

From Nano therapy to Thermal Conditioning: Novel Approaches to Blunt Air Pollution–Induced Arrhythmias

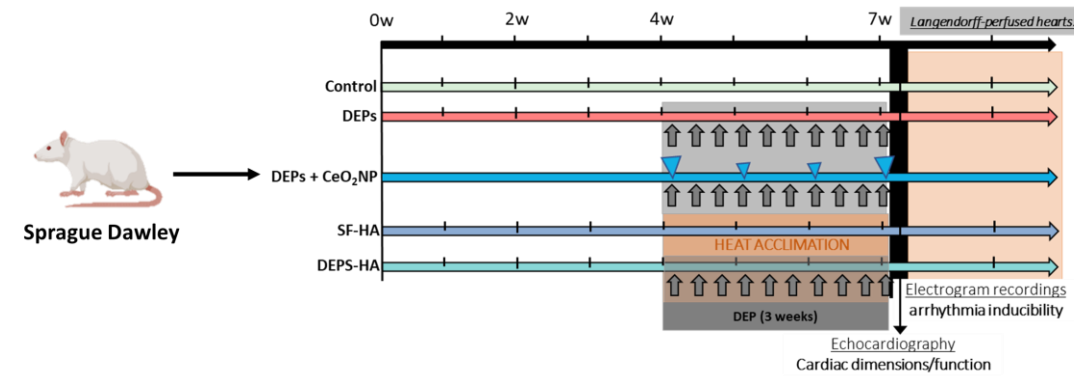
Freddy G. Ganse, Cristina Rodríguez, Lena M. Ernst, Marisol Ruiz-Meana, Javier Inserte, José Martínez-González, Begoña Benito, Víctor Puentes, Ignacio Ferreira-González, Antonio Rodríguez-Sinovas.



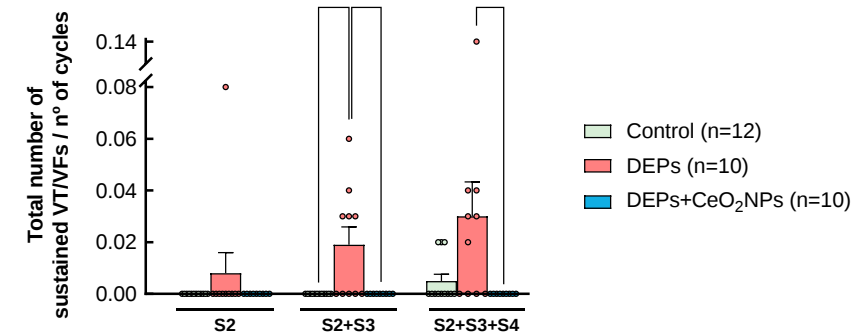
↑ Ventricular tachyarrhythmias

- Oxidative stress
- Inflammation
- Fibrosis
- ECG alterations/
alteration in heart
polarization

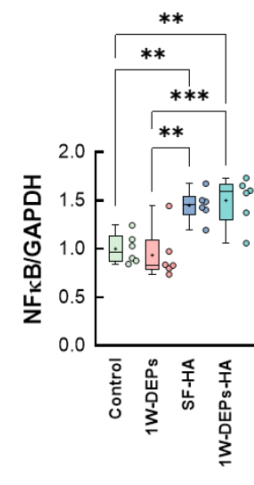
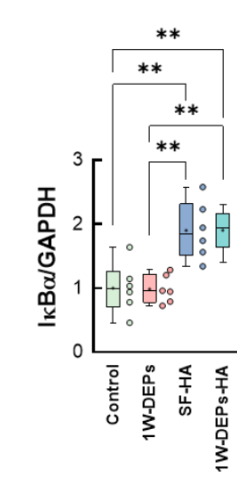
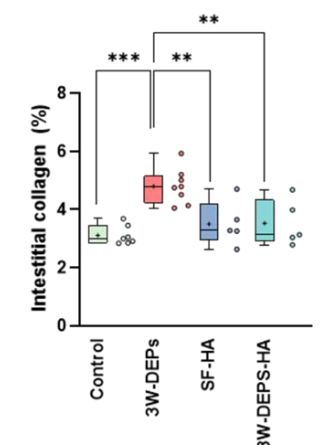
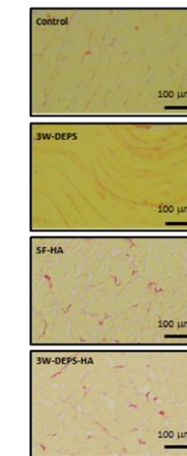
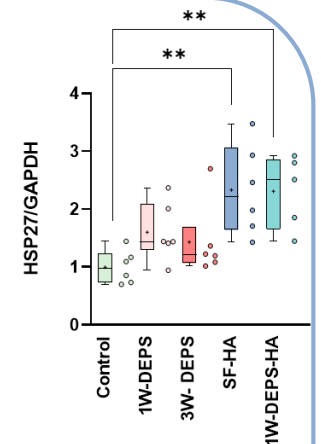
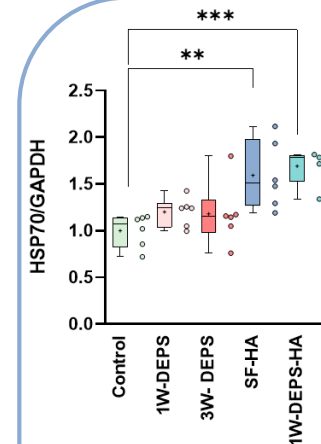
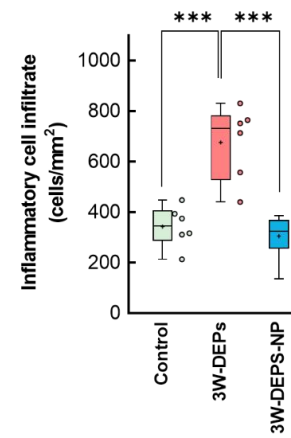
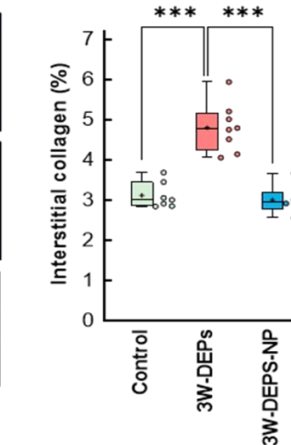
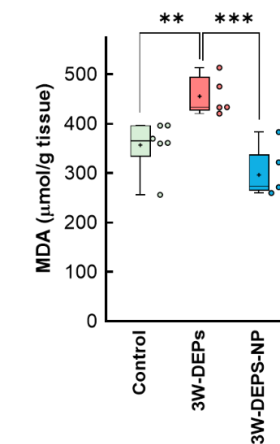
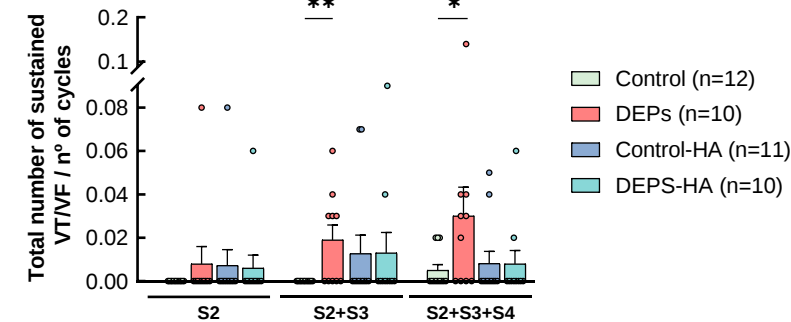
Ganse et al. *Particle Fibr Toxicol* 2025;22:36.



Cerium Oxide Nanoparticles



Heat Acclimation



Both CeO₂NP and HA significantly mitigate DEP-induced ventricular arrhythmogenesis through distinct, yet converging mechanisms targeting fibrosis, oxidative stress, inflammation, and electrical remodelling. These findings provide mechanistic evidence supporting ROS-driven pathways in pollution-induced arrhythmias and identify both nanotherapeutic and physiological conditioning strategies as promising preventive approaches against environmentally triggered cardiac arrhythmias.