



SICOBEventi

PERUGIA, 9 GIUGNO 2025

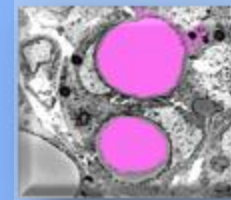
ADVANCED BARIATRIC SURGERY
CHIRURGIA BARIATRICA ASSOCIATA AD ALTRI
INTERVENTI E CHIRURGIA REVISIONALE

PRESIDENTE ONORARIO
Maurizio Cesari

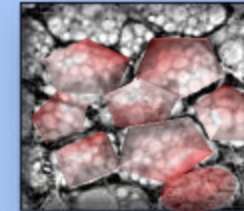
PRESIDENTI
R. Bellini - A. Contine



WHITE



PINK



BROWN



L'ORGANO ADIPOSO

SAVERIO CINTI MD

**DIR SCIENTIFICO CENTRO
OBESITA' UNIVPM-ANCONA**

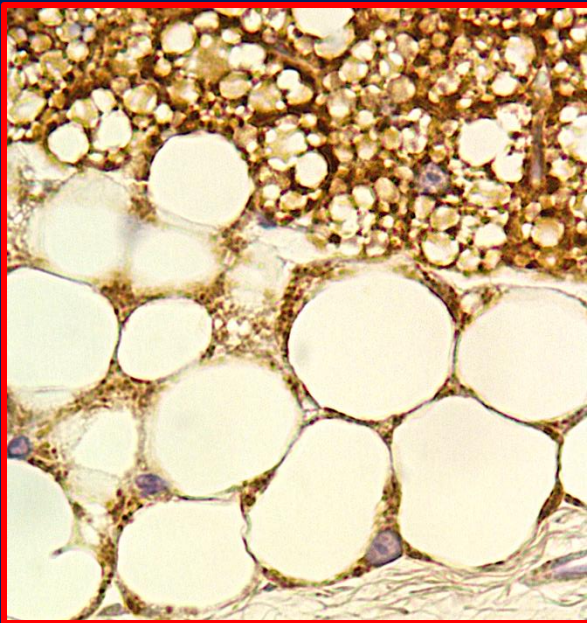


ORGANO ENDOCRINO ADIPOSO

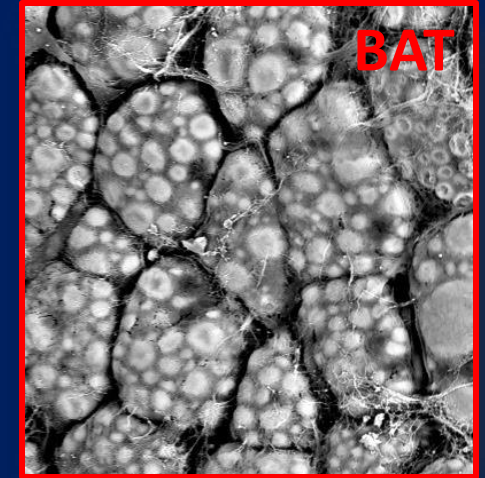
ADIPOCITI

LIGHT MICROSCOPY

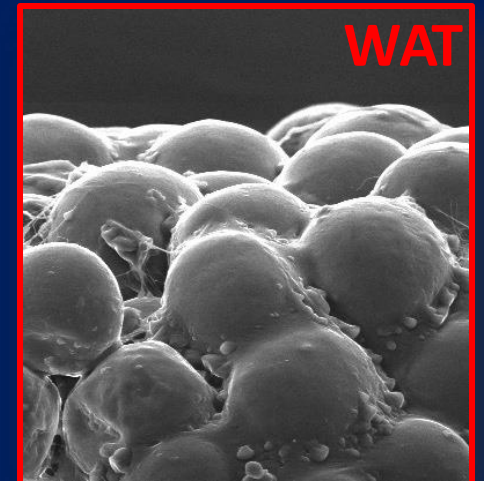
BAT



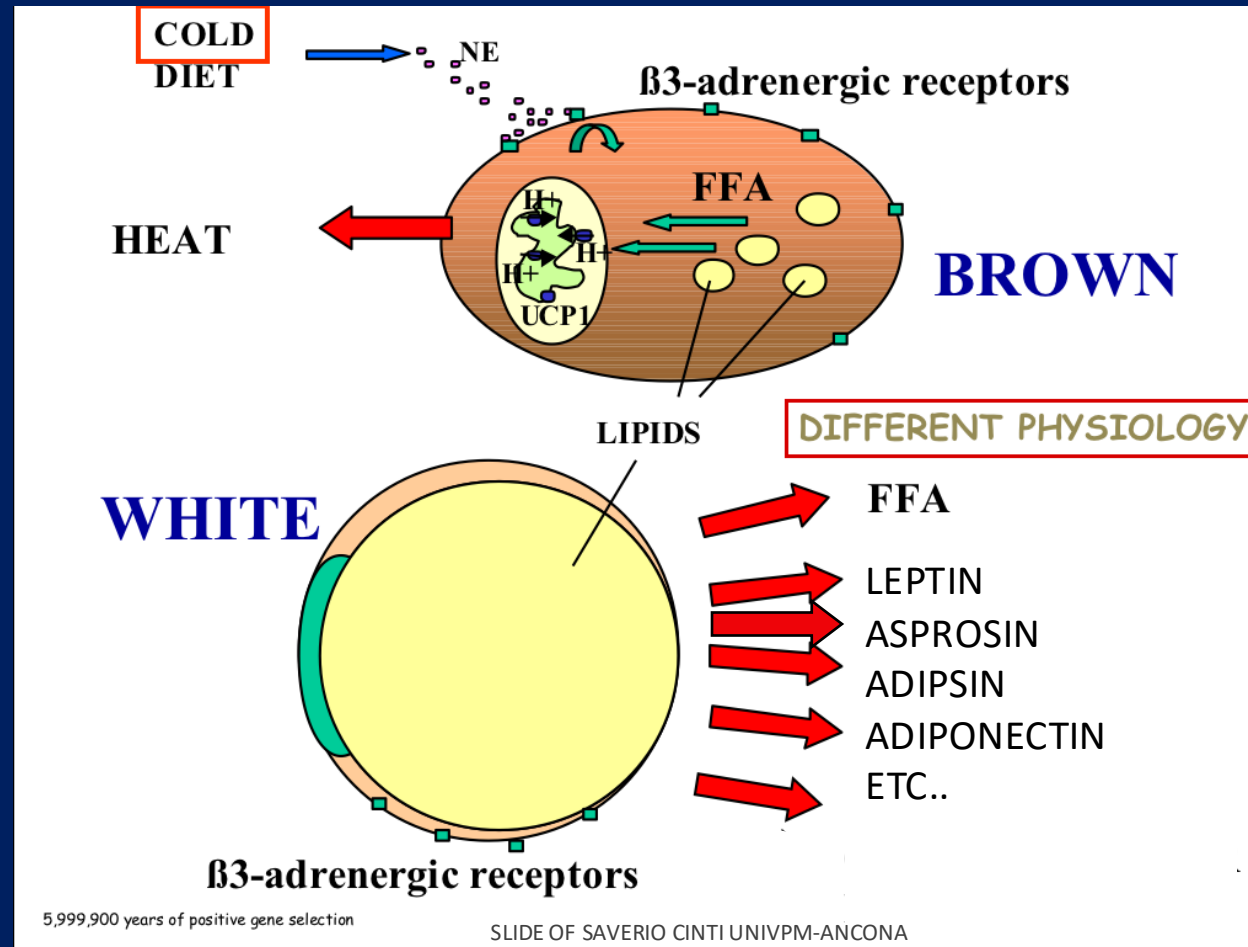
WAT



SCANNING EM



WAT



Cinti S
Obesity, T2 diabetes
and the Adipose Organ
Springer 2018

> Nature. 1994 Dec 1;372(6505):425-32. doi: 10.1038/372425a0.

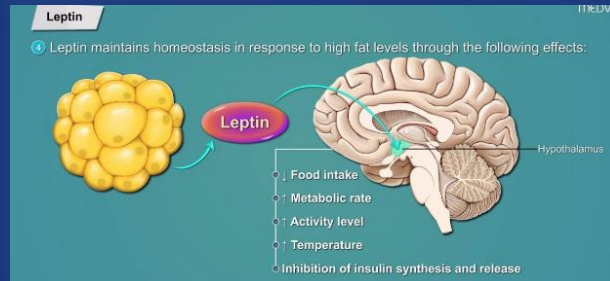
Positional cloning of the mouse obese gene and its human homologue

Y Zhang¹, R Proenca, M Maffei, M Barone, L Leopold, J M Friedman

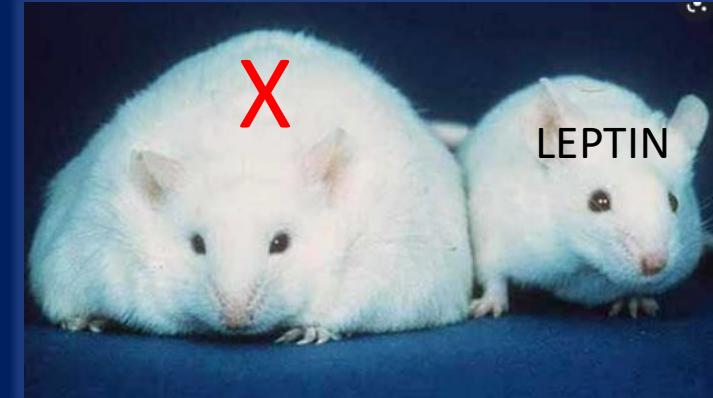
Affiliations + expand

PMID: 7984236 DOI: 10.1038/372425a0

1994

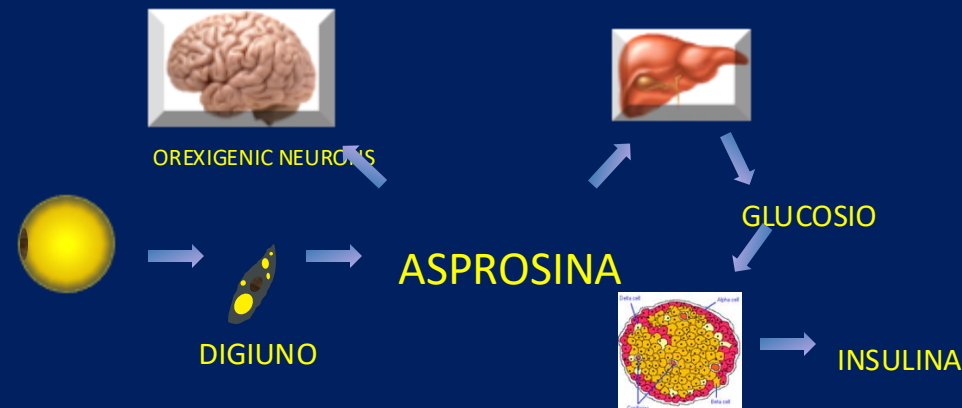


WAT physiology



J. FRIEDMAN
Rockefeller Univ

2016



SLIDE OF SAVERIO CINTI UNIVPM-ANCONA

LIPODISTROFIA
DOVUTA A
MANCANZA DI
ASPROSIN



Cell. 2016 Apr 21;165(3):568-79. doi: 10.1016/j.cell.2016.02.063. Epub 2016 Apr 14.

Asprosin, a Fasting-Induced Glucogenic Protein Hormone.

Romere C¹, Duerschmid C¹, Boumat J¹, Constable P¹, Jain M², Xia F², Saha PK¹, Del Solar M², LeMaire SA⁵, Coselli JS⁵, Milewicz DM⁶, Sutton VR², Butte NF⁴, Moore DD¹, Chopra AR⁷.

Nat Med. 2017 Dec;23(12):1444-1453. doi: 10.1038/nm.4432. Epub 2017 Nov 6.

Asprosin is a centrally acting orexigenic hormone.

Duerschmid C¹, He Y², Wang C², Li C^{3,4}, Boumat JC¹, Romere C¹, Saha PK¹, Lee DM⁷, Sutton VR⁸, Moore DD¹, Butte NF², Krashes MJ^{3,4}, Xu Y^{1,2}, Chopra AR^{1,8}.



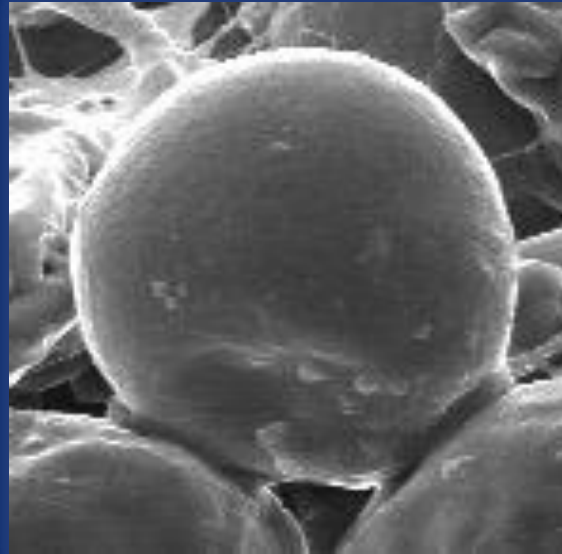
A. CHOPRA
Baylor Col-Houston

WAT physiology

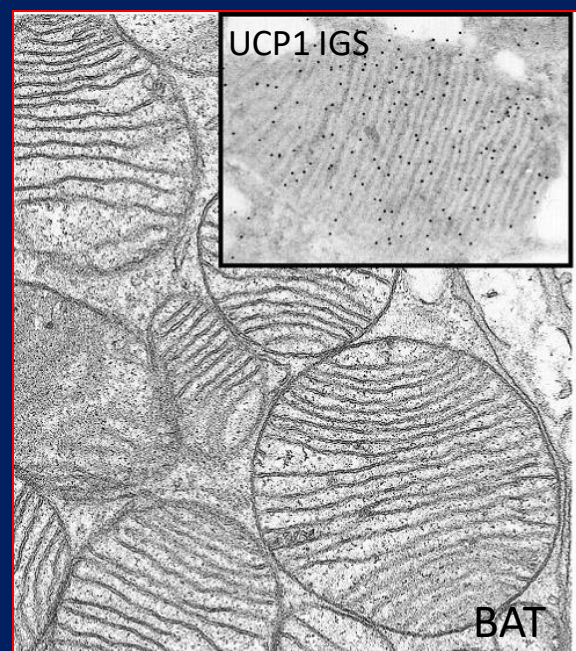


LEPTIN
FOOD SEARCH

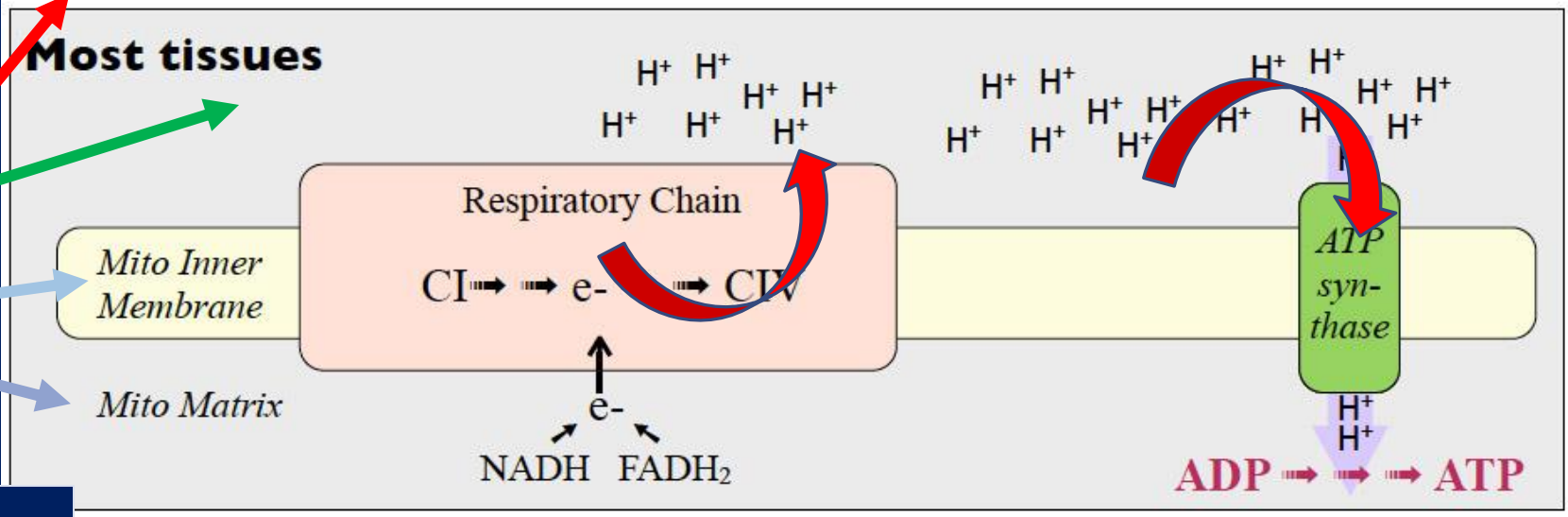
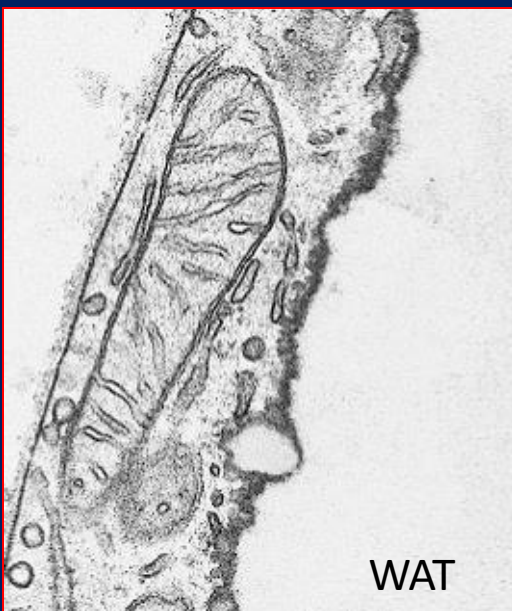
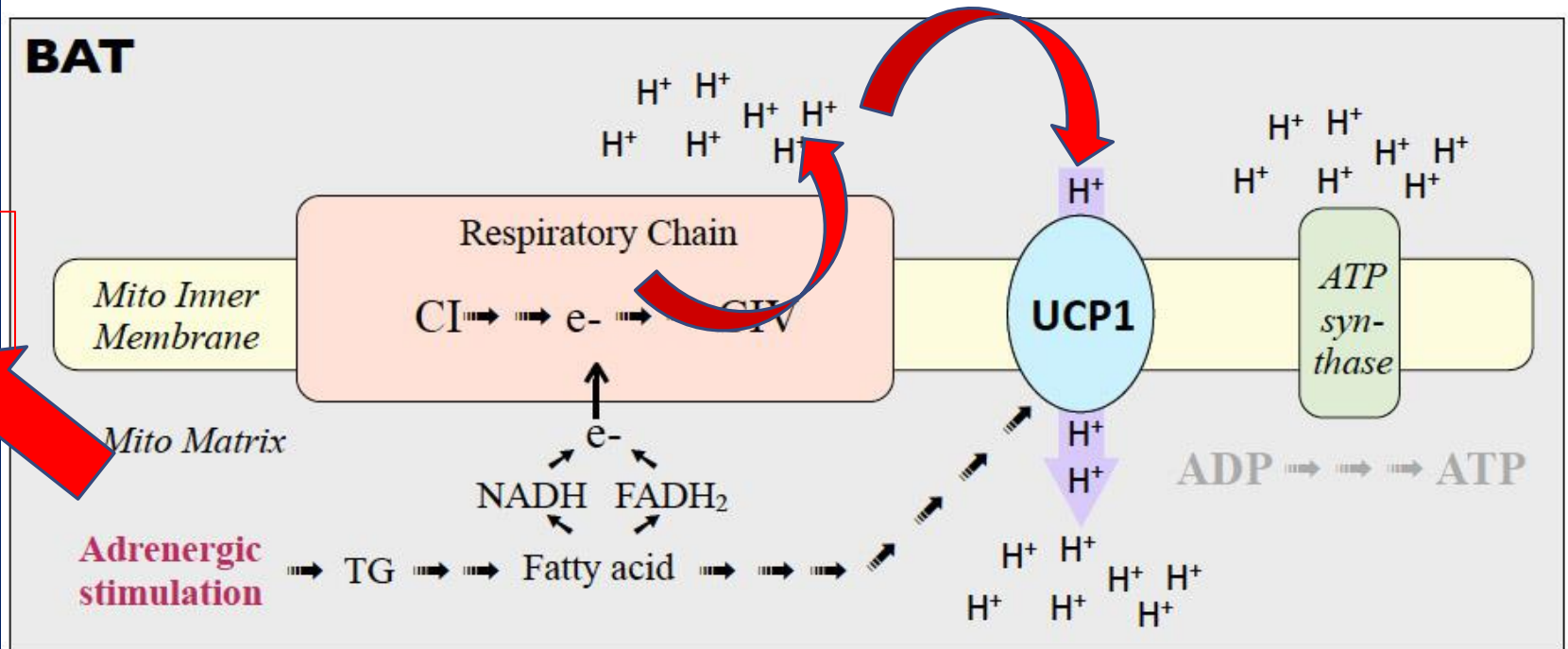
ASPROSIN
FOOD INTAKE



IL TESSUTO ADIPOSO BRUNO (BAT)



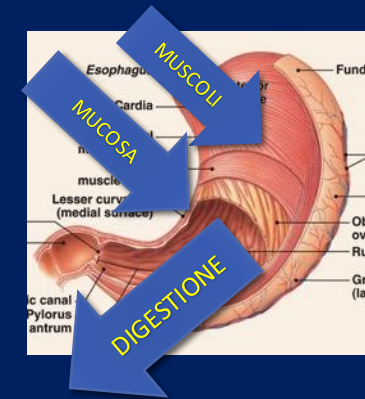
HEAT

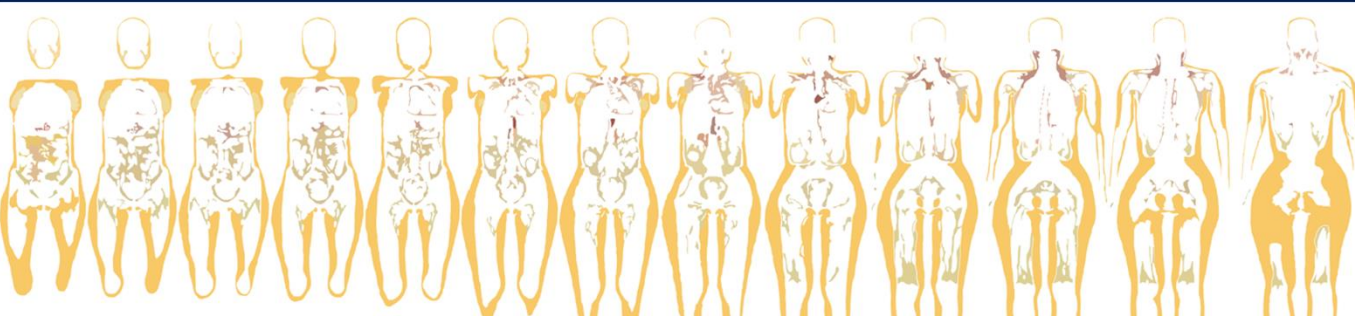
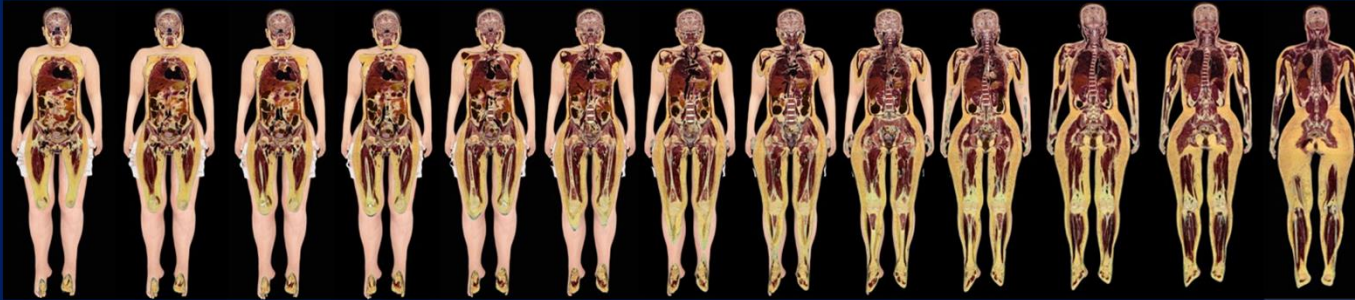


Cinti S
Obesity, T2 diabetes
and the Adipose Organ
Springer 2018

DEFINIZIONE DI ORGANO

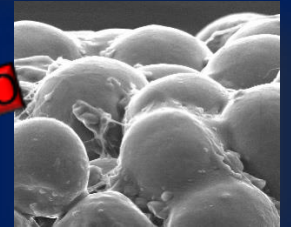
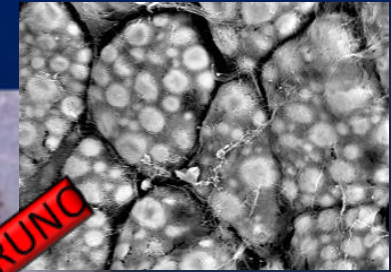
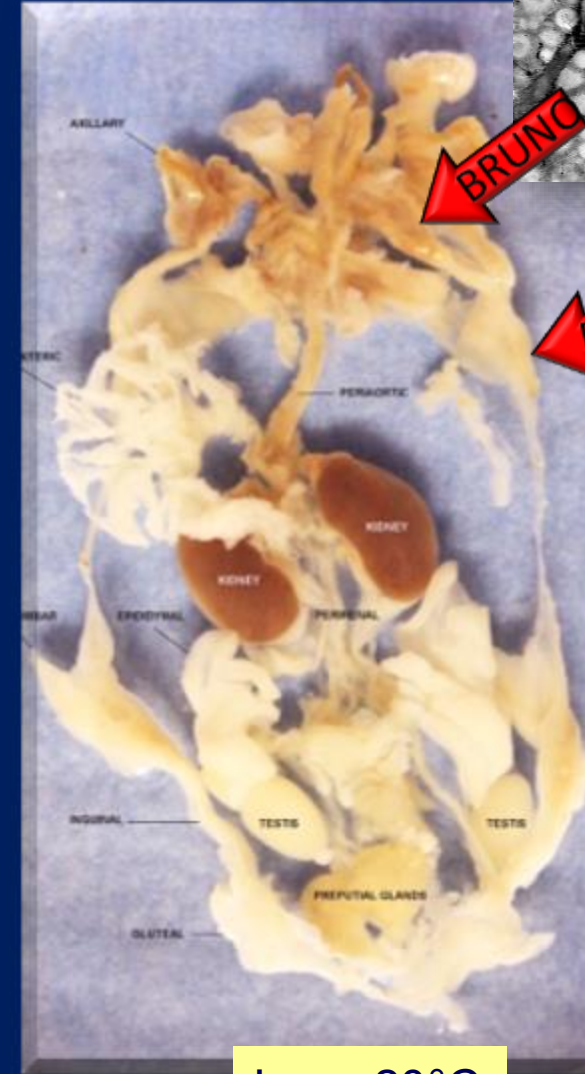
STRUTTURA DISSECABILE,
FORMATA DA ALMENO
DUE TESSUTI DIVERSI
RESPONSABILI DI FUNZIONI DIVERSE
E COORDINATE CHE
CONVERGONO PER RAGGIUNGERE
UN SINGOLO RUOLO FINALISTICO





Giordano et al Biomedicines 2022 Sep 14;10(9):2275.

SLIDE OF SAVERIO CINTI UNIVPM-ANCONA



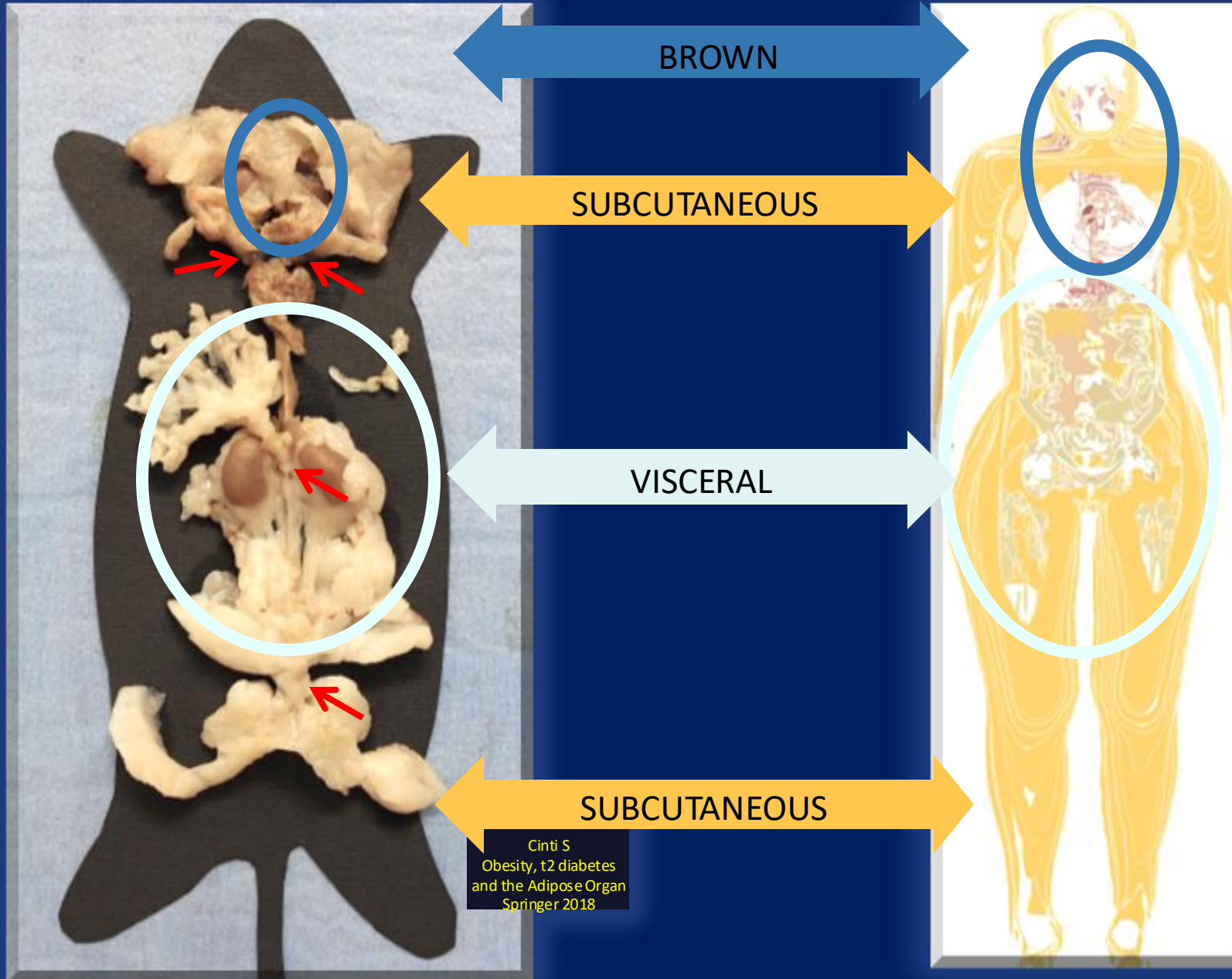
Lean 20°C

Giordano et al Biomedicines 2022 Sep 14

MOUSE ADIPOSE ORGAN

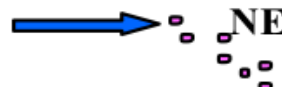
HUMAN ADIPOSE ORGAN

2D



Cinti S
Obesity, t2 diabetes
and the Adipose Organ
Springer 2018

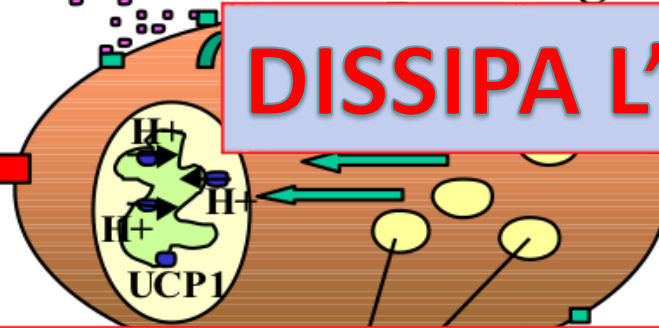
**COLD
DIET**



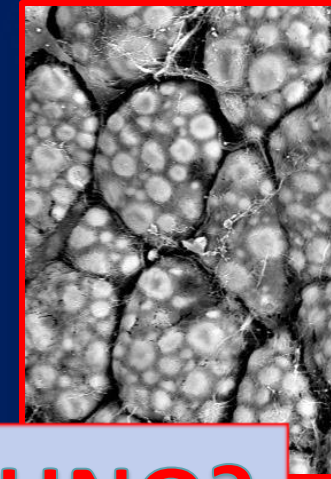
β 3-adrenergic receptors

DISSIPA L'ENERGIA

HEAT



BROWN



BRUNO

QUALE COOPERAZIONE TRA BIANCO E BRUNO?

WHITE

IMMAGAZZINA L'ENERGIA

β 3-adrenergic receptors



FFA



**LEPTIN
ADIPOCTENIN**



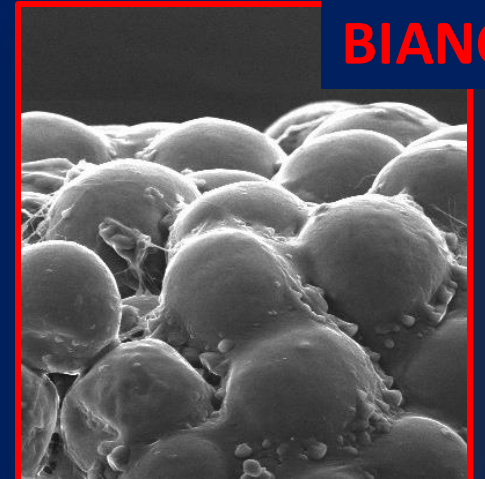
ADIPONECTIN



AUTOTAXIN



**CARDIOVASCULAR
FACTORS etc...**



BIANCO

5,999,900 years of positive gene selection

SLIDE OF SAVERIO CINTI UNIVPM-ANCONA

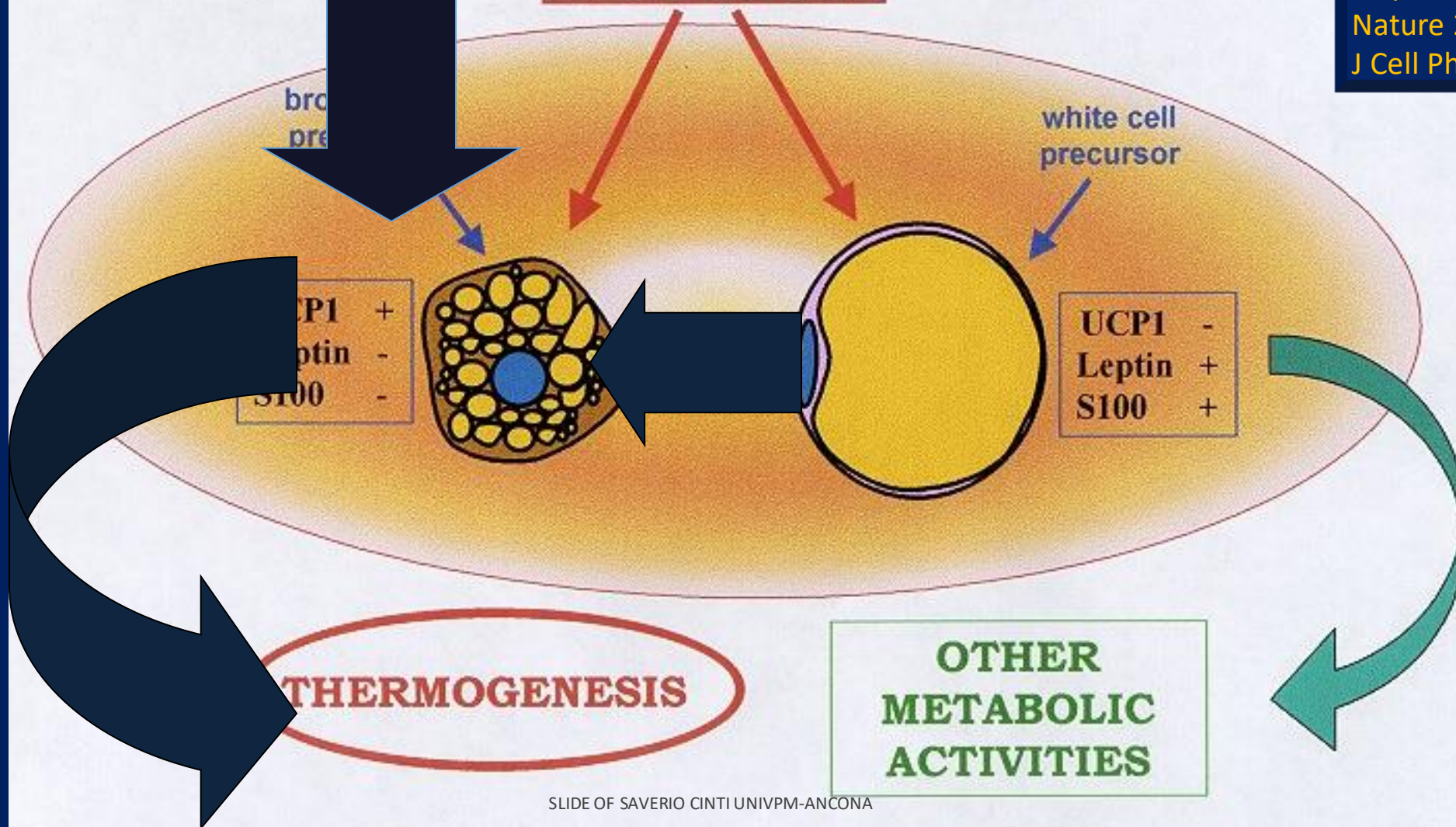
5,999,900 years of positive gene selection

Cinti S
Obesity, t2 diabetes
and the Adipose Organ
Springer 2018

THE ADIPOSE ORGAN
S.Cinti 1999

**CHRONIC
COLD**

ENERGY

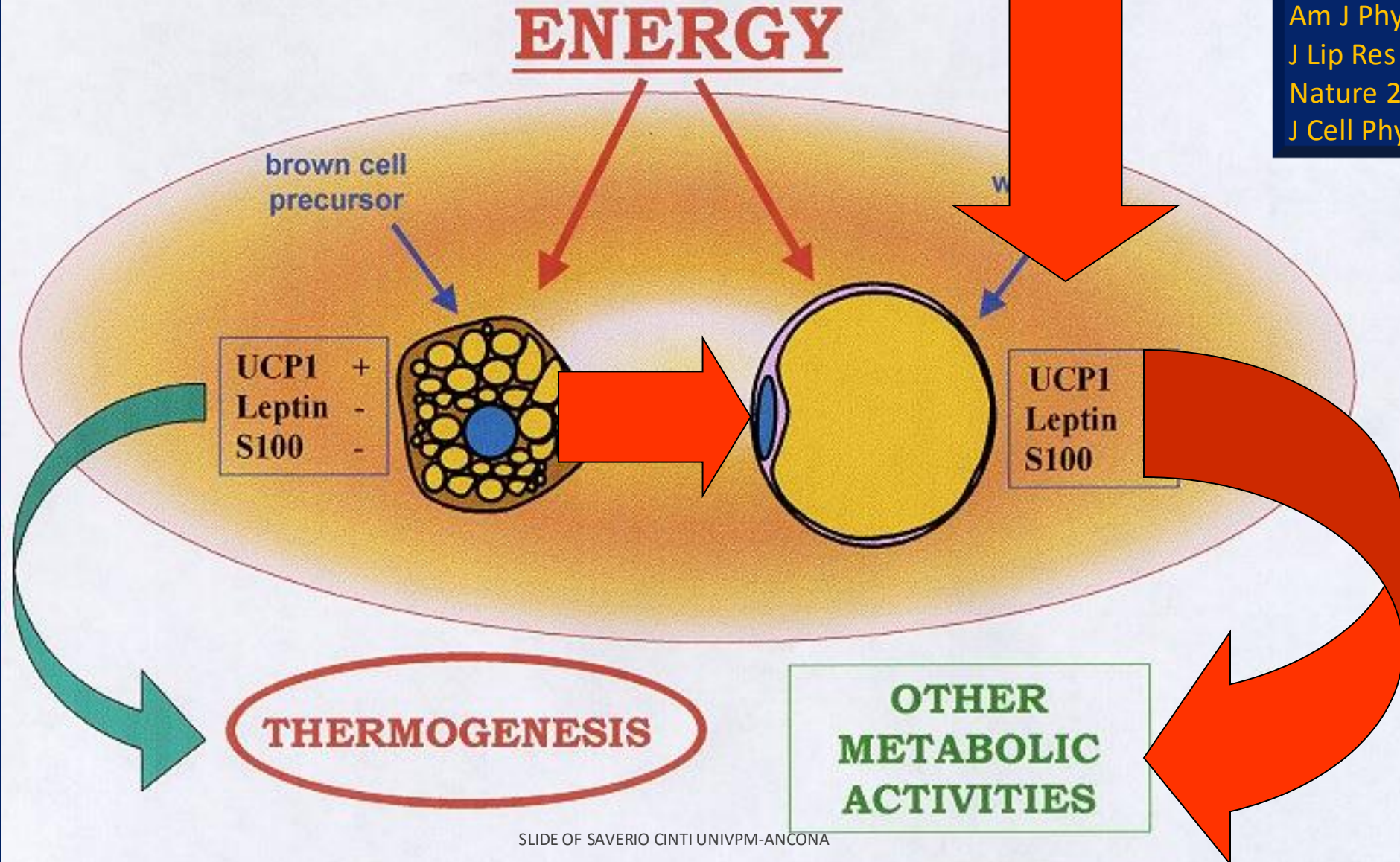


J Cell Sci 1992
Am J Physiol 2000
Science 2001
Europ J Biochem 2003
Am J Physiol EM 2010
J Lip Res 2012
Nature 2102
J Cell Physiol 2017

THE ADIPOSE ORGAN
S.Cinti 1999

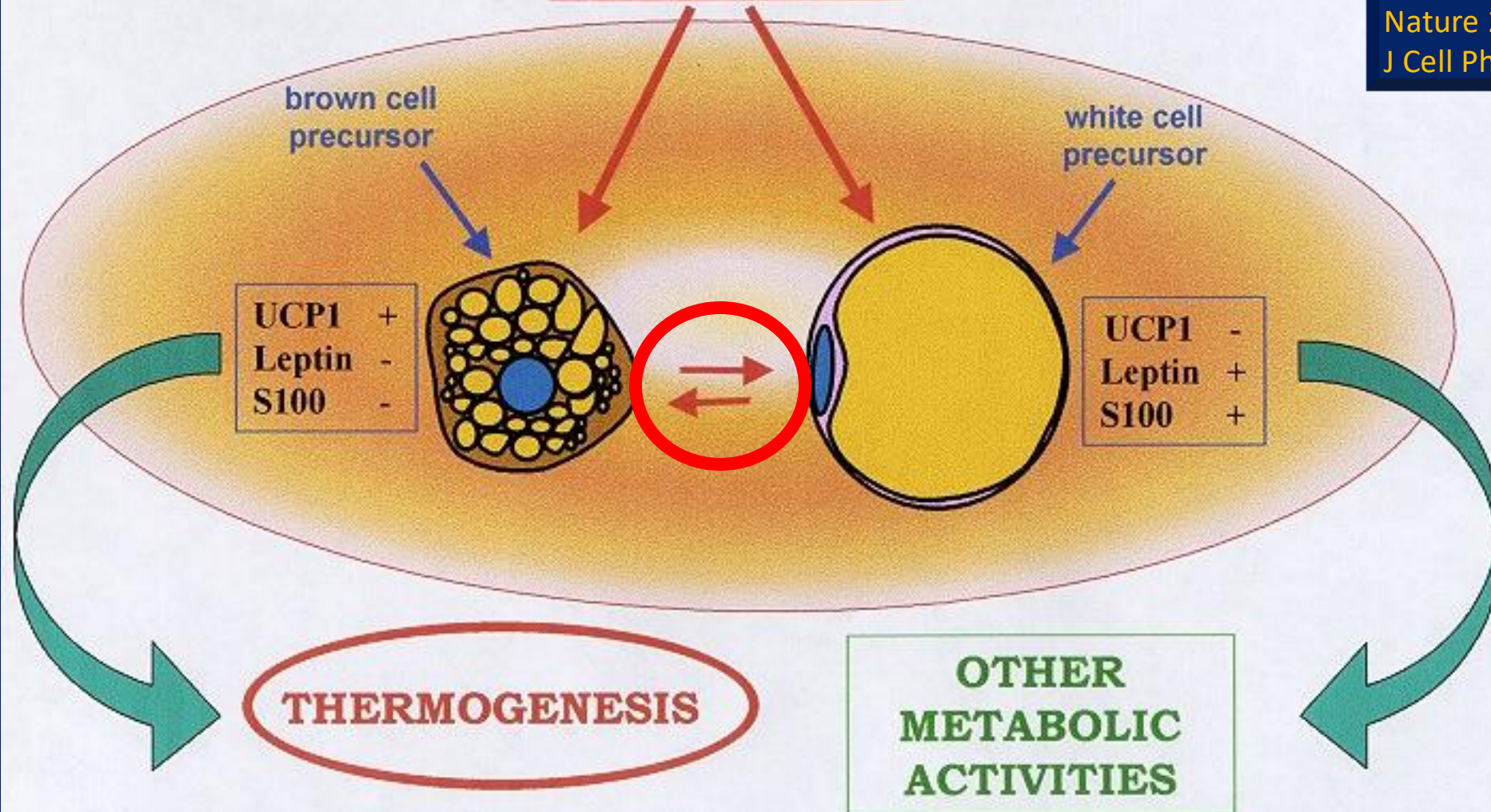
HYPERCALORIC
DIET

J Cell Sci 1992
Am J Physiol 2000
Science 2001
Europ J Biochem 2003
Am J Physiol EM 2010
J Lip Res 2012
Nature 2102
J Cell Physiol 2017



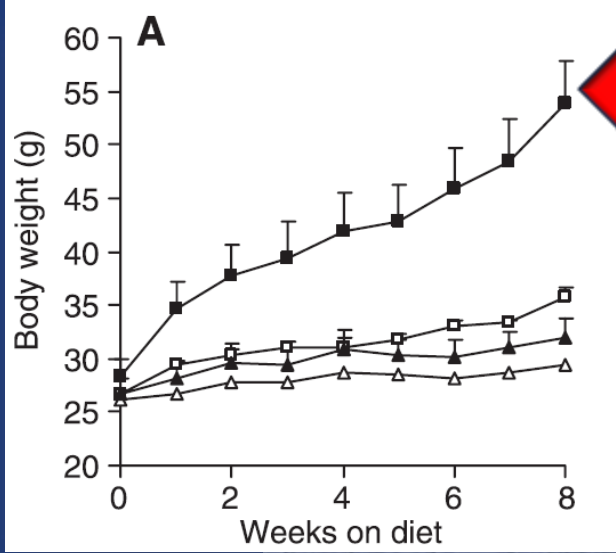
THE ADIPOSE ORGAN
S.Cinti 1999

ENERGY



J Cell Sci 1992
Am J Physiol 2000
Science 2001
Europ J Biochem 2003
Am J Physiol EM 2010
J Lip Res 2012
Nature 2102
J Cell Physiol 2017

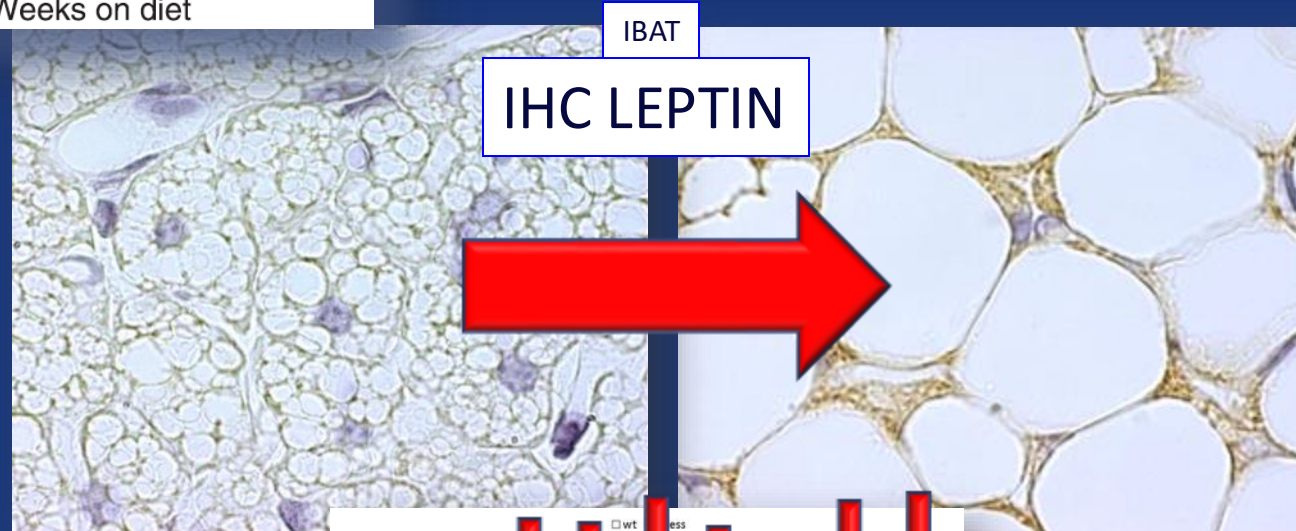
IMPORTANZA CLINICA?



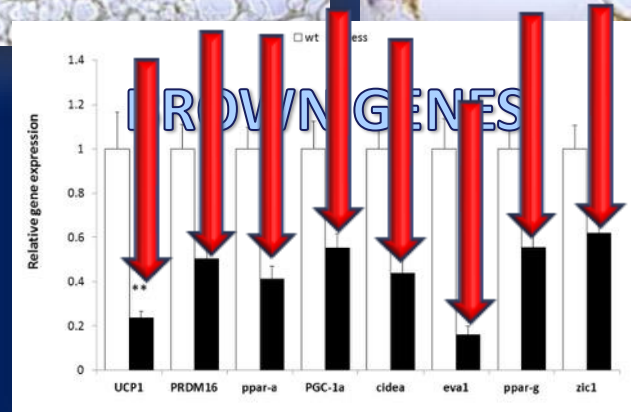
IBAT Ablation Required for Diet-Induced Thermogenesis and Obesity Resistance

Eric S. Bachman,¹ Harveen Dhillon,¹ Chen-Yu Zhang,¹
Saverio Cinti,² Antonio C. Bianco,³ Brian K. Kobilka,⁴
Bradford B. Lowell^{1*}

Science 02



IHC LEPTIN



B. LOWELL
Harvard Univ

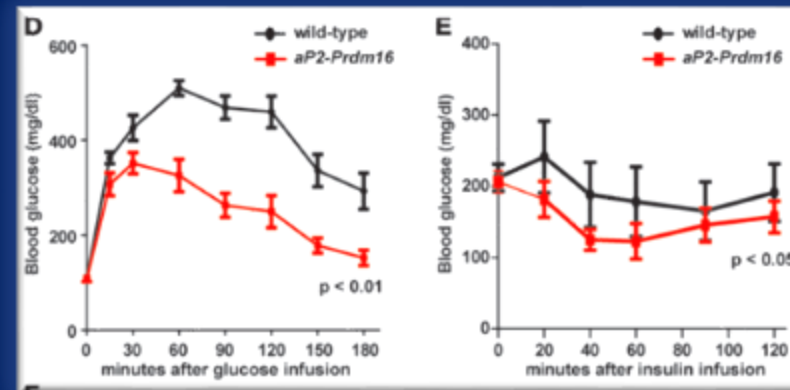
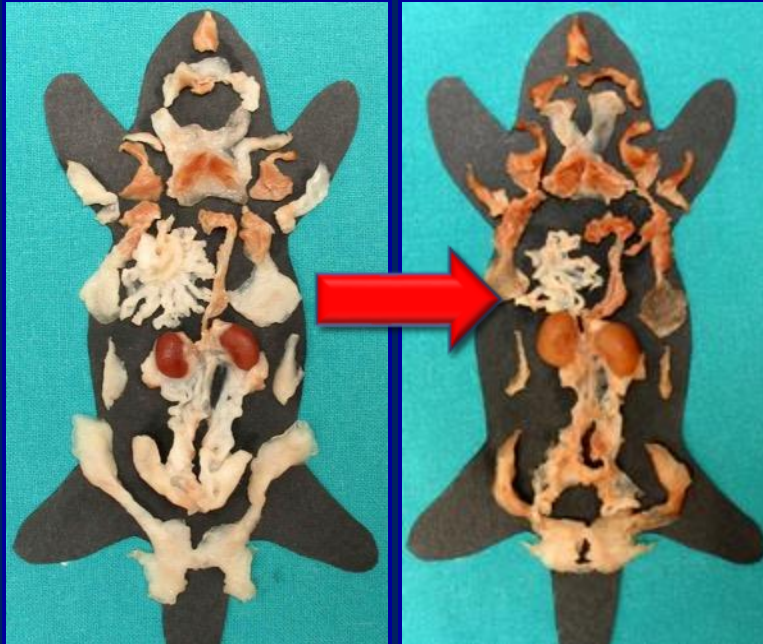
**BRUNO IMPORTANTE
PER PREVENIRE L'OBESITA'**

Ravazzoli et al Mol Metab 2016

Prdm16 determines the thermogenic program of subcutaneous white adipose tissue in mice

Patrick Seale,¹ Heather M. Conroe,² Jennifer Estall,² Shingo Kajimura,² Andrea Frontini,³ Jeff Ishibashi,¹ Paul Cohen,² Saverio Cinti,³ and Bruce M. Spiegelman²

J Clin Invest 2011



SLIDE OF SAVERIO CINTI UNIVPM-ANCONA



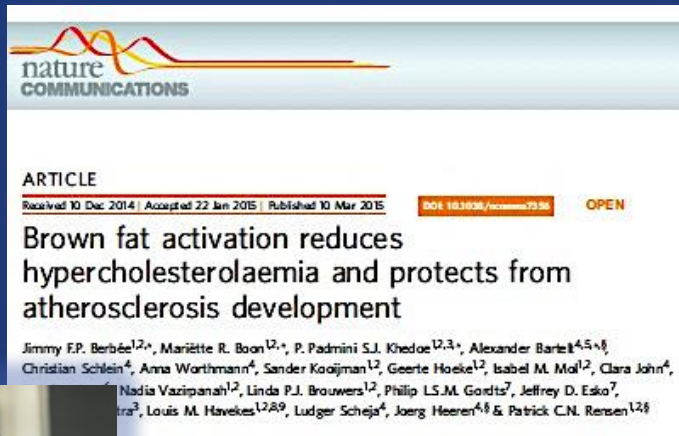
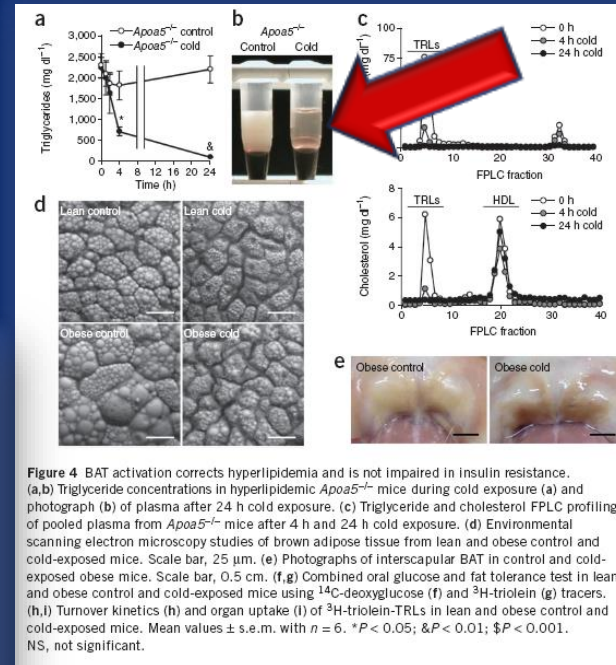
P. SEALE
Harvard Univ

BRUNO IMPORTANTE PER PREVENIRE IL DIABETE

BRUNO IMPORTANTE PER PREVENIRE L' ATEROSCLEROSI

Brown adipose tissue activity controls
triglyceride clearance

Alexander Bartelt et al

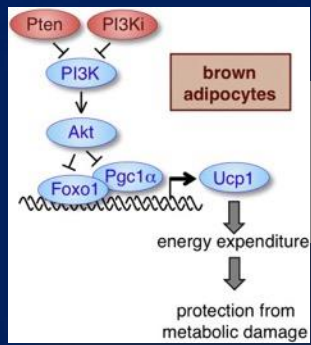


P. RENSEN
Leiden Univ

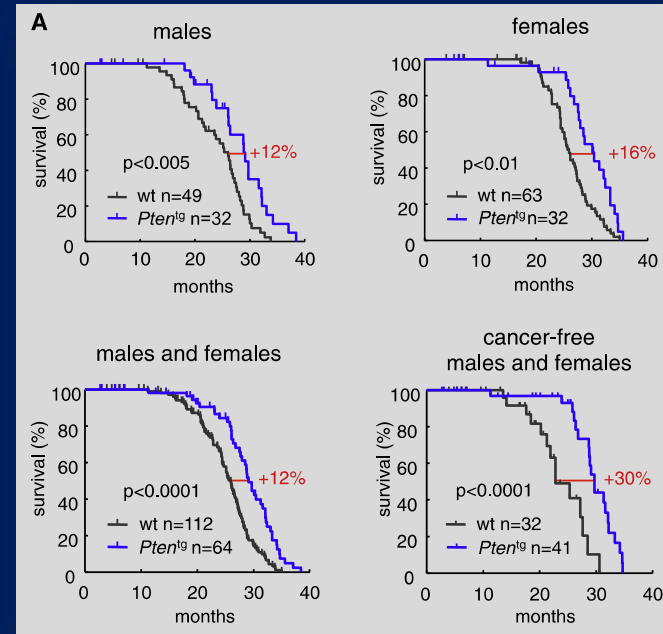
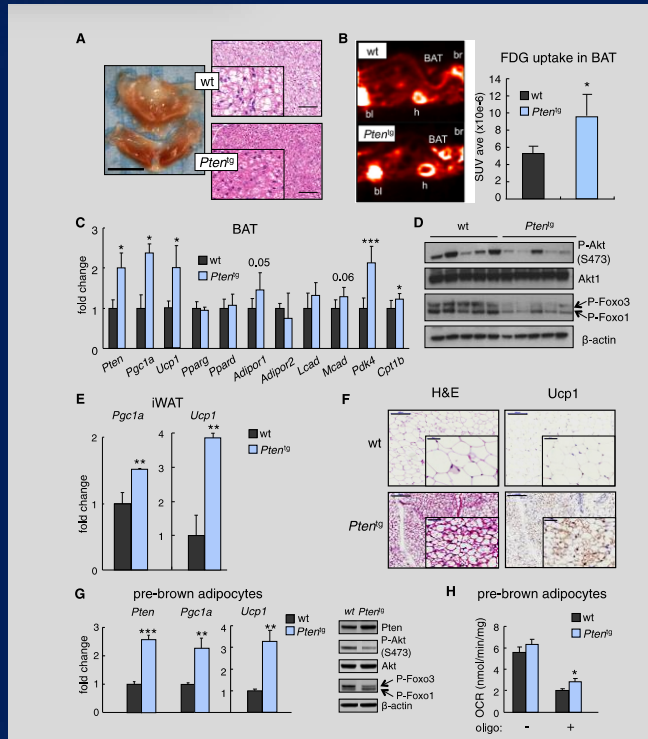


J. HEEREN
Hamburg Univ

FEBRUARY 2011
Nature medicine



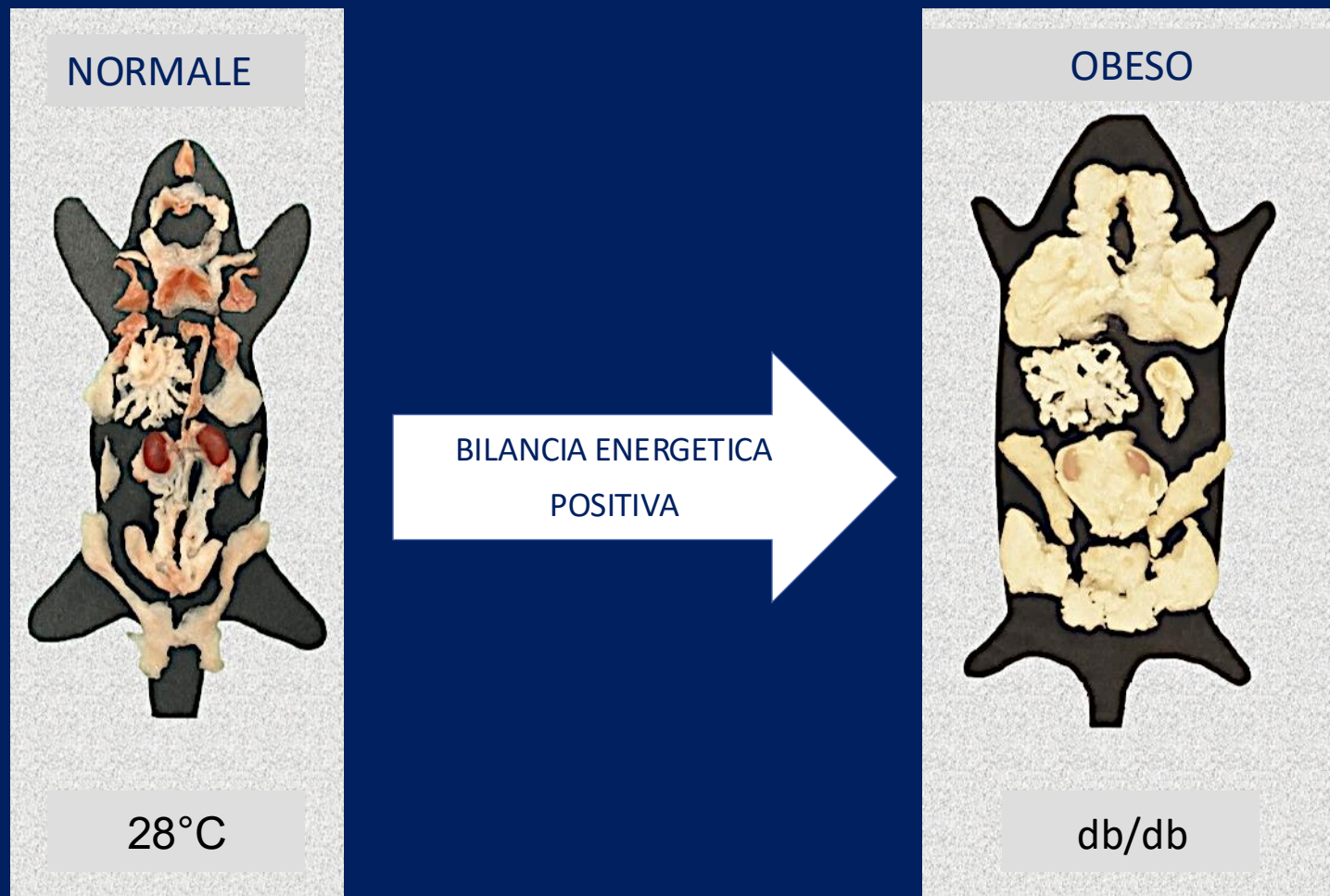
Pten Positively Regulates Brown Adipose Function, Energy Expenditure, and Longevity



M. SERRANO
Madrid Cancer Res Center

SLIDE OF SAVERIO CINTI UNIVPM-ANCONA

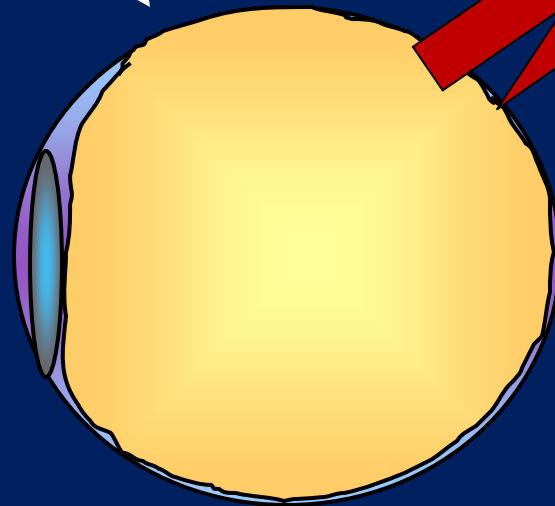
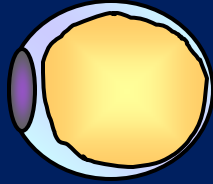
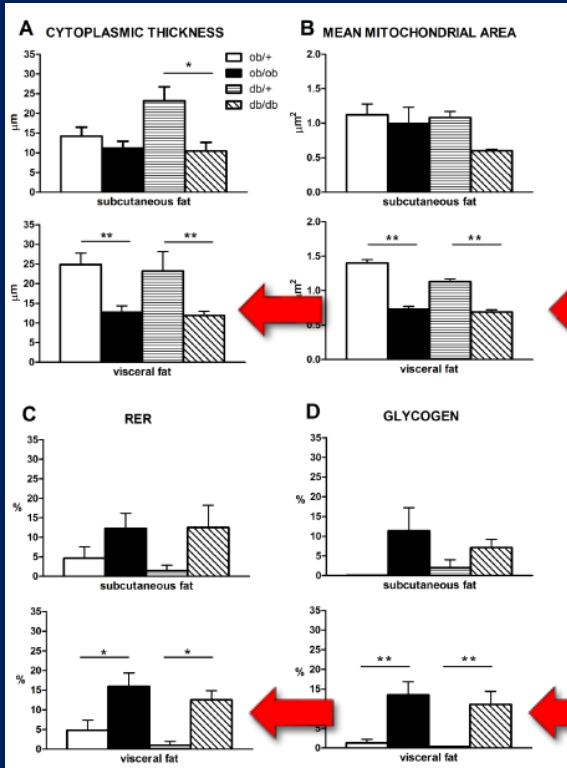
ORGANO ADIPOSO OBESO



PATHOGENESIS OF INFLAMMATION AND T2 DIABETES

Cinti et al J Lip Res 2005
Murano et al J Lip Res 2008
Giordano et al J Lip Res 2013
Camastra et al Sci Rep 2017
Kotzbeck et al J Lip Res 2018

VISCERAL FAT IS MORE STRESSED



RER

Golgi

MVB

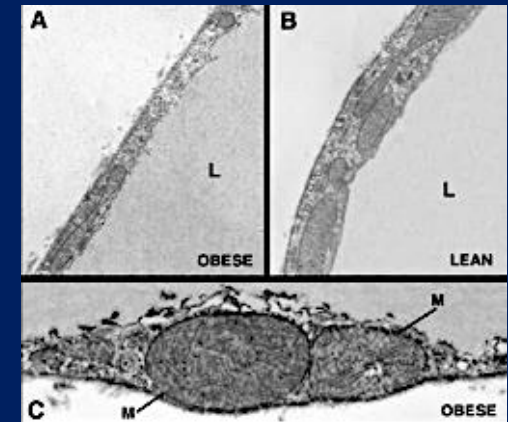
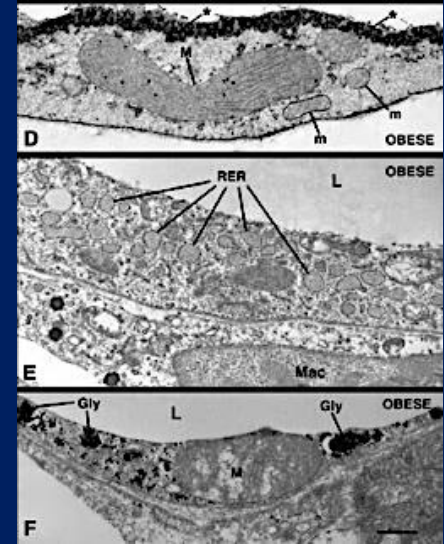
Calcium

Crystals

Glycogen

Cytoplasmic rim

Mitochondria

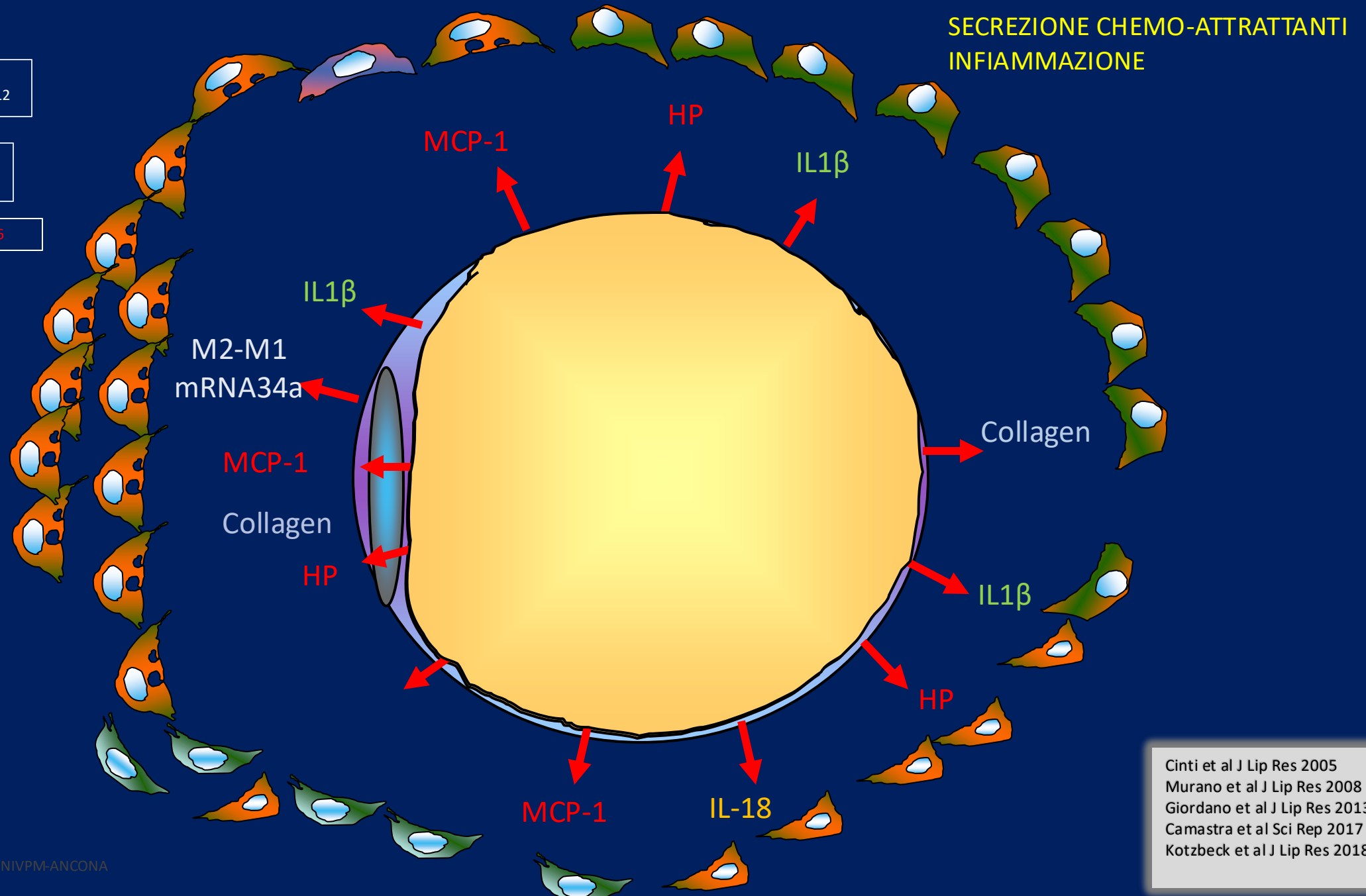


M2-M1
mRNA34a
Pan et al JCI 2019

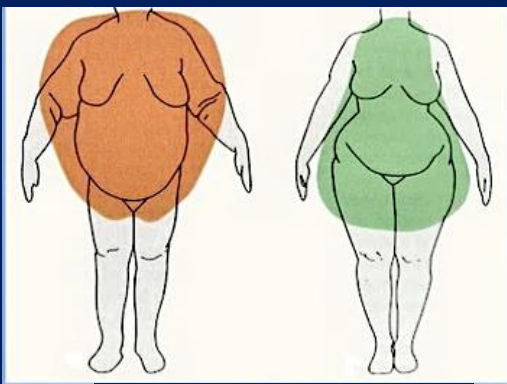
sFRP4
Mahdi et al Cell Metab 2012

MCP-1
Sartipy et al PNAS 2003

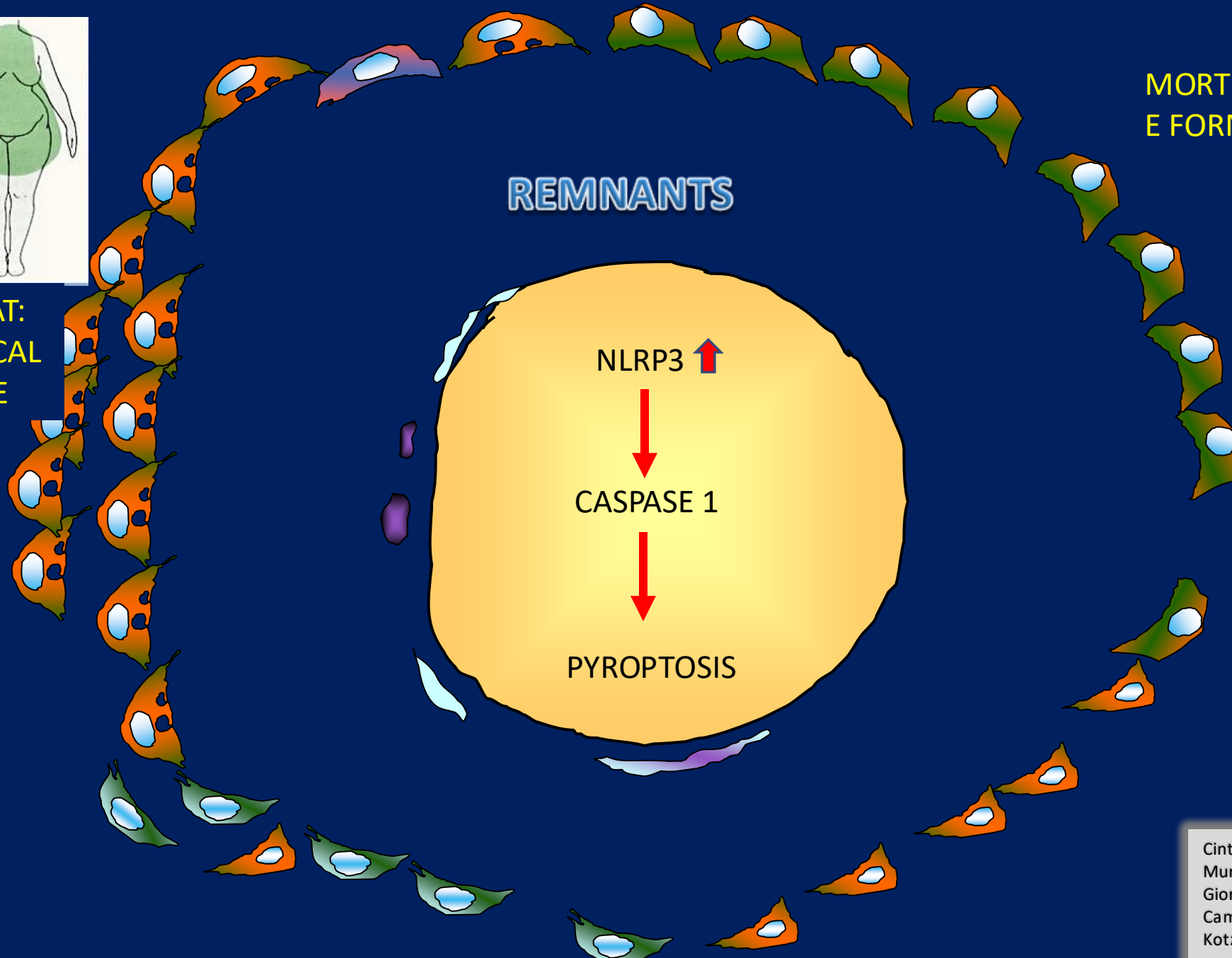
HP Maffei et al End Rev 2016



Cinti et al J Lip Res 2005
Murano et al J Lip Res 2008
Giordano et al J Lip Res 2013
Camastra et al Sci Rep 2017
Kotzbeck et al J Lip Res 2018

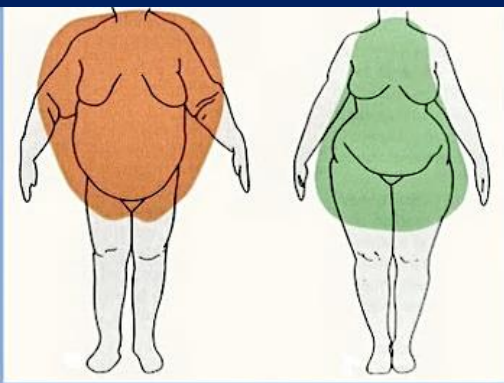


VISCERAL FAT:
LOWER CRITICAL
DEATH SIZE



MORTE ADIPOCITI
E FORMAZIONE CLS

Cinti et al J Lip Res 2005
Murano et al J Lip Res 2008
Giordano et al J Lip Res 2013
Camastra et al Sci Rep 2017
Kotzbeck et al J Lip Res 2018

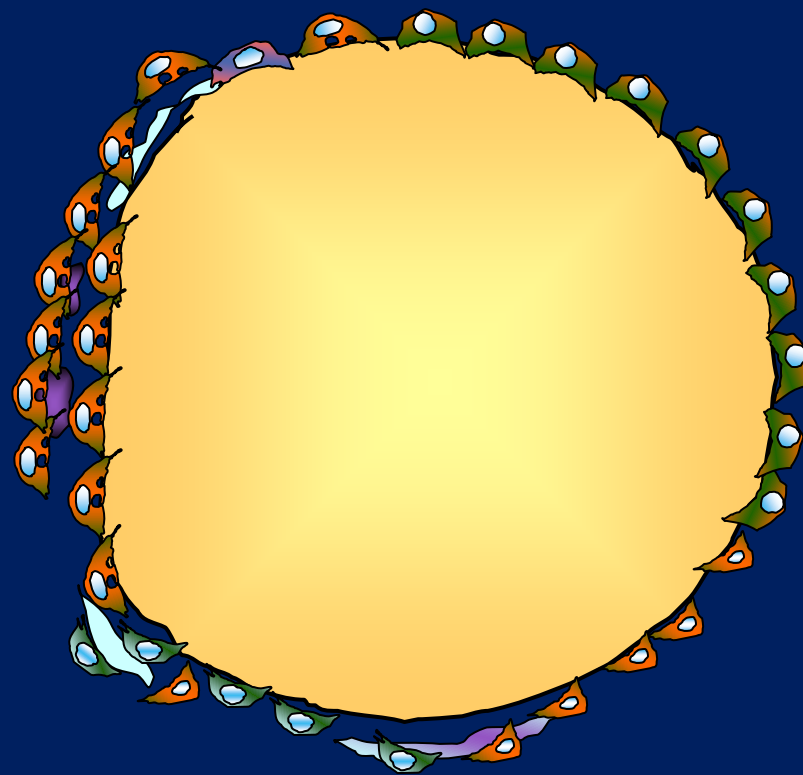


VISCERAL FAT:
LOWER CRITICAL
DEATH SIZE

CLS



SLIDE OF SAVERIO CINTI UNIVPM ANCONA



MORTE ADIPOCITI
E FORMAZIONE CLS

Cinti et al J Lip Res 2005
Murano et al J Lip Res 2008
Giordano et al J Lip Res 2013
Camastra et al Sci Rep 2017
Kotzbeck et al J Lip Res 2018

Patogenesi infiammazione e Diabete T2

Alzheimer

(Flores-Cordero et al IJMS 2022
Taki et al Obesity 2008
Pflanz et al Int J Obes 2022)

Infiammazione cronica di basso grado

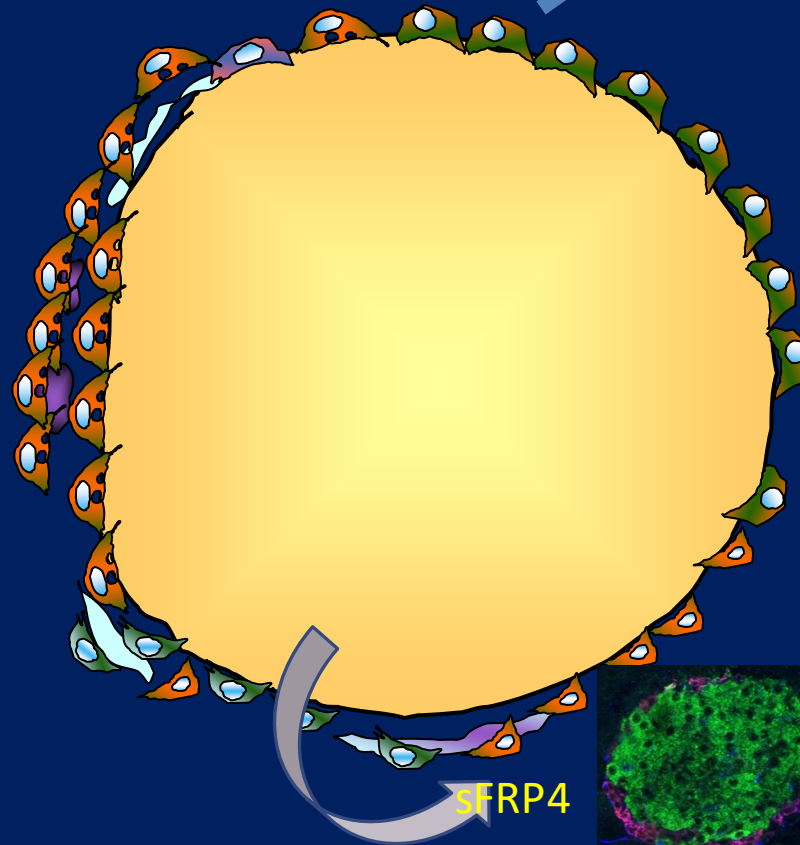
Cancro

(Avgerinos et al Metabolism 2019
Iyengar et al J Clin Oncol 2016)

CLS



SLIDE OF SAVERIO CINTI UNIVPM ANCONA

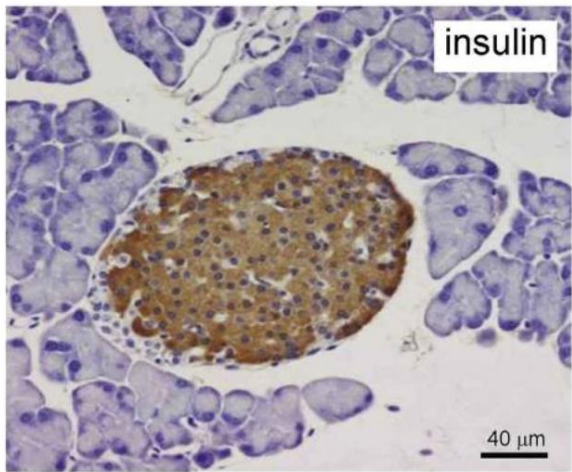


TNF α , IL6...
Resistin
Exosome-MicroRNA

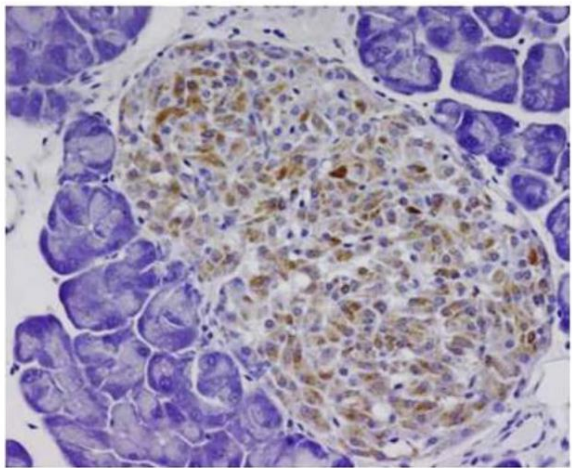
insulino- resistenza

DIABETE T2

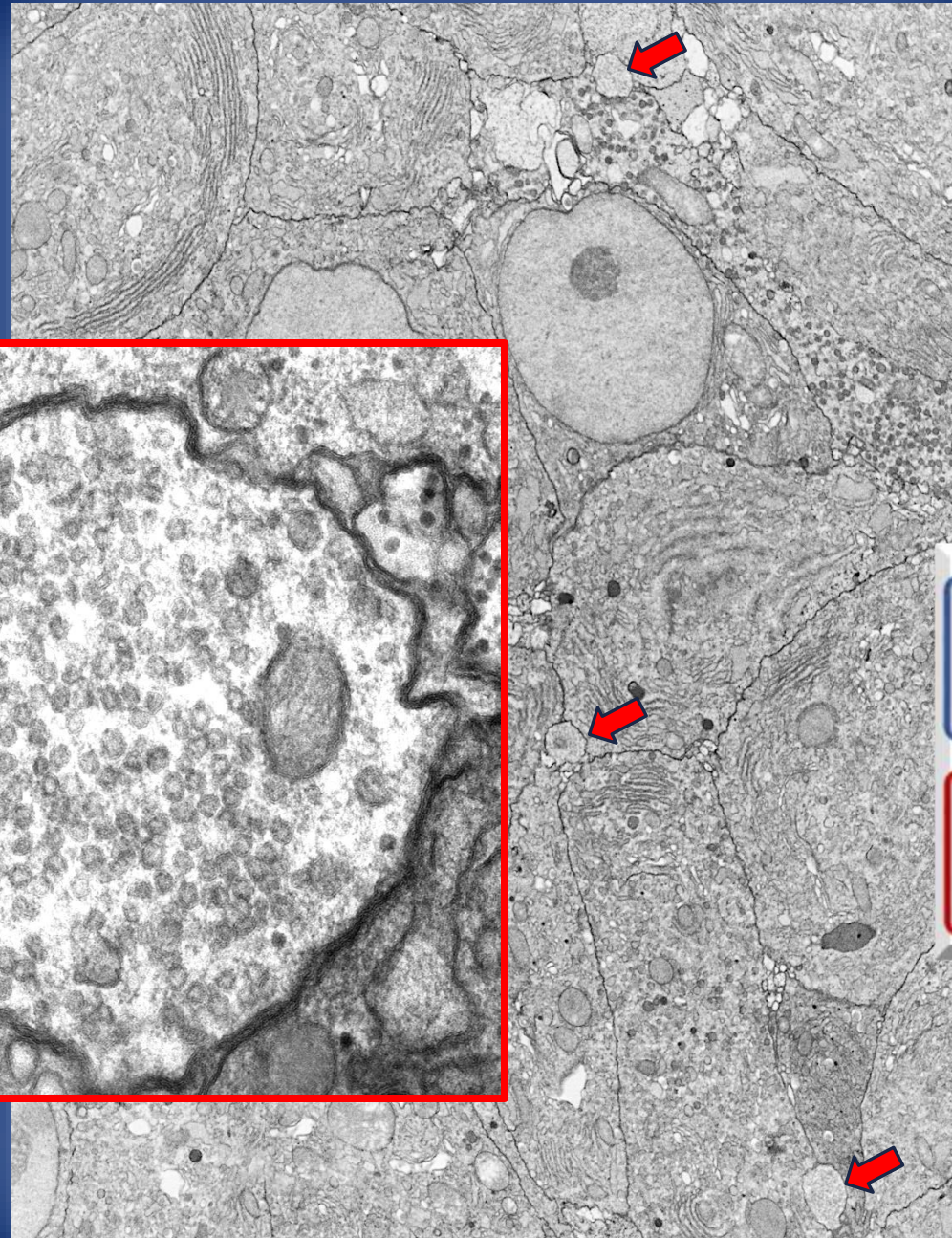
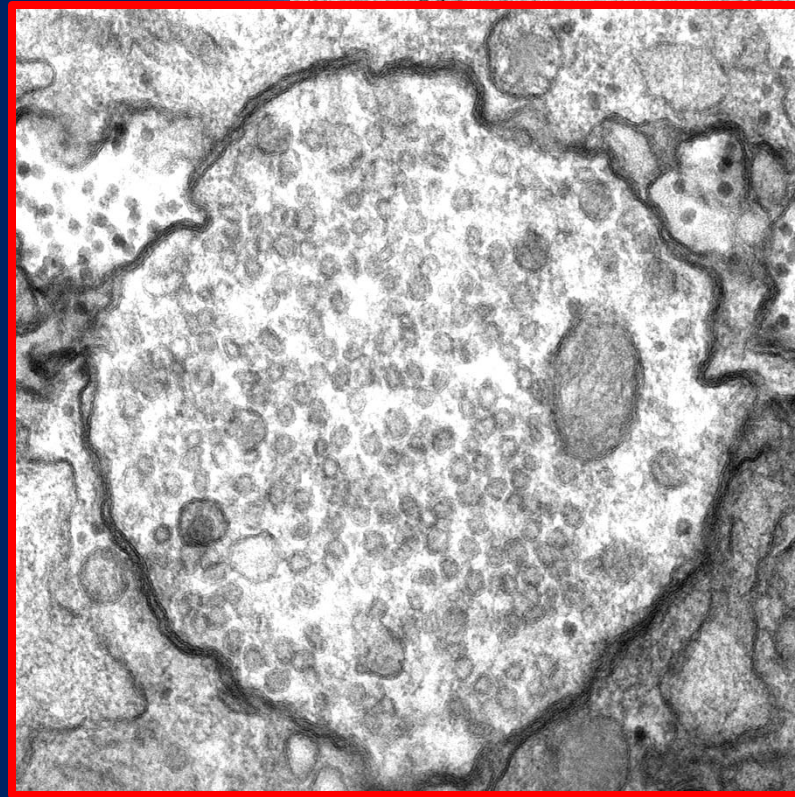
Cinti et al J Lip Res 2005
Murano et al J Lip Res 2008
Giordano et al J Lip Res 2013
Camastra et al Sci Rep 2017
Kotzbeck et al J Lip Res 2018



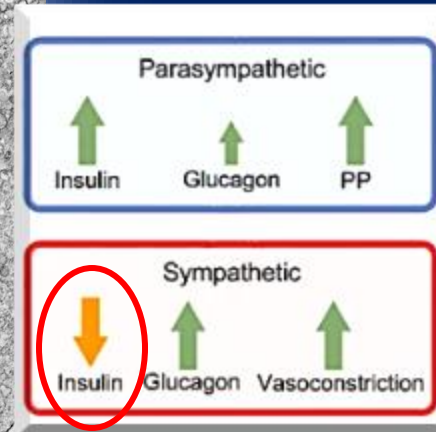
db/+



db/db



D. ACCILI
Columbia Univ



[Diabetologia](#). 2018; 61(2): 257–264.

Published online 2017 Dec 9. doi: [10.1007/s00125-017-4513-y](https://doi.org/10.1007/s00125-017-4513-y)

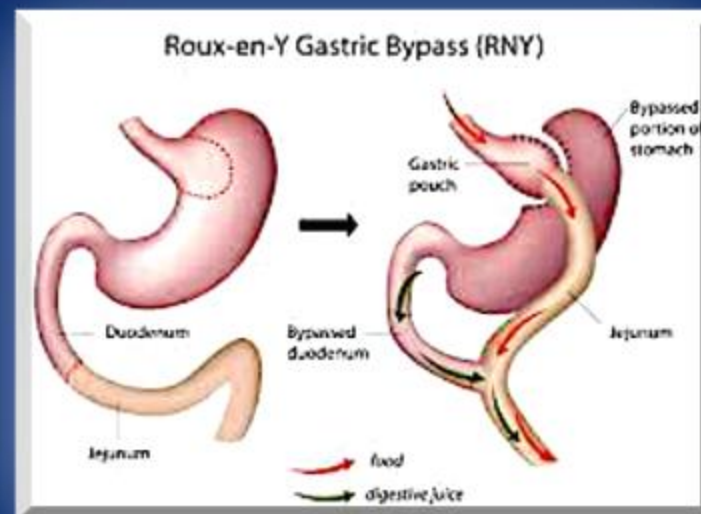
PMCID: PMC6448

PMID: [29224](#)

Metabolic surgery for the treatment of type 2 diabetes in obese individuals

[David E. Cummings](#)^{1,2} and [Francesco Rubino](#)^{1,3}

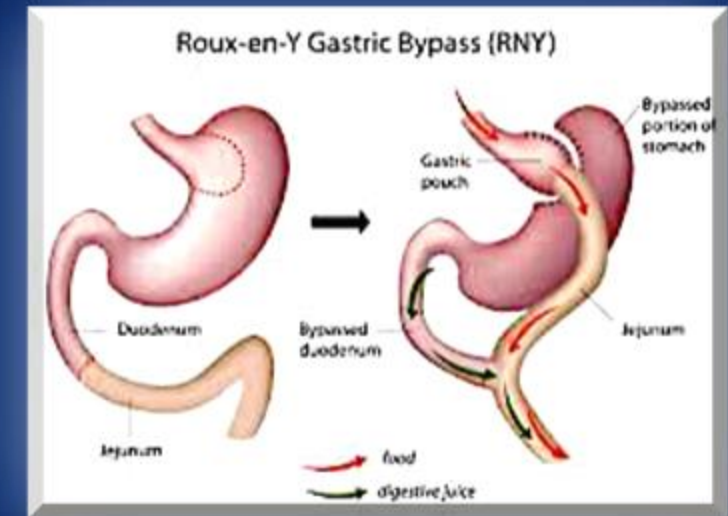
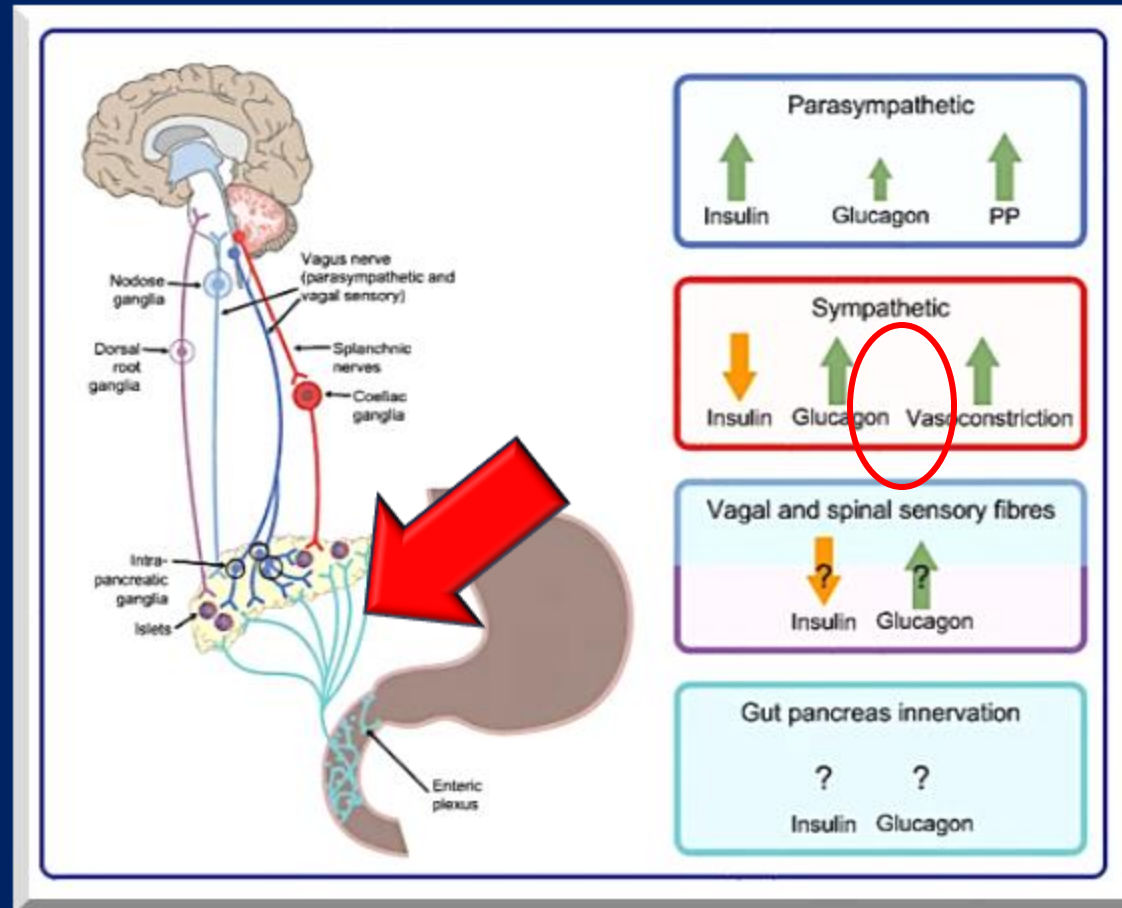
► [Author information](#) ► [Article notes](#) ► [Copyright and License information](#) ► [PMC Disclaimer](#)



Unravelling innervation of pancreatic islets

Rolie F. Hampton, Maria Jimenez-Gonzalez & Sarah A. Stanley

Diabetologia 65, 1069–1084 (2022) | Cite this article



Alzheimer

(Flores-Cordero et al IJMS 2022
Taki et al Obesity 2008
Pflanz et al Int J Obes 2022)

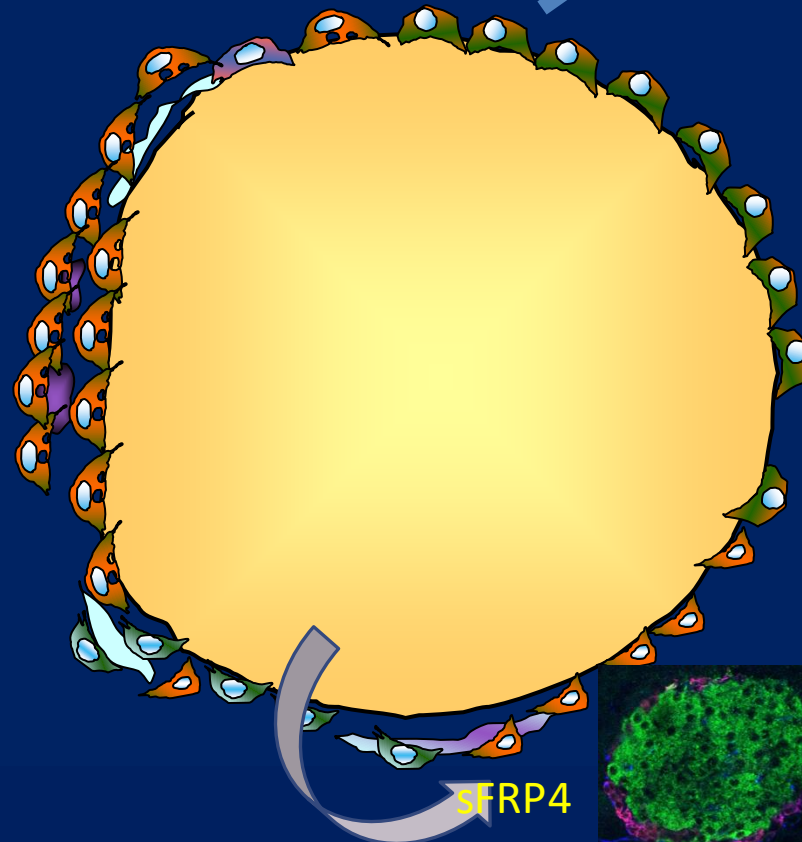
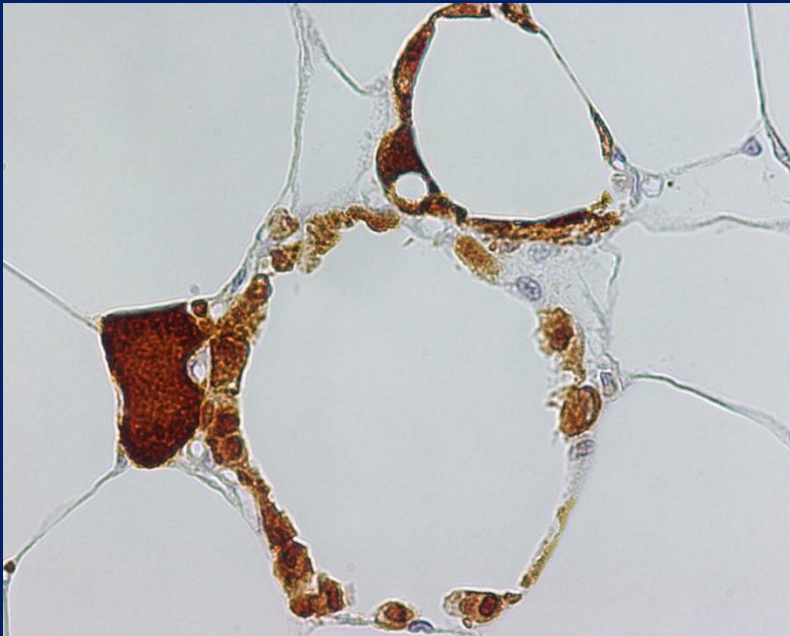
Pathogenesis Inflammation and T2 Diabetes

Low grade chronic inflammation

Cancer

(Avgerinos et al Metabolism 2019
Iyengar et al J Clin Oncol 2016)

CLS

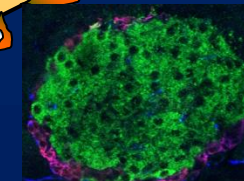


TNF α , IL6...
Resistin
Exosome-MicroRNA

insulin- resistance

Cinti et al J Lip Res 2005
Murano et al J Lip Res 2008
Giordano et al J Lip Res 2013
Camastra et al Sci Rep 2017
Kotzbeck et al J Lip Res 2018

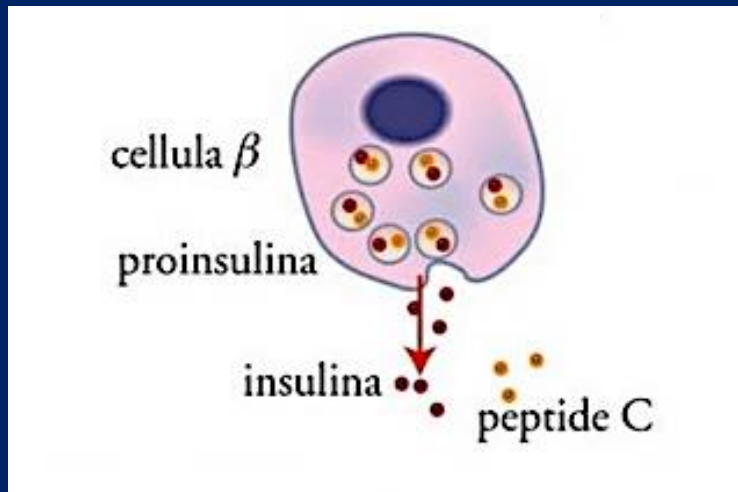
T2 DIABETES



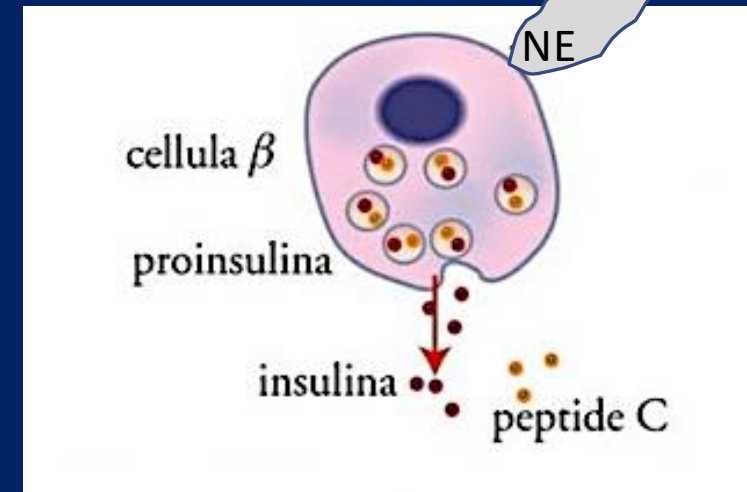
Pathogenesis Inflammation and T2 Diabetes

insulin- resistance

OLD THEORY: β CELL EXHAUSTION



NEW THEORY: FUNCTIONAL BLOCK



T2 DIABETES

Francesca Cinti et al

> J Clin Endocrinol Metab. 2016 Mar;101(3):1044-54. doi: 10.1210/je.2015-2860. Epub 2015 Dec 29.

Evidence of β -Cell Dedifferentiation in Human Type 2 Diabetes

Francesca Cinti ¹, Ryotaro Bouchi ¹, Ja Young Kim-Muller ¹, Yoshiaki Ohmura ¹, P R Sandoval ¹, Matilde Masini ¹, Lorella Marselli ¹, Mara Suleiman ¹, Lloyd E Ratner ¹, Piero Marchetti ¹, Domenico Accili ¹

> Nutr Metab Cardiovasc Dis. 2014 Apr;24(4):384-92. doi: 10.1016/j.numecd.2013.09.006. Epub 2013 Oct 23.

Increased density of inhibitory noradrenergic parenchymal nerve fibers in hypertrophic islets of Langerhans of obese mice

I Giannulis ¹, E Mondini ¹, F Cinti ¹, A Frontini ¹, I Murano ¹, R Barazzoni ², G Barbatelli ¹, D Accili ³, S Cinti ⁴

> Metabolism. 2021 Jan;114:154414. doi: 10.1016/j.metabol.2020.154414. Epub 2020 Oct 28.

Noradrenergic fibers are associated with beta-cell dedifferentiation and impaired beta-cell function in humans

F Cinti ¹, T Mezza ¹, I Severi ², M Suleiman ³, C M A Cefalo ¹, G P Sorice ¹, S Moffa ¹, F Impronta ¹, G Quero ⁴, S Alfieri ⁴, A Mari ⁵, A Pontecorvi ⁶, L Marselli ³, S Cinti ², P Marchetti ³, A Giaccari ⁷

1977



2025

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Thank you for your attention!