

Contribución de la disfunción mitocondrial
al desarrollo de las complicaciones vasculares
de la Diabetes Tipo 2

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Vascular complications of diabetes

Diabetes: Complications

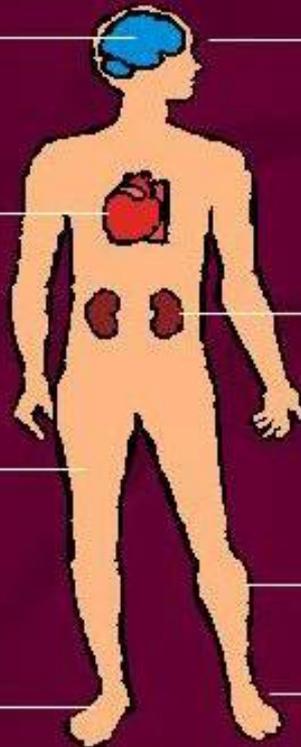
Macrovascular

Stroke

Heart disease and
hypertension

Peripheral
vascular disease

Foot problems



Microvascular

Diabetic eye disease
(retinopathy and cataracts)

Renal disease

Neuropathy

Foot problems

REVIEW ARTICLE

Prevention of cardiovascular disease through reduction of glycaemic exposure in type 2 diabetes: A perspective on glucose-lowering interventions

Ronan Roussel MD, PhD^{1,2,3}  | Philippe Gabriel Steg MD^{2,3,4,5} |

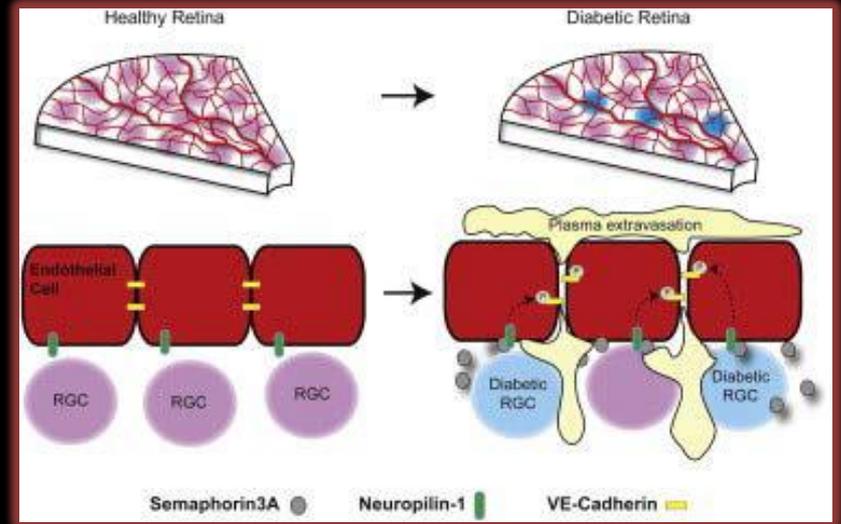
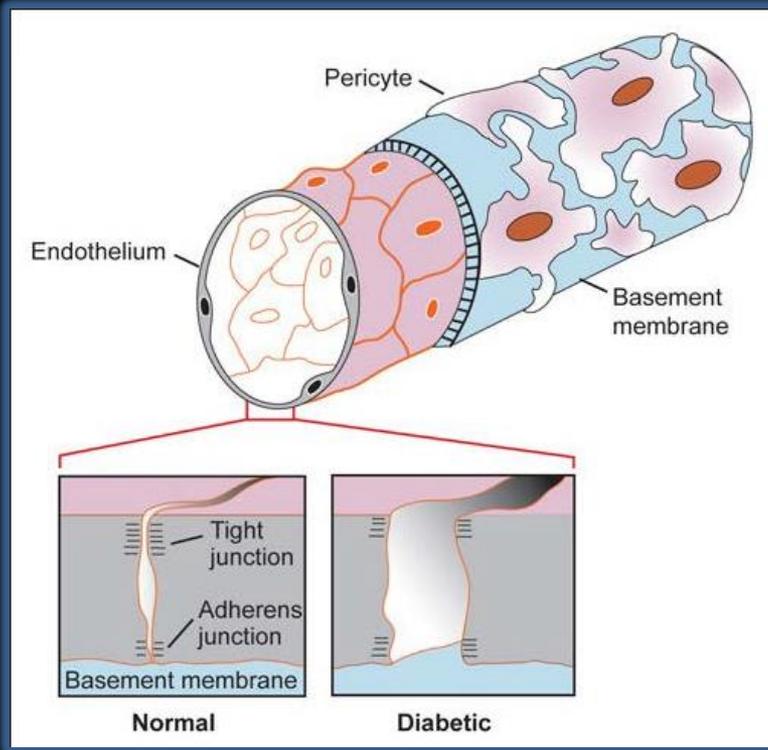
Kamel Mohammedi MD, PhD³ | Michel Marre MD, PhD^{1,2,3} | Louis Potier MD, PhD^{1,2,3}

Type 2 diabetes is a leading cause of cardiovascular disease (CVD). Observational studies have consistently shown an association between glycaemic level and risk of major adverse cardiovascular events (MACE); however, intervention studies have provided limited evidence supporting a reduction in the cardiovascular burden of diabetes through intensive glucose control. In the present review, we aimed to examine the concept of cumulative glycaemic exposure with regard to protection against CVD in diabetes. We address how

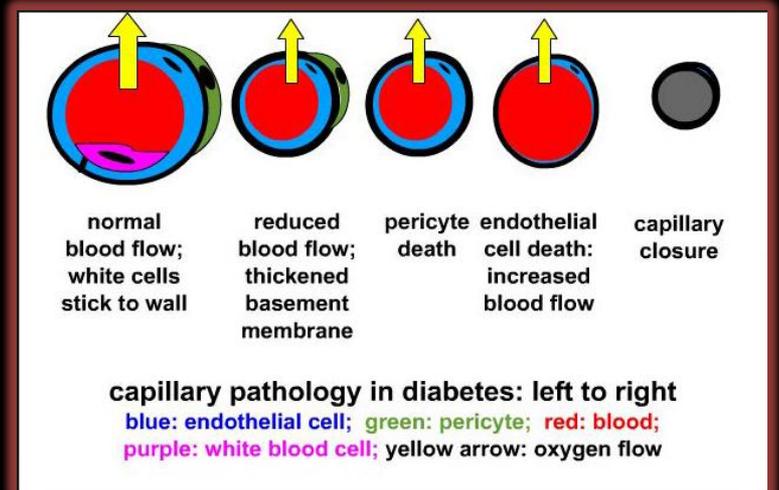
($r^2 = 0.51$, $P < .05$; Figure S1). Beyond glucose control, the existence of several potentially important confounding factors should be acknowledged because the populations were different in these trials

Diabetic retinopathy

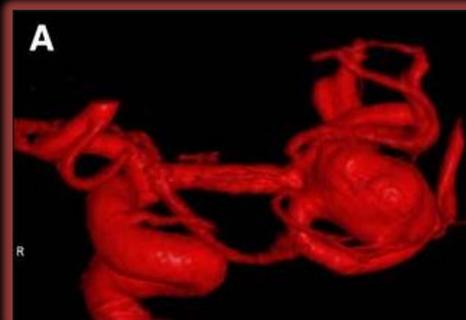
Leakage



Loss of pericytes

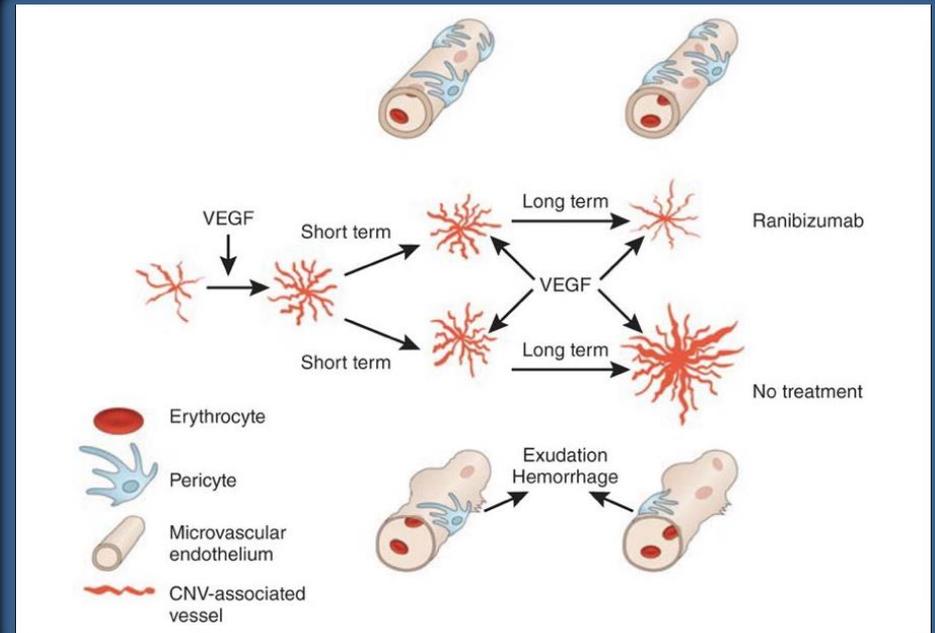
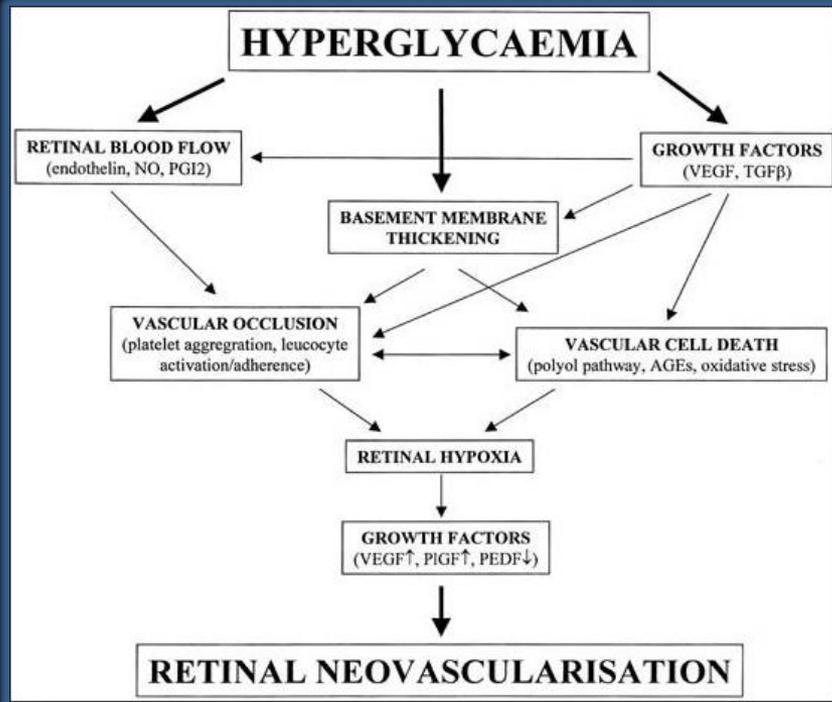


Hemorrhages

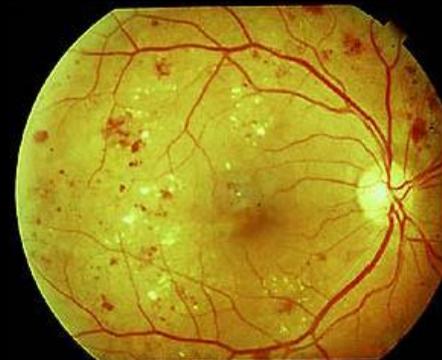


Tortuosity

Clinical treatment, anti-VEGF



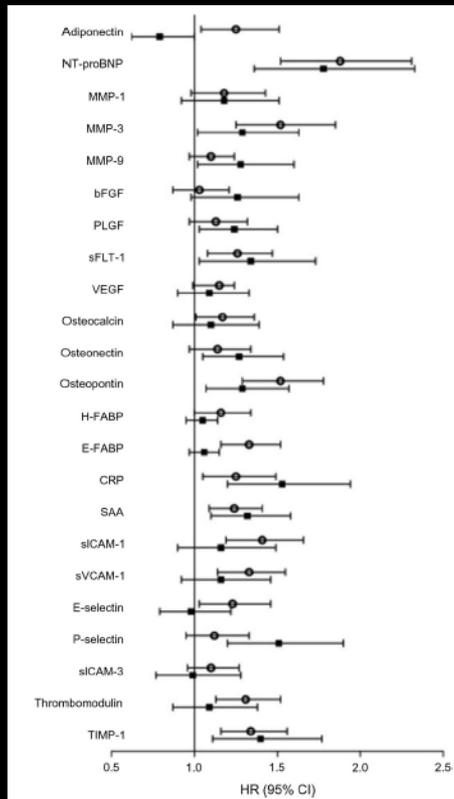
- Infective angiogenesis,
- Vessels are tortuous, dilated, poorly perfused
- Poor pericyte coverage
- Hemorrhagic
- Tissular hypoxia



REVIEW

Biomarkers of cardiovascular disease: contributions to risk prediction in individuals with diabetes

Katherine N. Bachmann^{1,2} · Thomas J. Wang^{1,3}



At present, certain biomarkers and biomarker combinations can lead to modest improvements in the prediction of cardiovascular disease in diabetes beyond traditional cardiovascular risk factors. Emerging technologies

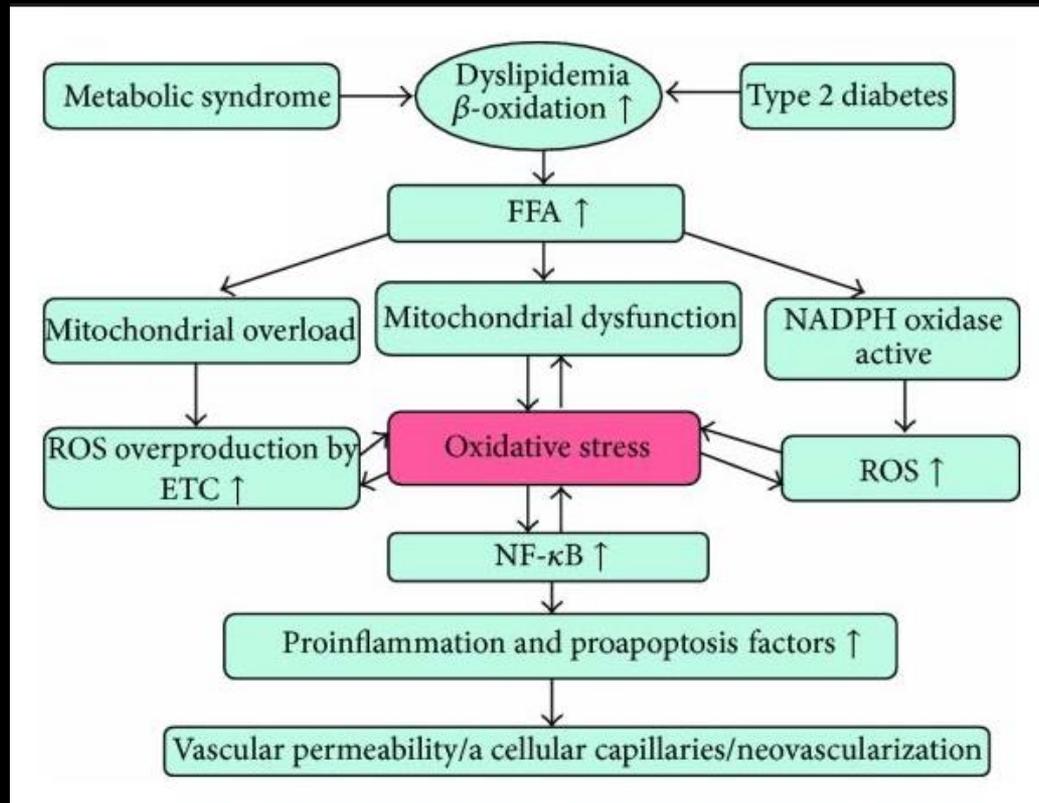
Review

Mitochondrial dysfunction and complications associated with diabetes [☆]



Rachel Blake, Ian A. Trounce ^{*}

Centre for Eye Research Australia, University of Melbourne, Department of Ophthalmology, Royal Victorian Eye and Ear Hospital, 32 Gisborne Street East, Melbourne, Victoria 3002, Australia
University of Melbourne Department of Medicine, St. Vincent's Hospital, Fitzroy, Melbourne, Victoria 3065, Australia



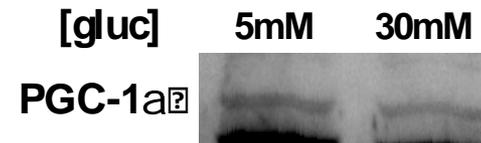
Hyperglycemia Increases mitochondrial ROS production



letters to nature

Normalizing mitochondrial superoxide production blocks three pathways of hyperglycaemic damage

Takeshi Nishikawa[†], Diane Edelstein^{*}, Xue Liang Du^{*}, Sho-ichi Yamagishi^{*}, Takeshi Matsumura^{*}, Yasufumi Kaneda[‡], Mark A. Yorek[§], David Beebe^{||}, Peter J. Oates^{||}, Hans-Peter Hammes[¶], Ida Giardino^{*} & Michael Brownlee^{*}



I. Valle *et al.*, *CvR*, 2005

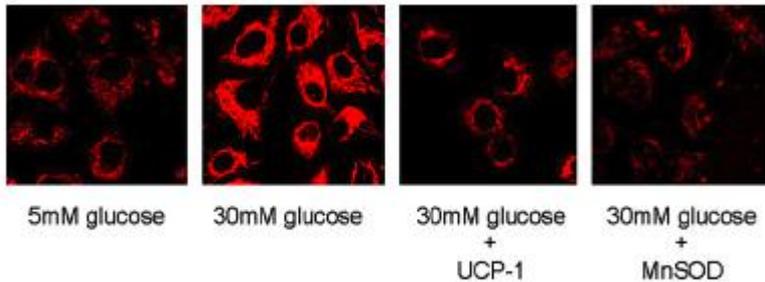
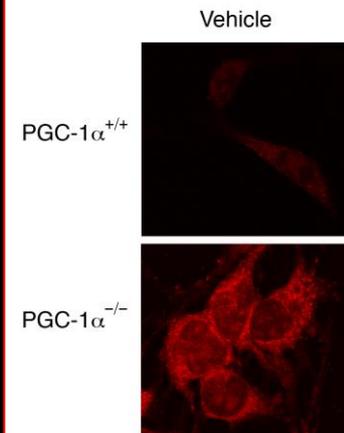


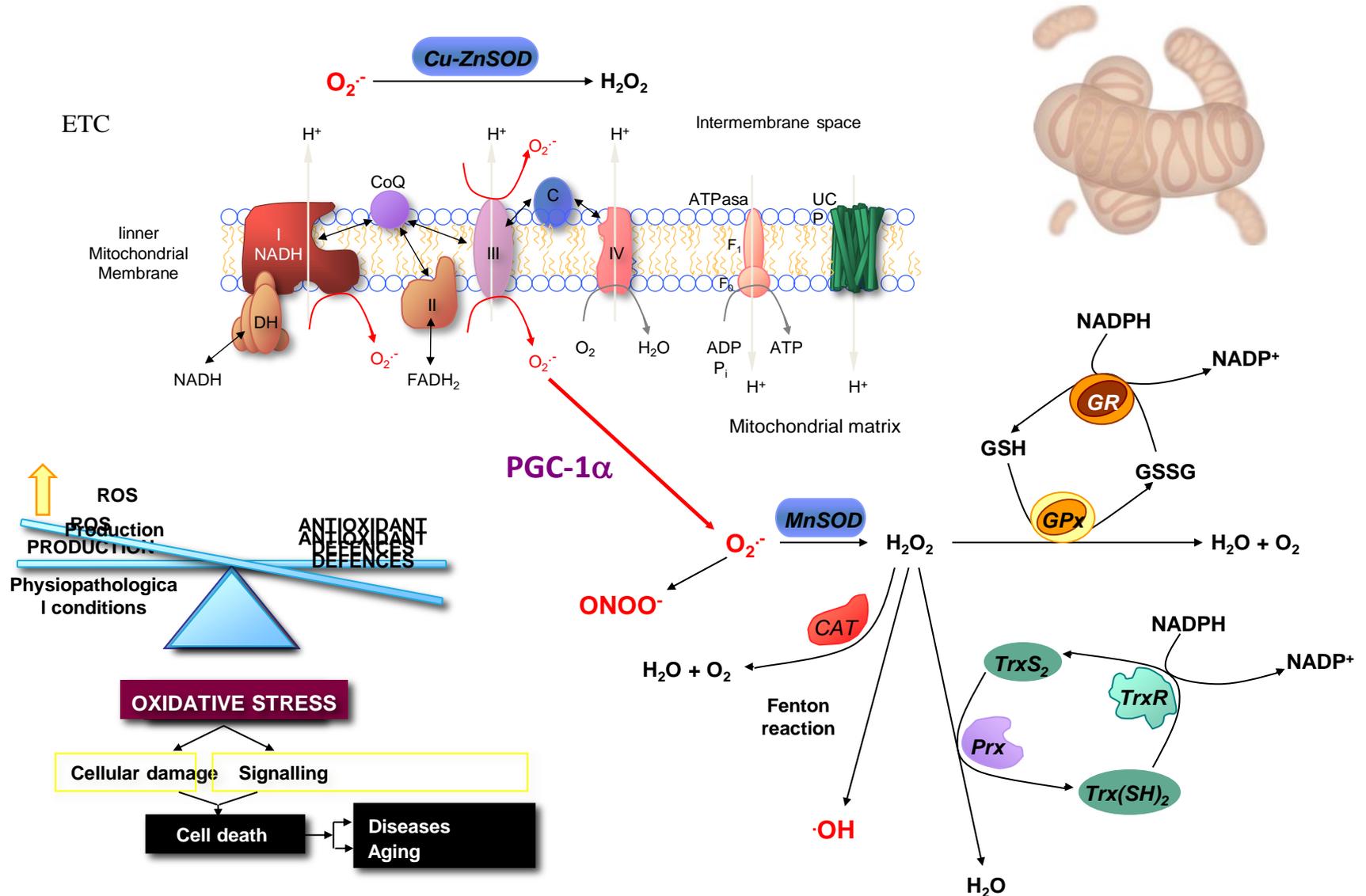
Fig. 2. Effect of hyperglycemia on mitochondrial reactive oxygen species production.

MitoSox



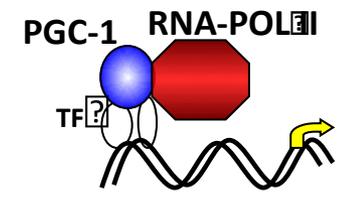
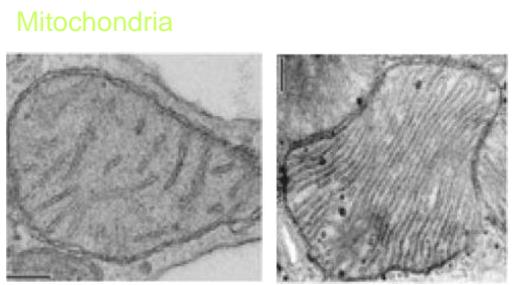
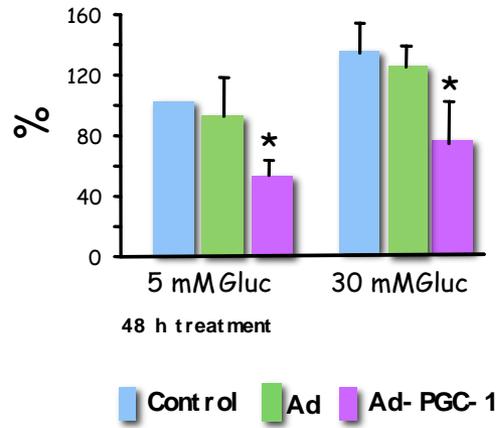
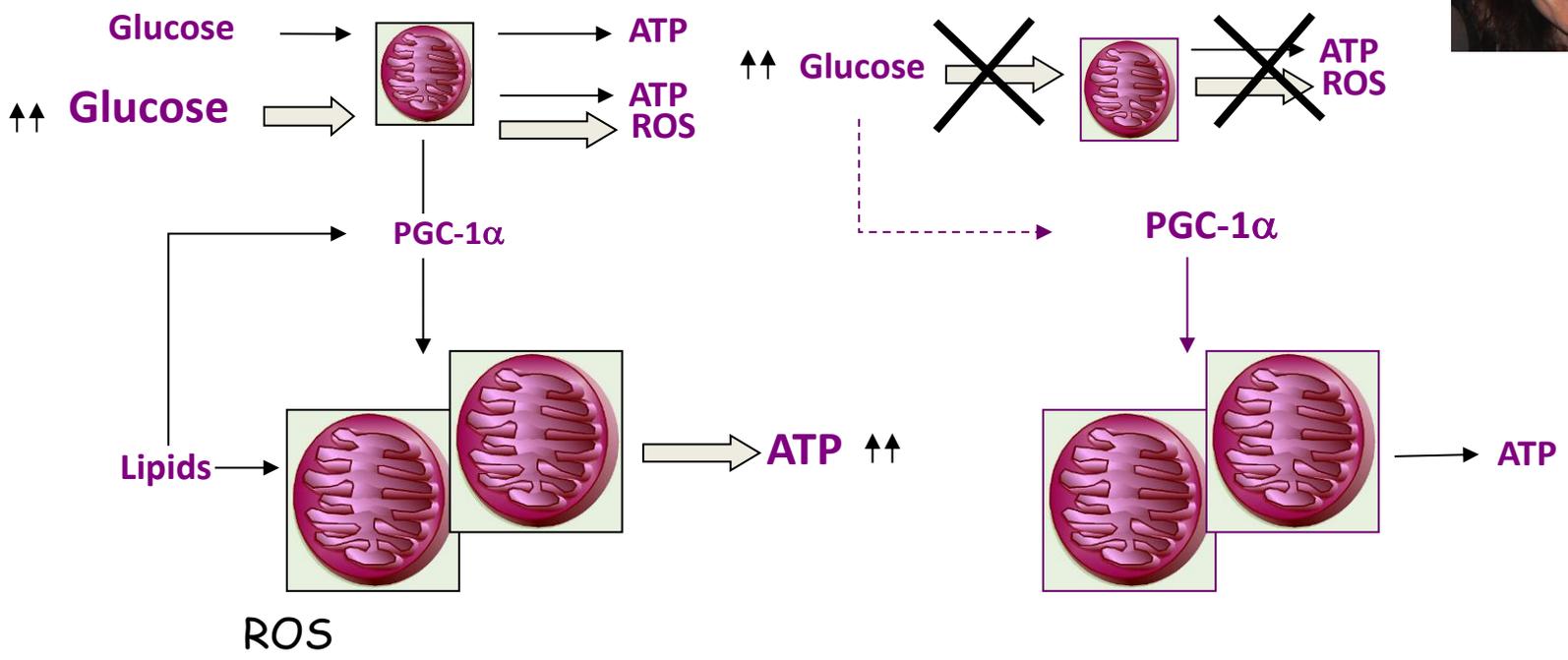
S. Borniquel *et al.*, *MCB*, 2010

Mitochondria, una fuente de ROS





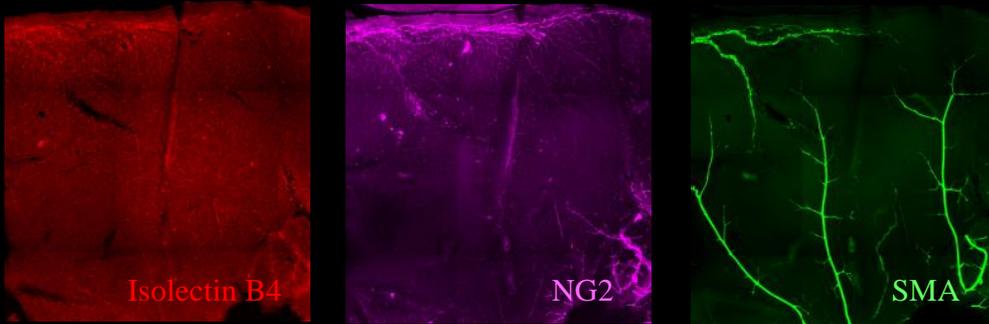
PGC-1 α , a modulator of mitochondrial ROS



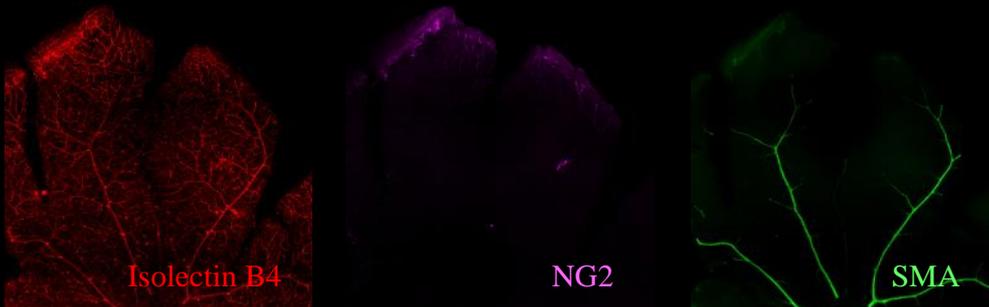
Perdida de recubrimiento pericitico y baja perfusion en ausencia de PGC-1 α



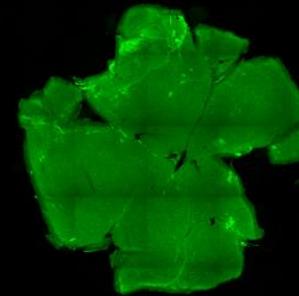
PGC-1 α ^{+/+}



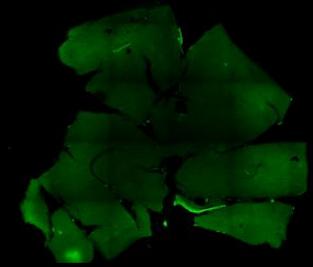
PGC-1 α ^{-/-}



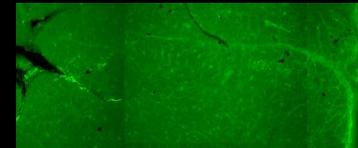
PGC-1 α ^{+/+}



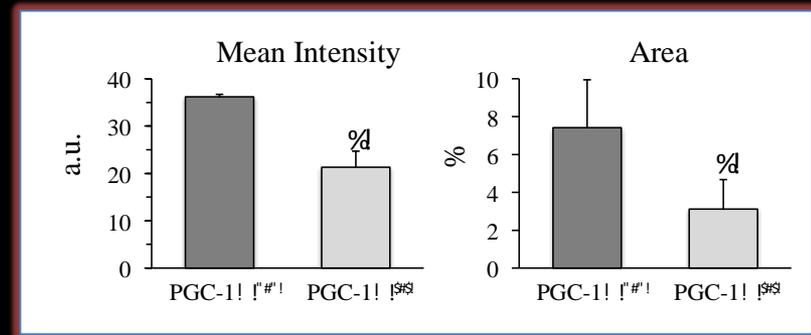
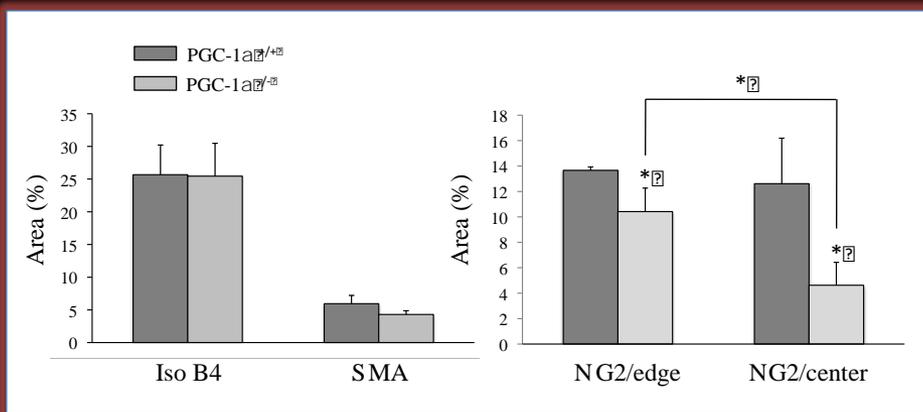
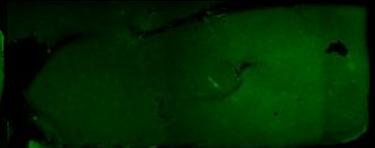
PGC-1 α ^{-/-}



PGC-1 α ^{+/+}



PGC-1 α ^{-/-}

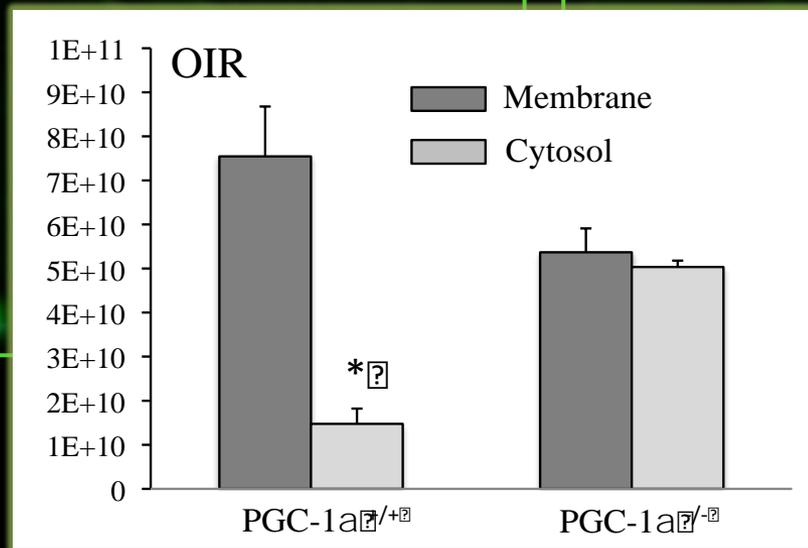
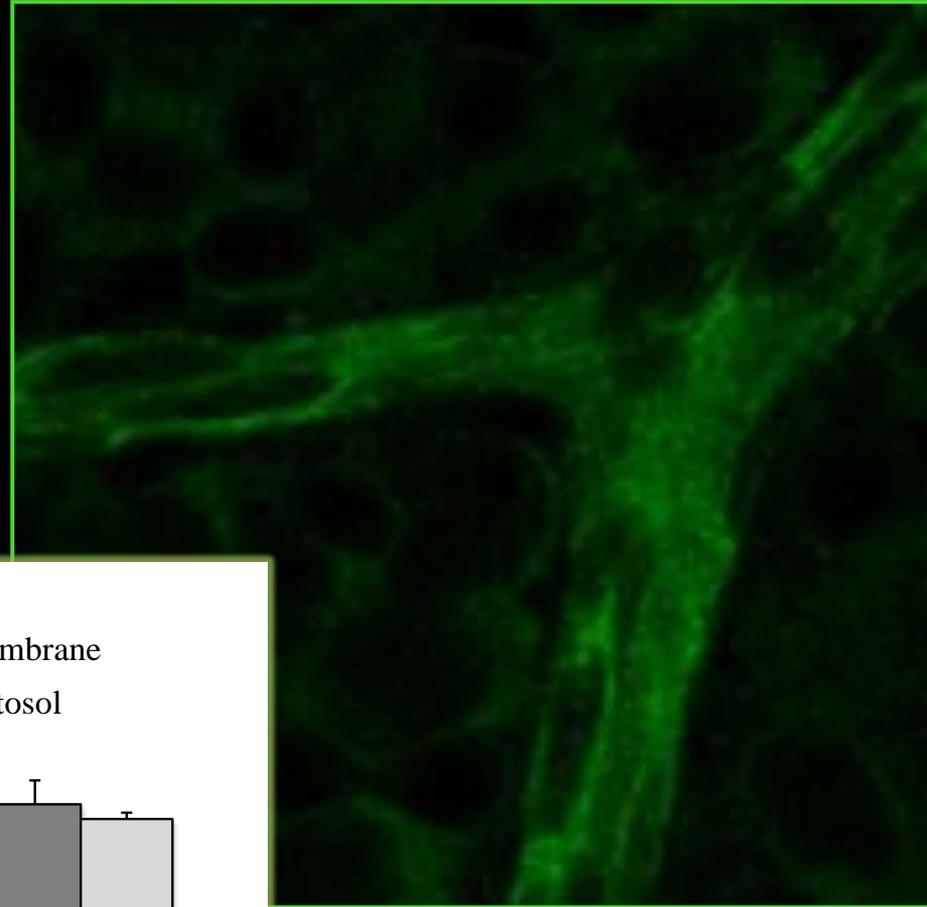
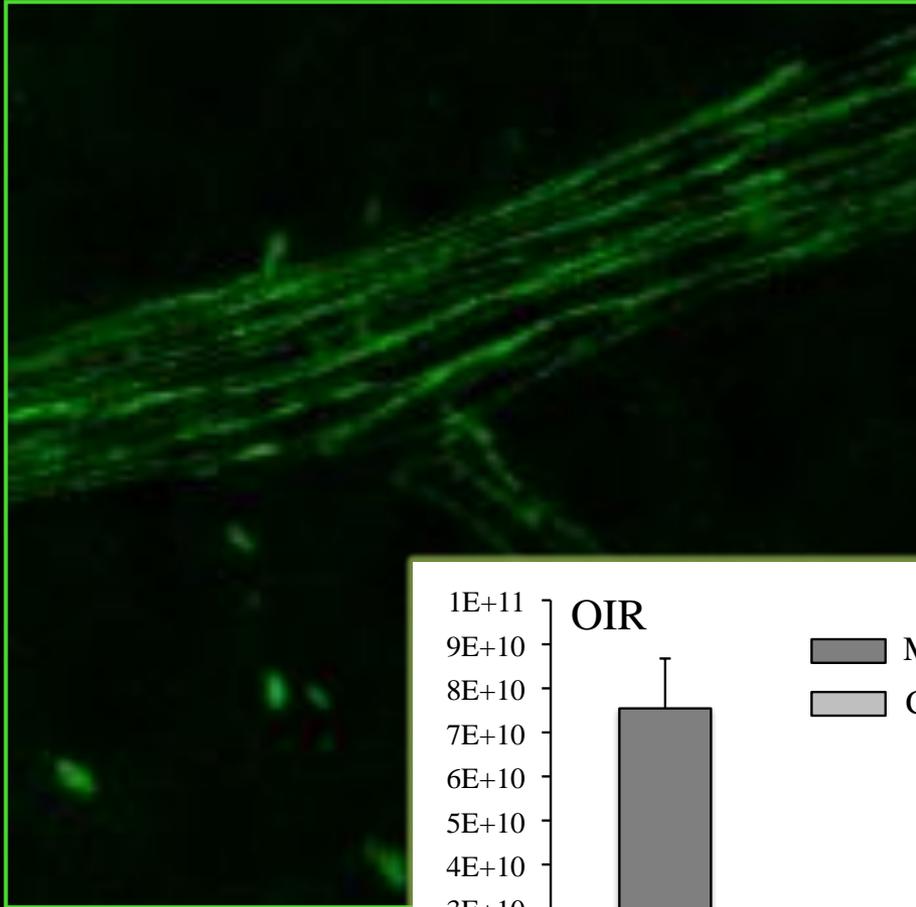


OIR induce la translocación de VE-Cadherin al citosol en ausencia de PGC-1 α



PGC-1 α ^{+/+}

PGC-1 α ^{-/-}

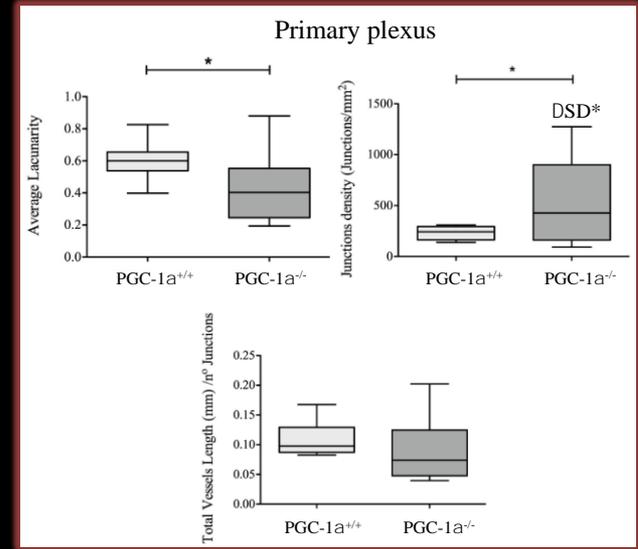
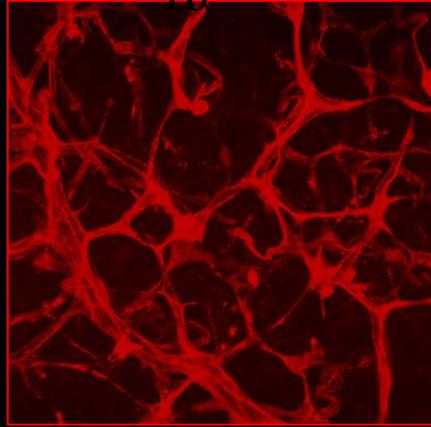
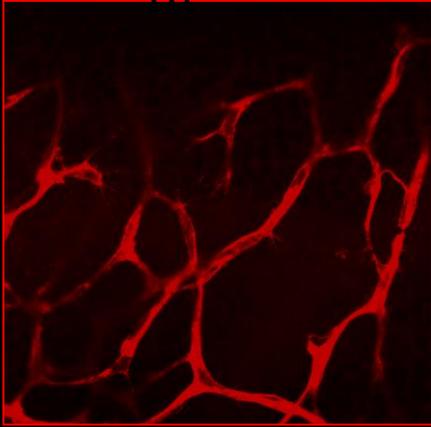


Torduosidad y hemorragias en ausencia de PGC-1 α



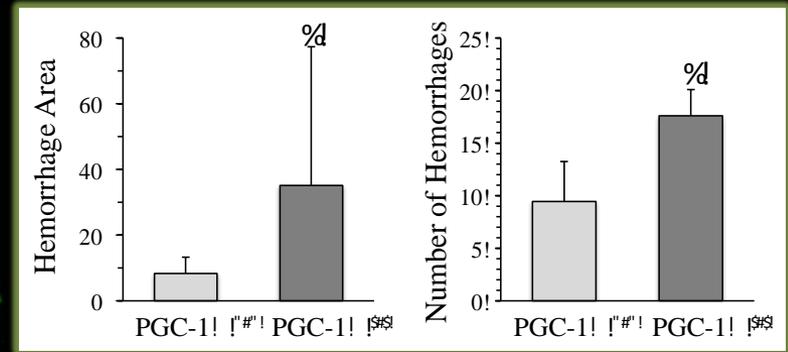
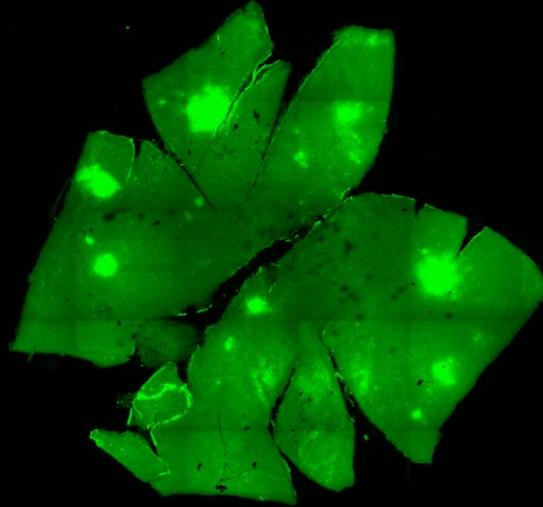
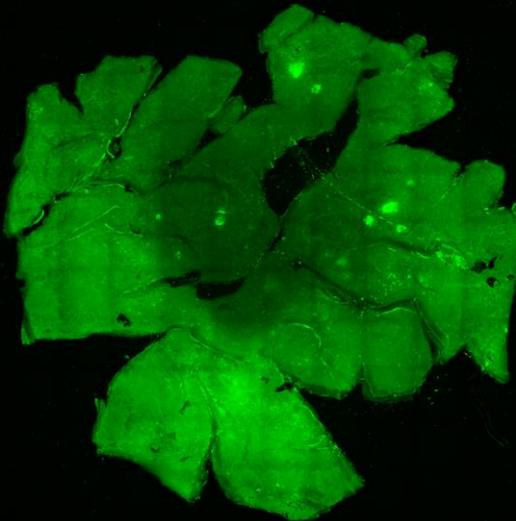
PGC-1 $\alpha^{+/+}$

PGC-1 $\alpha^{-/-}$

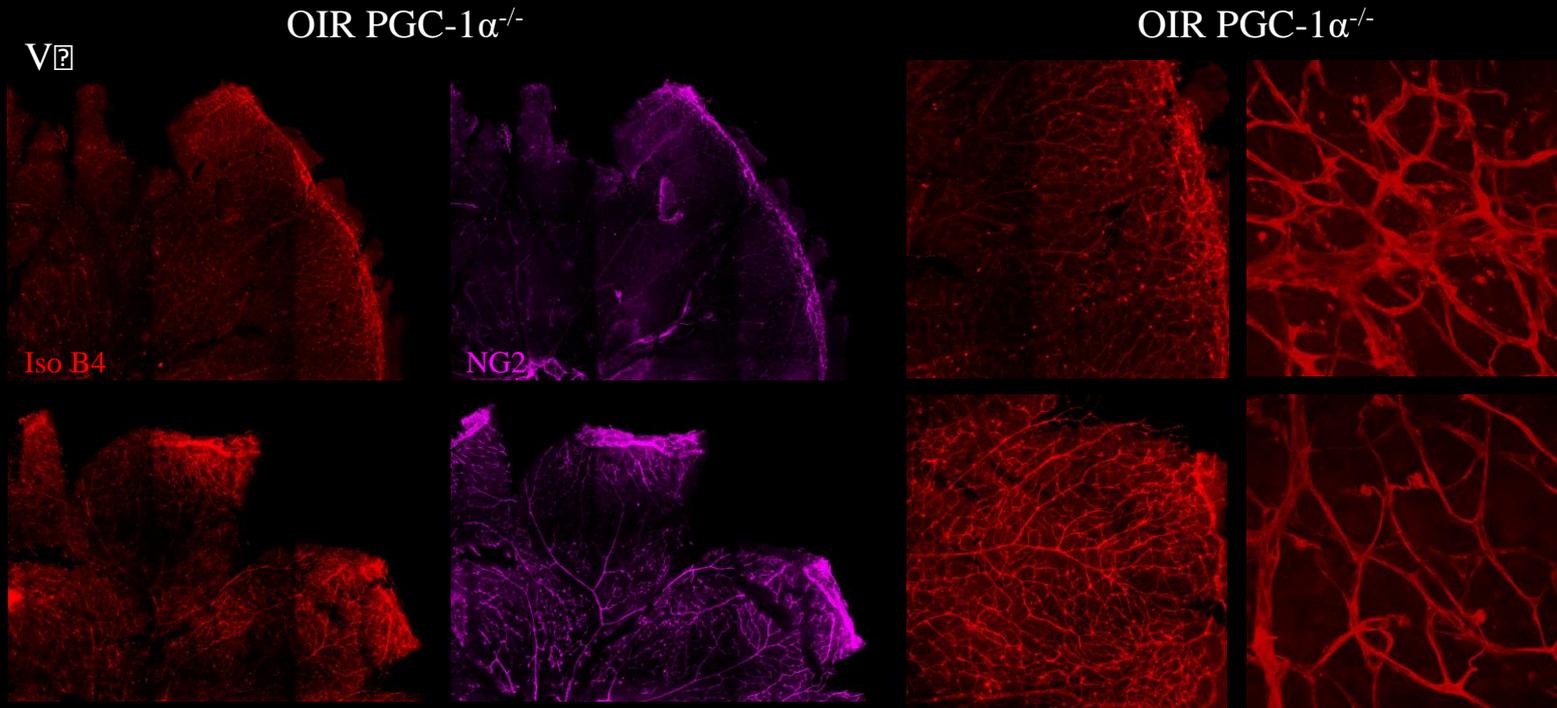


PGC-1 $\alpha^{+/+}$

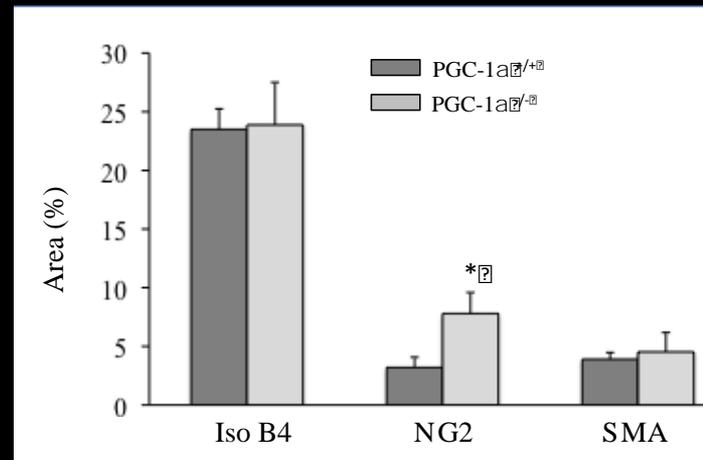
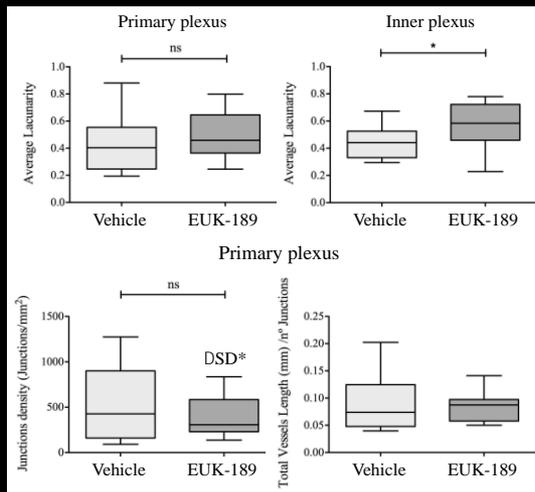
PGC-1 $\alpha^{-/-}$



Antioxidant treatment improves vascular stability



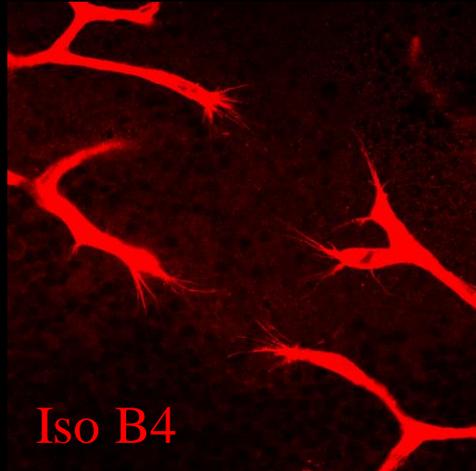
EUK-189



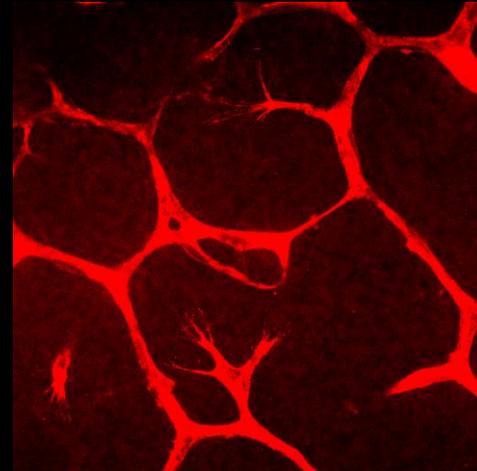
El tratamiento con antioxidantes no recupera la polaridad de las células tip



PGC-1 $\alpha^{+/+}$



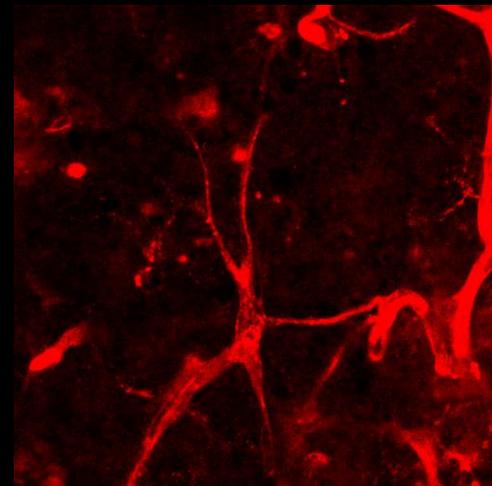
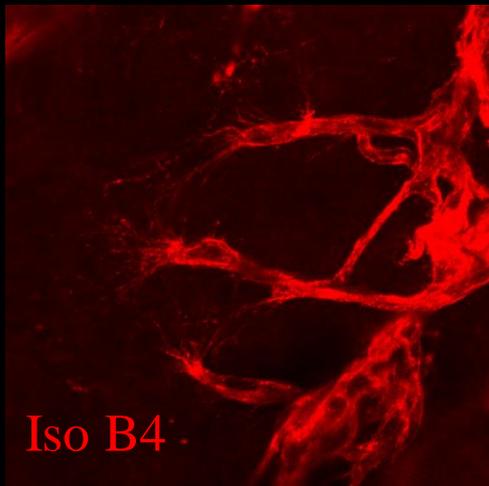
PGC-1 $\alpha^{-/-}$



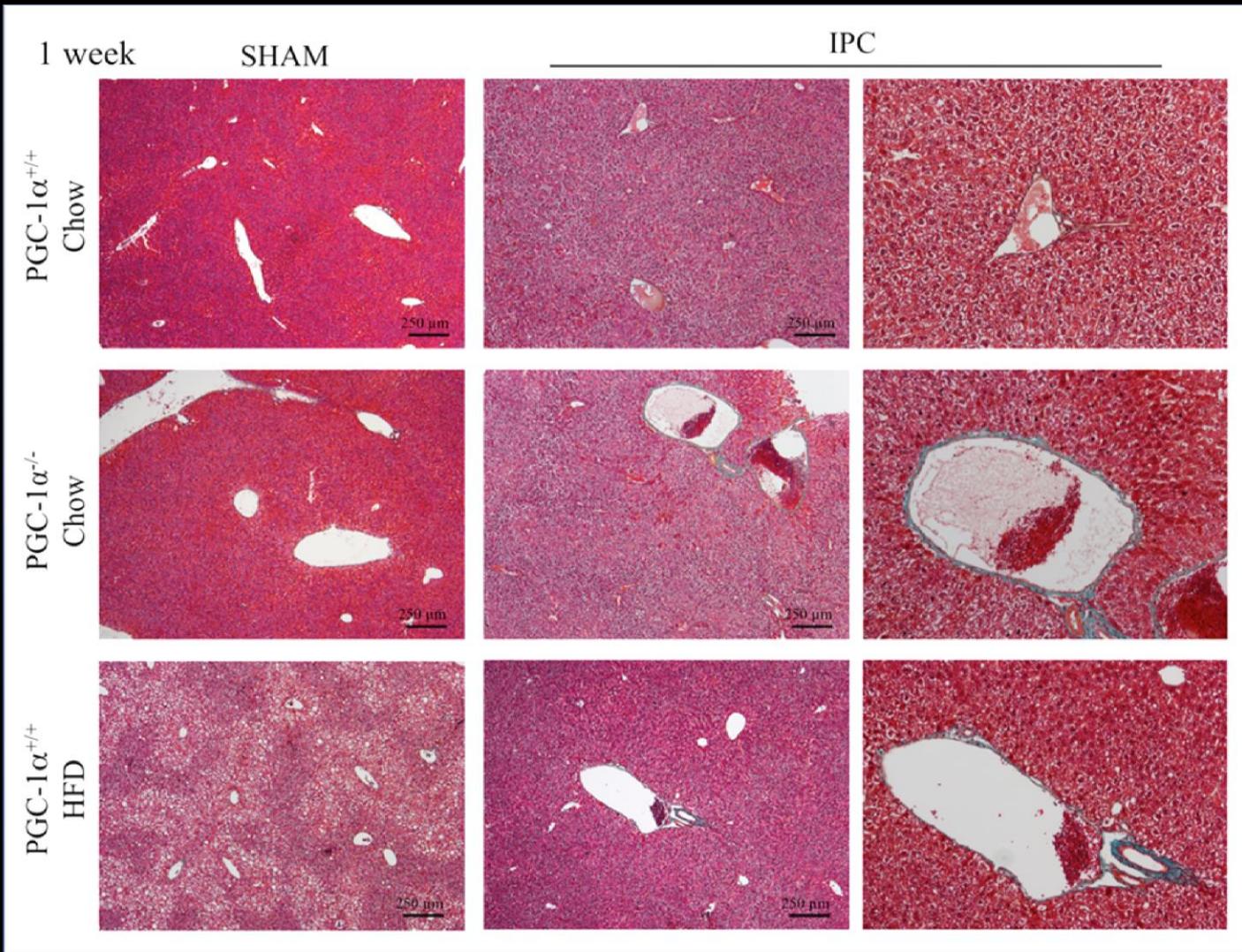
V

PGC-1 $\alpha^{-/-}$

EUK-189



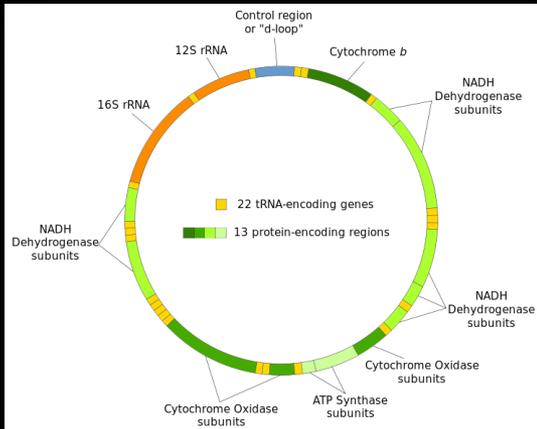
IPC induces perivascular fibrosis in the absence of PGC-1 α



MEMORY

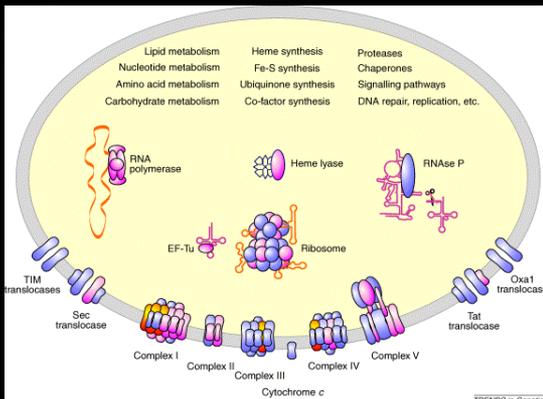
Prevalence of mitochondrial dysfunction in T2D

-The mtDNA



Accumulation of 8-Hydroxy-2'-Deoxyguanosine and Mitochondrial DNA Deletion in Kidney of Diabetic Rats

Maiko Kakimoto, Toyoshi Inoguchi, Toshiyo Sonta, Hai Yan Yu, Minako Imamura, Takashi Etoh, Toshihiko Hashimoto, and Hajime Nawata



Retinal Cell Biology

Retinal Mitochondrial DNA Mismatch Repair in the Development of Diabetic Retinopathy, and Its Continued Progression After Termination of Hyperglycemia

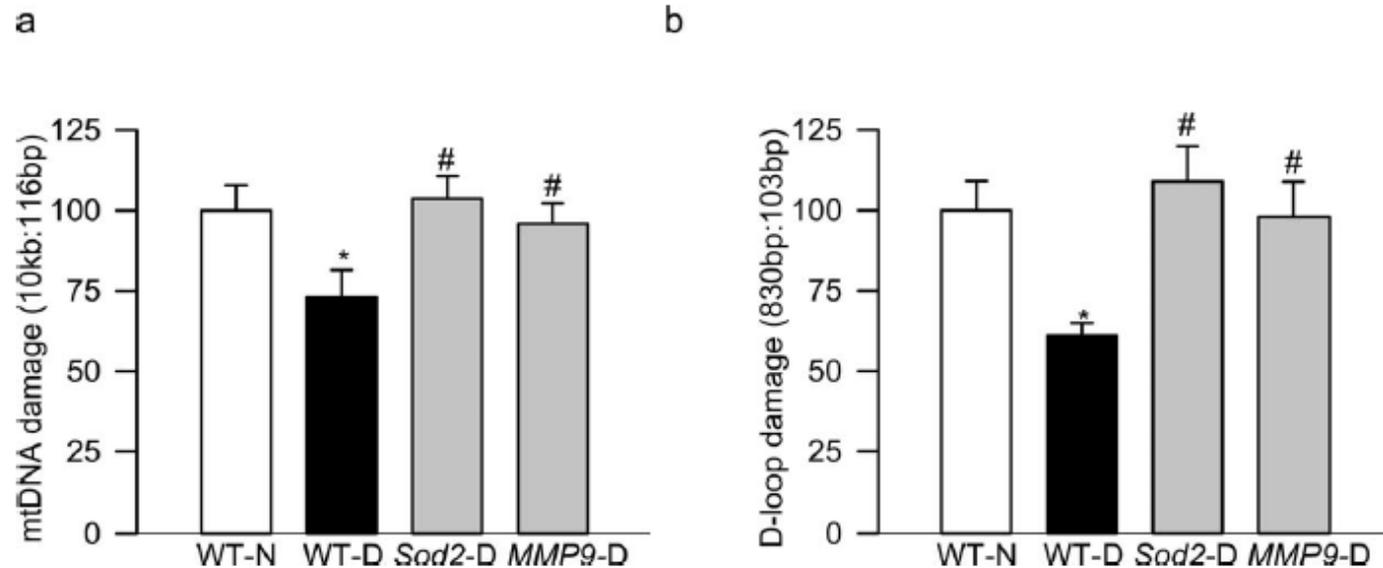
Manish Mishra and Renu A. Kowluru

Peripheral Blood Mitochondrial DNA Damage as a Potential Noninvasive Biomarker of Diabetic Retinopathy

Manish Mishra,¹ John Lillis,¹ Berhane Seyoum,² and Renu A. Kowluru^{1,2}

¹Department of Ophthalmology, Wayne State University, Detroit, Michigan, United States

²Department of Endocrinology, Wayne State University, Detroit, Michigan, United States



¿Quiénes somos?

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Miriam Granado (UAM)

