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Special Issue Reprint

Oxidative Stress Induced by Air Pollution, 2nd Edition

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This reprint conceptualizes oxidative stress as a unifying molecular axis through which environmental exposure reprograms biological systems. Rather than focusing exclusively on exposure intensity, this framework underscores that the chemical composition and oxidative potential of particulate matter and related atmospheric factors critically shape cellular and systemic responses. Environmental stimuli are thus interpreted as bioactive signals that modulate redox homeostasis, innate immune activation, and tissue integrity.

At the organismal level, oxidative stress functions as a central integrator linking epithelial injury, inflammatory signaling, and barrier dysfunction. Perturbation of mucosal interfaces facilitates the systemic dissemination of inflammatory mediators, extending local insults to distant organs and reinforcing self-propagating redox–inflammatory circuits. This amplification underlies the transition from localized exposure effects to chronic disease susceptibility. By assembling contributions spanning mechanistic redox biology, immune regulation, barrier integrity, and host-directed intervention strategies, this reprint provides an integrated perspective on how environmental information is molecularly encoded and biologically executed. Collectively, the articles position oxidative stress as a central organizing principle connecting environmental chemistry with cellular decision-making and systemic pathology.

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