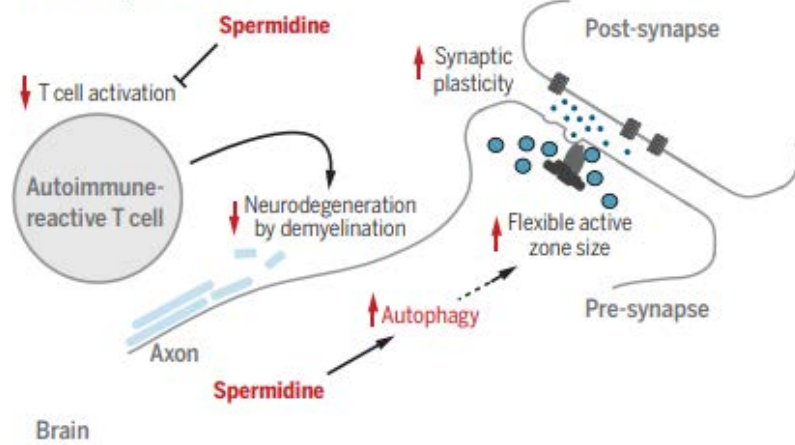
Frank Madeo,*† Tobias Eisenberg,† Federico Pietrocola, Guido Kroemer*

C: Anti-inflammatory effects on macrophages. Spermidine favors formation of CD8⁺ memory T cells via induction of autophagy

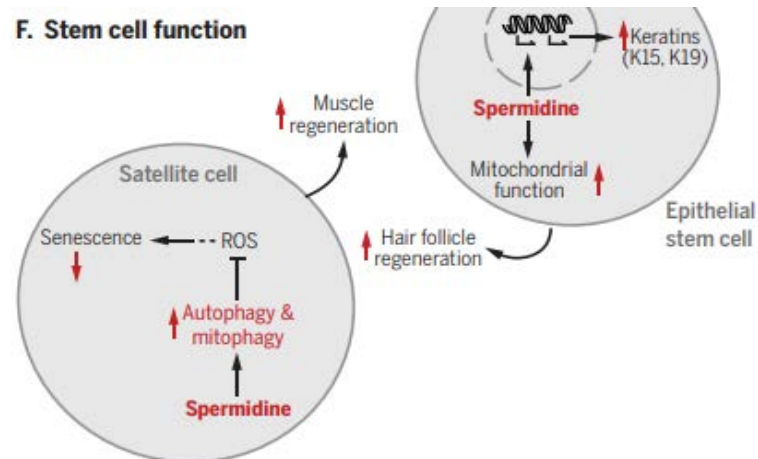
D: Suppression of TNFα. Spermidine-enhanced autophagy contribute to cardiomyocyte elasticity and mitochondrial functionality

What is spermidine?

E. Neuroprotection



F. Stem cell function



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E: Inhibitory effect on autoimmune-reactive T cells. Neuroprotection is also mediated via autophagy-dependent proteostasis of presynaptic active zones

F: Spermidine promotes mitochondrial function and production of keratins in epithelial stem cells