



LOTTA ALLO STRESS OSSIDATIVO: NUTRACEUTICA E NANOTECNOLOGIA

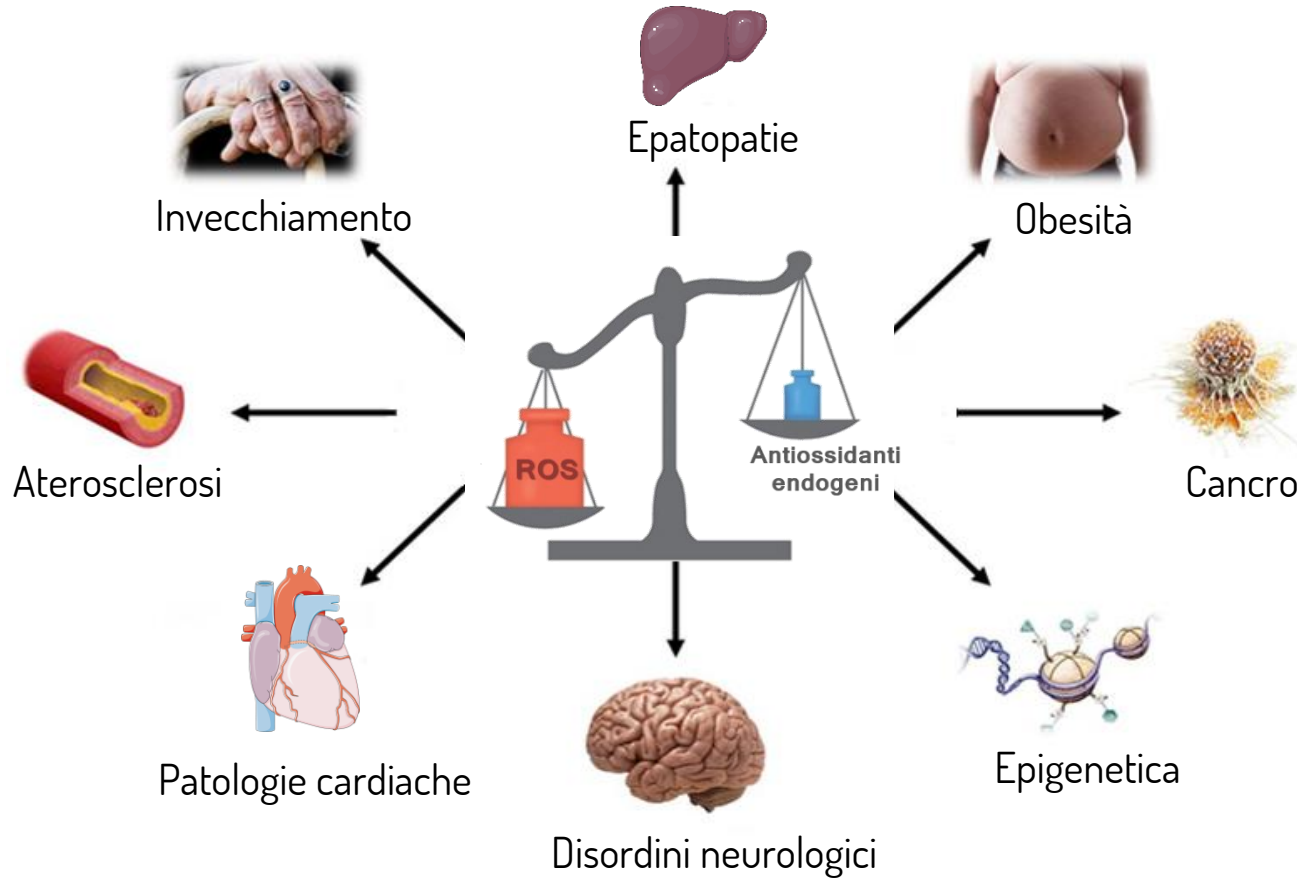
Serena Del Turco

Cause di Stress Ossidativo

Squilibrio tra specie ossidanti (ROS) e antiossidanti endogeni



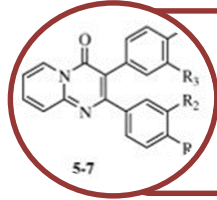
Stress Ossidativo e Insorgenza di Malattia



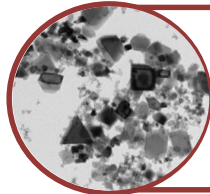
Lotta allo stress ossidativo: approcci naturali, chimici e nanotecnologici



Nutraceutici



**Molecole di nuova
sintesi**



**Nanoparticelle
antiossidanti**

Nutraceutici

«...composti attivi naturali che hanno una funzione benefica sulla salute umana, inclusi il trattamento e la prevenzione di una malattia»

Antiossidanti Naturali

Acidi fenolici

Riducono danno miocardico
Azione anti-ossidante &
anti-infiammatoria



RESVERATROLO



CURCUMA

Flavonoidi

Azione anti-ipertensiva, anti-ossidante
anti-infiammatoria e antitumorale



QUERCETINA



APIGENINA



GENISTEINA



Pre-Probiotici

OMEGA-3

Effetto antiipertensivo,
anti-ossidante, anti-infiammatorio
antitrombotico



Fitosteroli

Riducono l'assorbimento
del colesterolo



Vitamine



Nutraceutici

Antiossidanti Naturali: il contributo IFC alla Ricerca

The omega-3 fatty acid docosahexaenoate attenuates endothelial cyclooxygenase-2 induction through both NADP(H) oxidase and PKC ϵ inhibition

**Omega-3 e attività antiossidante,
anti-infiammatoria e antitrombotica**

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Endothelium and Vascular Development

Parallel decrease of tissue factor surface expression and of tissue factor microparticle release by docosahexaenoate in endothelial cells

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¹C.N.R. Institute of Clinical Physiology, Pisa, ²Institute of Pathology, the University of Milan, Milan, and ⁴Chair of Cardiology and Center of Excellence on Aging, G. d'Annunzio University, Chieti, Italy

Haematol. 11545.

Original Article

Effect of the administration of n-3 polyunsaturated fatty acids on circulating levels of microparticles in patients with a previous myocardial infarction

Serena Del Turco,^{1,2} Giuseppina Basta,¹ Guido Lazzerini,¹ Monica Evangelista,¹ Giuseppe Rainaldi,¹ Piero Tanganelli,² Jeppe Hagstrup Christensen,³ Erik Berg Schmidt,⁴ and Raffaele De Caterina^{1,4}

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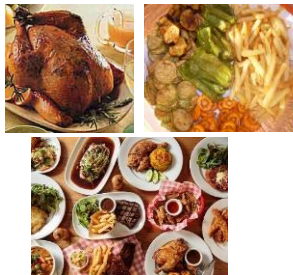
Stile dietetico, glicotossine (AGEs) e antiossidanti



Fonte endogena di AGEs

Alimentazione ricca in carboidrati aumenta la glicemia del sangue

Fonte esogena di AGEs



STRESS OSSIDATIVO

Maillard Reaction



Ageing



Diabetes



Obesity



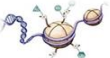
Atherosclerosis



Hypertension



Disorders of the central nervous system



Epigenetics



Cancer



Stile dietetico, glicotossine e antiossidanti: contributo IFC alla Ricerca

I polifenoli possono contrastare la formazione di sostanze glicotossiche

Current Drug Metabolism, 2016, 17, 000-000

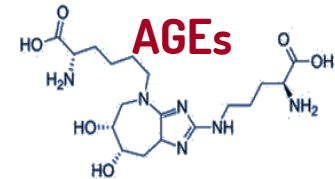
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Can Dietary Polyphenols Prevent the Formation of Toxic Compounds from Maillard Reaction?

Serena Del Turco and Giuseppina Basta*



Maillard Reaction



Radiazioni e prevenzione...in pillole

RiduROS e Radiazioni

Radiazioni
ionizzanti



- **Infiammazione**
- **Stress ossidativo**
- **Danno al DNA**

RiduROS:

- **Selenio**
- **Curcumina**
- **Resveratrolo**
- **Glutazione**



Hindawi
Oxidative Medicine and Cellular Longevity
Volume 2017, Article ID 9085947, 7 pages
<https://doi.org/10.1155/2017/9085947>



Research Article

A New Natural Antioxidant Mixture Protects against Oxidative and DNA Damage in Endothelial Cell Exposed to Low-Dose Irradiation

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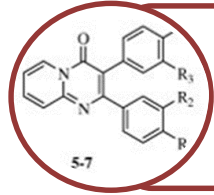
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Exposure to ionizing radiation during diagnostic procedures increases systemic oxidative stress and predisposes to higher risk of cancer and cardiovascular disease development. Many studies indicated that antioxidants protect against radiation-induced damage and have high efficacy and lack of toxicity in preventing radiation exposure damages. The purpose of this study was to investigate the *in vitro* protective effect of a new antioxidant mixture, named RiduROS, on oxidative stress generation and DNA double-strand breaks (DSBs) induced by low doses of X-rays in endothelial cells. Human umbilical vein endothelial cells (HUVEC) were treated with RiduROS mixture 24h before a single exposure to X-rays at an absorbed dose of 0.25 Gy. The production of reactive oxygen species (ROS) was evaluated by fluorescent dye staining and nitric oxide (NO) by the Griess reaction, and DSBs were evaluated as number of γ -H2AX foci. We demonstrated that antioxidant mixture reduced oxidative

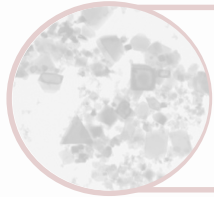
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Nutraceutici

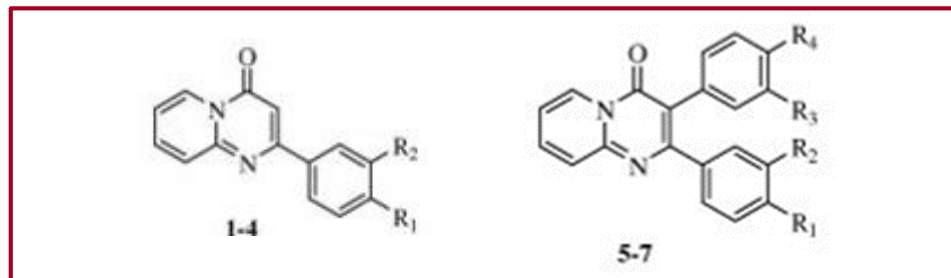
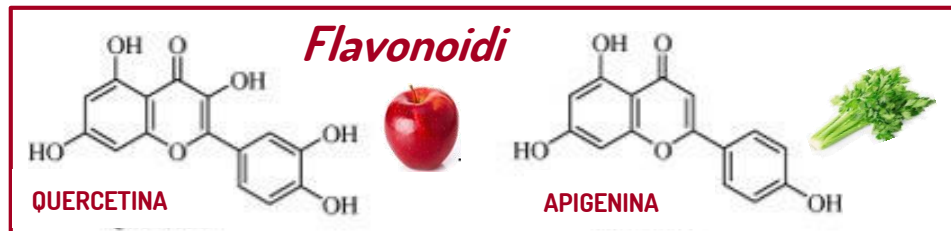


**Molecole di nuova
sintesi**



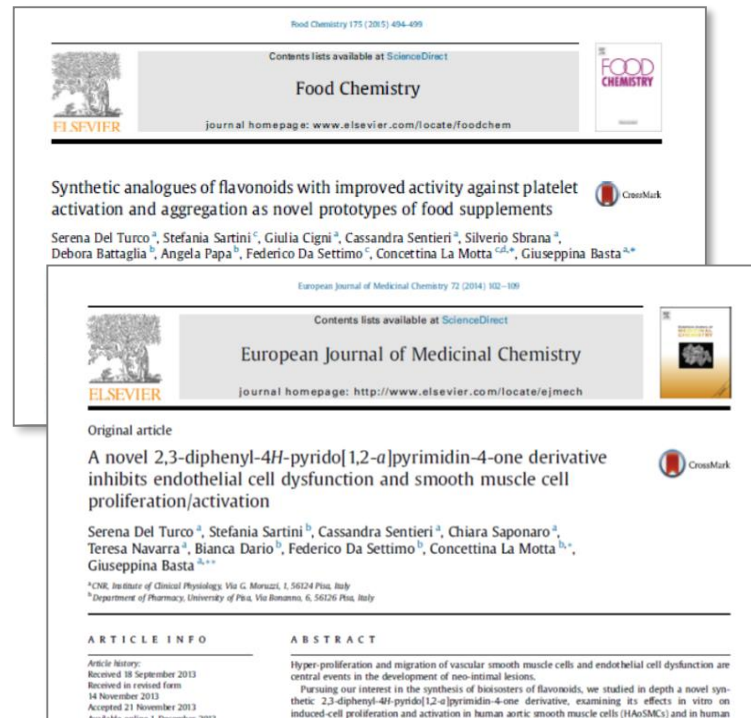
**Nanoparticelle
antiossidanti**

Molecole di nuova sintesi ispirate alla struttura dei flavonoidi



Ben tollerate, anche a tempi più lunghi d'incubazione

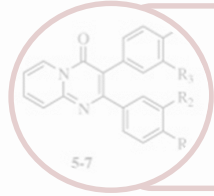
Effetto anti-ossidante e anti-infiammatorio **a concentrazioni più basse** rispetto a quelle dei flavonoidi



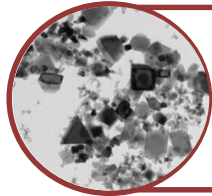
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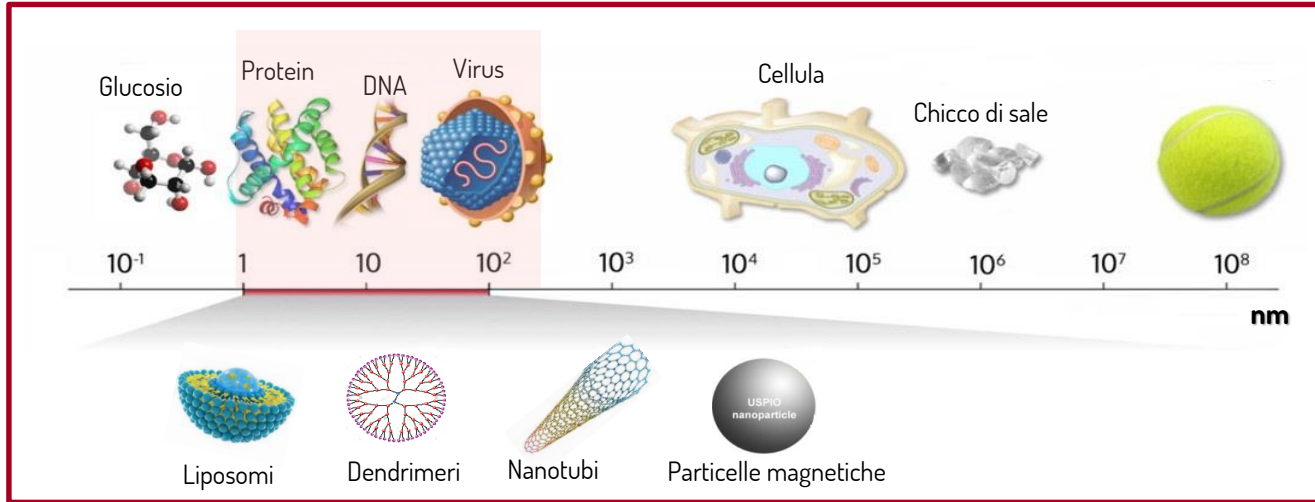


**Molecole di nuova
sintesi**



**Nanoparticelle
antiossidanti**

Nanoparticelle e attività antiossidante



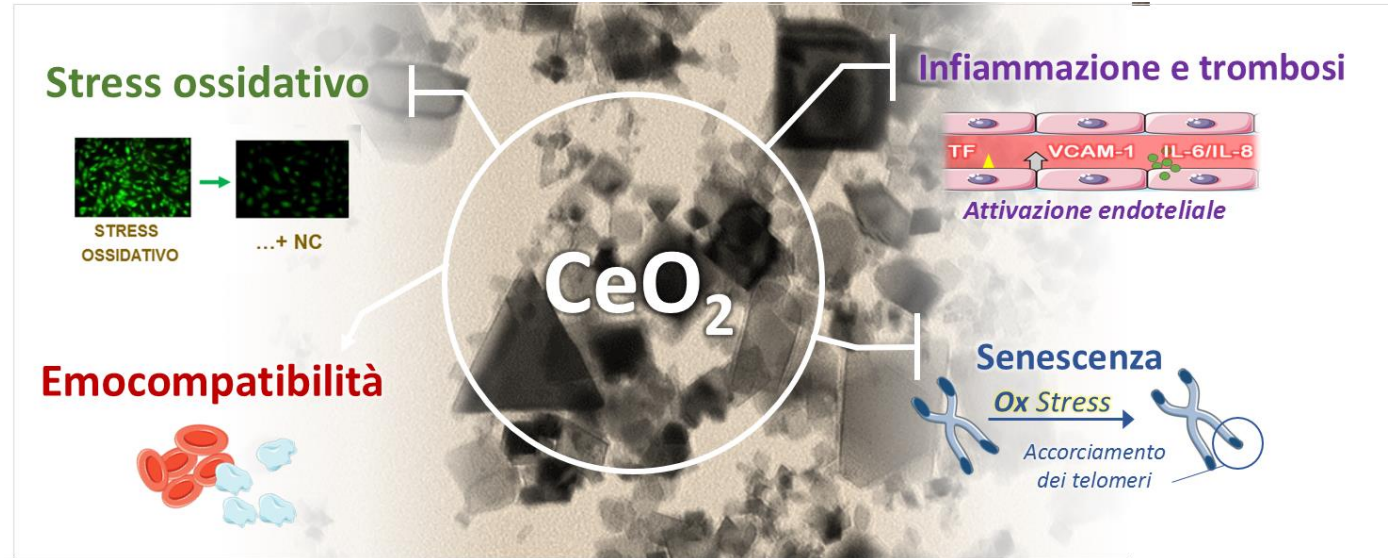
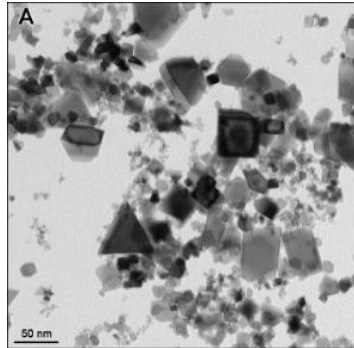
- Nanoparticelle *carrier* di antiossidanti
- Nanoparticelle con attività antiossidante intrinseca

Nanoparticelle e attività antiossidante:

Contributo di IFC alla Ricerca

Esperimenti *in vitro* hanno dimostrato che la nanoceria protegge l'endotelio dal danno indotto da stress ossidativo

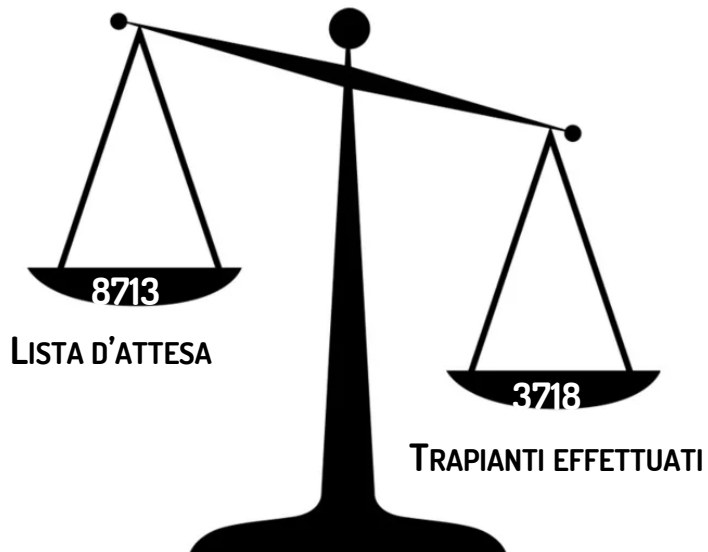
Nanoceria (CeO_2)



Del Turco S, et al. Effects of cerium oxide nanoparticles on hemostasis: coagulation, platelets and vascular endothelial cells *Journal of Biomedical Material Research A* 2019

Una nuova frontiera: Nanotecnologia e Trapianto di Fegato

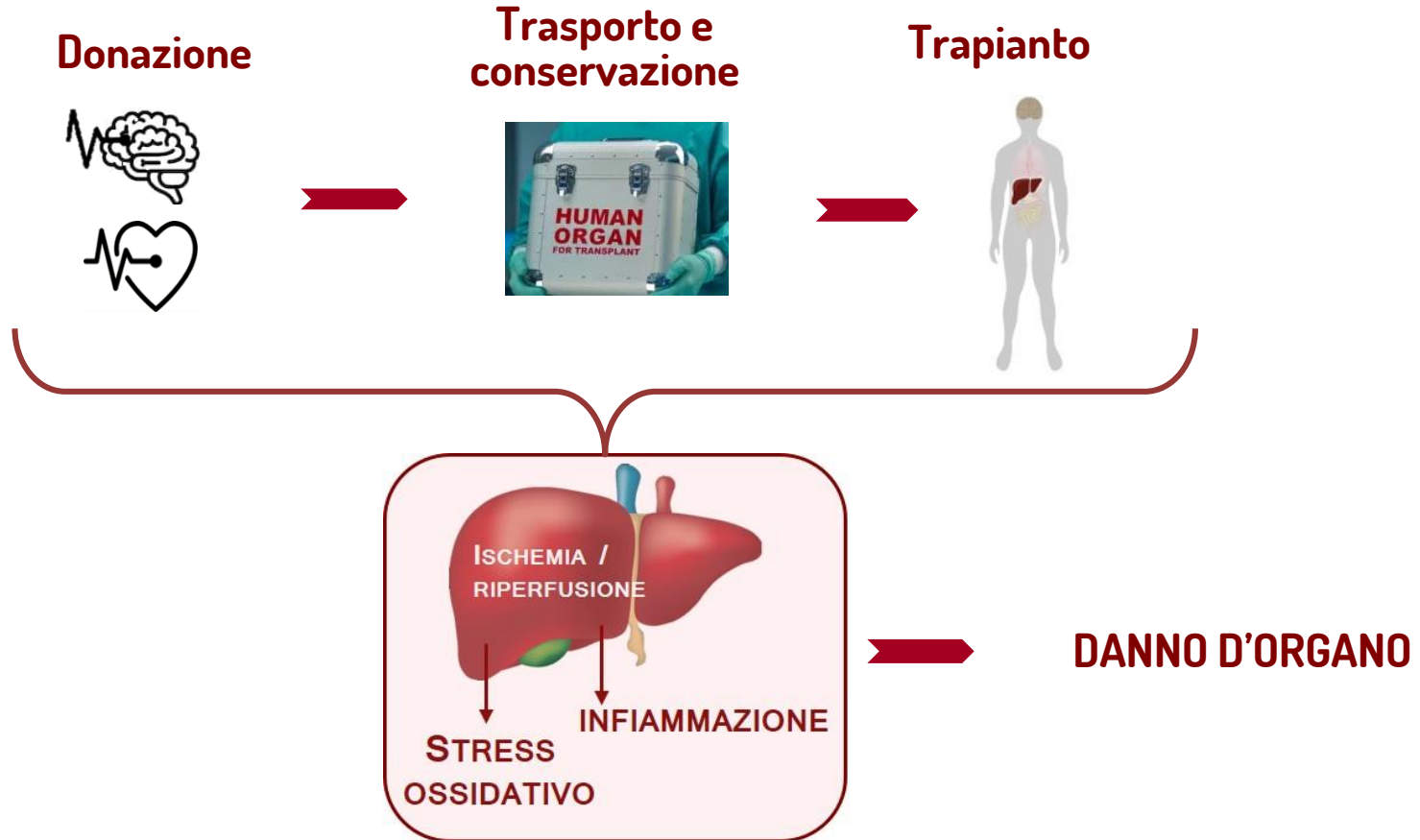
Il problema maggiore nel mondo dei trapianti è costituito dalla CARENZA DI DONATORI e dall'INSUFFICIENZA DI ORGANI disponibili rispetto al numero di potenziali riceventi



Recupero di organi marginali

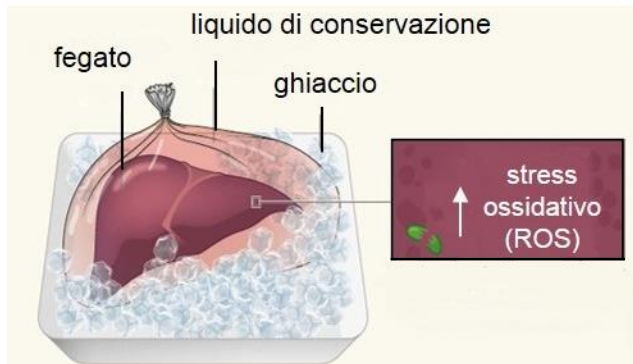
- ✓ deceduti per morte cardiaca
- ✓ anziani con comorbidità
- ✓ fegati steatosici

Il trapianto d'organo: danno ossidativo da I/R



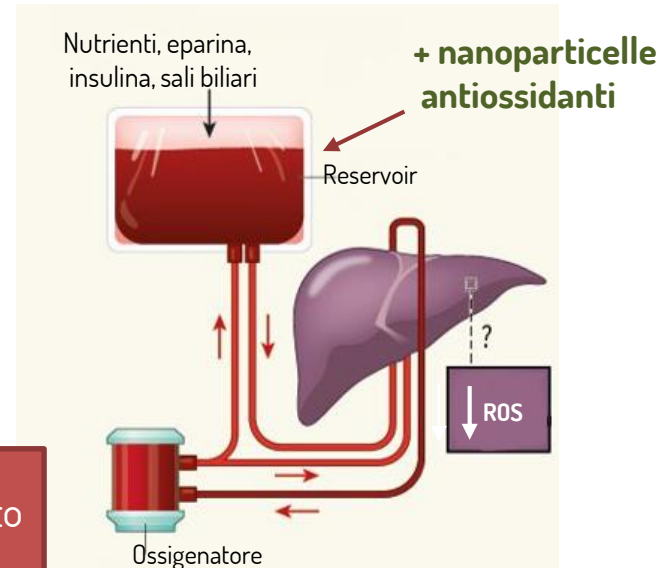
Perfusione normotermica e nanoparticelle

Conservazione statica



- ✓ incrementare il numero di organi destinati al trapianto
- ✓ migliorare l'*outcome* post-operatorio dei riceventi

Preservazione dinamica continua : macchina di perfusione



TEAM WORK - Laboratorio di Biologia Vascolare -



Giuseppina Basta



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Collaborazioni:

- ISTITUTO ITALIANO DI TECNOLOGIA



- DIPARTIMENTO DI FARMACIA
UNIVERSITÀ DI PISA

- UO CHIRURGA EPATICA E DEL
TRAPIANTO DI FEGATO

