



REDOX BIOLOGY IN HEALTH AND DISEASE

Proposal for a Blended Intensive Program (Erasmus +)



R. Gerschman: A personal remembrance

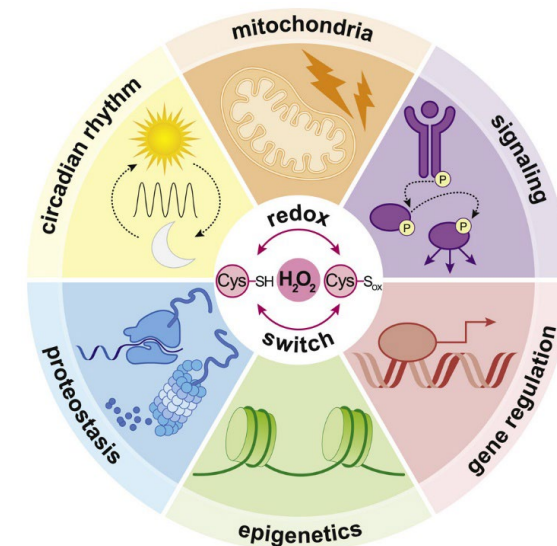
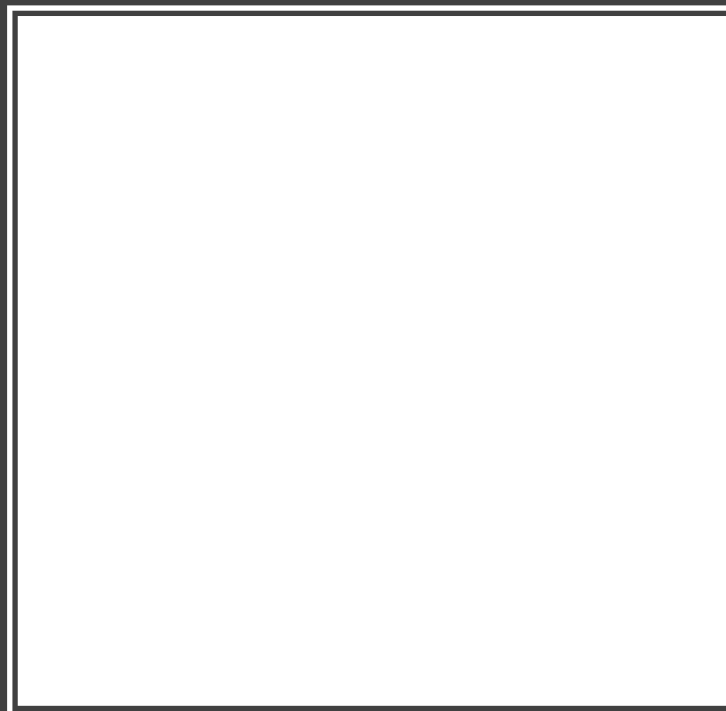
Reprinted from *SCIENCE*, May 7, 1954, Vol. 119, No. 3097, pages 623–626.

Oxygen Poisoning and X-irradiation: A Mechanism in Common¹

Rebeca Gerschman, Daniel L. Gilbert, Sylvanus W. Nye, Peter Dwyer,
and Wallace O. Fenn²

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A CONSIDERATION of various isolated reports in the literature has led us to the hypothesis that oxygen poisoning and radiation injury have at least one common basis of action, possibly through the formation of oxidizing free radicals.



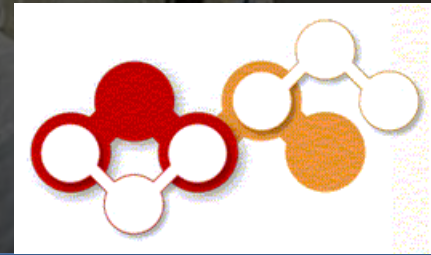
Claudia Lennicke and Helena M. Cochemé,
Molecular Cell, 2021

ROS: From a “Toxic” residue to a Redox Signaling role

Redox Research Areas



Adressed to: Master's/PhD students



El Màster de Fisiologia Integrativa ha recibid la
Mención distintiva
'International Master's Programme'
otorgada por la AGAUR - Generalitat de Catalunya

Global Learning Outcomes to Be Achieved

- Know the basics of redox chemistry and the physiological formation of reactive species of oxygen, nitrogen and sulphide.
- Know the redox signaling pathways involved in cellular homeostasis.
- Evaluate the role of redox imbalance in physiology and pathophysiology.
- Quantitatively analyze the effects of oxidative stress in biological samples.
- Develop the ability to analyze and to solve problems in oxidative stress models.



1. Introduction: overview of redox biology. Stress signaling, survival and resilience during the evolutionary development of life.
2. Redox chemistry based on sulphide, nitrogen and oxygen.
3. Formation of ROS in the body. Enzymatic production of superoxide, hydrogen peroxide, nitric oxide and derived species. redox interactome.
4. Effects of free radicals on biomolecules: lipoperoxidation. Protein oxidation. Oxidation of carbohydrates. DNA oxidation.
5. ROS scavenging: the Keap1-Nrf2 pathway. Enzymatic and non-enzymatic antioxidants. The glutathione system.
6. Oxidative stress in physiology. Nutrition and antioxidants. Aging and frailty. Redox signaling as a fundamental control for adaptations to the physiology of physical exercise.
7. Redox imbalance and oxidative damage in pathological processes: Metabolic diseases. Atherosclerosis Neurodegenerative diseases. cancer
8. Methodologies for the analysis of markers of oxidative stress, oxidants and antioxidants.

On-Line learning

- Lectures of experts in the field, which can be in synchronous or asynchronous mode
- Individual work: Reading, preparation of articles
- Collaborative work groups: Analysis and discussion of the readings. Data analysis. Preparation of an oral communication or a poster to be presented at the evaluation symposium. Online and synchronous



Face to face learning

- Laboratory training program (5 days). Methodologies for the analysis of biomarkers of oxidative stress, oxidants and antioxidants
- Preferably in the middle or at the end of the term



Assessment

Presentation of an oral communication or a poster in a virtual symposium at the end of the year



Online test-type assessment using a Moodle-type platform

Question 2
Not answered
Marked out of 1.00
[Flag question](#)
[Edit question](#)

Las especies más longevas presentan:

Select one:

- ☐ a. Menor insaturación de los ácidos grasos de sus membranas celulares
- ☐ b. Mitocondrias más eficientes en la cadena respiratoria, y consecuentemente menor producción de radical superóxido
- ☐ c. Niveles elevados de antioxidantes celulares
- ☐ d. Enzimas antioxidantes más eficientes en el citoplasma celular

La teva resposta és incorrecta.

The correct answer is: Menor insaturación de los ácidos grasos de sus membranas celulares

[Make comment or override mark](#)

Response history

Step	Time	Action	State	Marks
1	5/02/21, 19:17	Started	Not yet answered	
2	5/02/21, 19:52	Attempt finished UB Admin	Not answered	



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- Schedule

January to May 2025

Face to face classes: March 2025

- Proposal for academic recognition

3 ECTS credits

We are currently teaching two subjects that cover a similar curriculum in the Master's in Integrative Physiology