

Oxidative stress augments chemoreflex sensitivity in rats exposed to chronic intermittent hypoxia

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Chronic exposure to intermittent hypoxia (CIH) elicits plasticity of the carotid sinus and phrenic nerves via reactive oxygen species (ROS). To determine whether CIH-induced alterations in ventilation, metabolism, and heart rate are also dependent on ROS, we measured responses to acute hypoxia in conscious rats after 14 and 21 d of either CIH or normoxia (NORM), with or without concomitant administration of allopurinol (xanthine oxidase inhibitor), combined allopurinol plus losartan (angiotensin II type 1 receptor antagonist), or apocynin (NADPH oxidase inhibitor). Carotid body nitrotyrosine production was measured by immunohistochemistry. CIH produced an increase in the ventilatory response to acute hypoxia that was virtually eliminated by all three pharmacologic interventions. CIH caused a robust increase in carotid body nitrotyrosine production that was greatly attenuated by allopurinol plus losartan and by apocynin but unaffected by allopurinol. CIH caused a decrease in metabolic rate and a reduction in hypoxic bradycardia. Both of these effects were prevented by allopurinol, allopurinol plus losartan, and apocynin. © 2016 Elsevier B.V.

Antioxidant

Chemoreceptor

Intermittent hypoxia

Reactive oxygen species

3 nitrotyrosine

allopurinol

apocynin

losartan

reactive oxygen metabolite

3-nitrotyrosine

acetophenone derivative

allopurinol

antiarrhythmic agent

antioxidant

apocynin

carbon dioxide

catecholamine

losartan

reactive oxygen metabolite

scavenger

tyrosine

adult

amino acid synthesis

animal experiment

animal model

Article

breathing

carotid body chemoreceptor

chemoreceptor reflex

chemosensitivity

chemosensitization

chronic intermittent hypoxia

controlled study

heart rate

immunohistochemistry

long term exposure

male

metabolic rate

nonhuman

oxidative stress

priority journal

rat

analogs and derivatives

analysis of variance

animal

blood

body weight

breathing

carotid sinus

chemoreceptor cell

drug effects

hypoxia

metabolism

oxidative stress

oxygen consumption

pathology

pathophysiology

physiology

plethysmography

regression analysis

Sprague Dawley rat

tidal volume

time factor

Acetophenones

Allopurinol

Analysis of Variance

Animals

Anti-Arrhythmia Agents

Antioxidants

Body Weight

Carbon Dioxide

Carotid Sinus

Catecholamines

Chemoreceptor Cells

Free Radical Scavengers

Heart Rate

Hypoxia

Losartan

Male

Oxidative Stress

Oxygen Consumption

Plethysmography

Rats

Rats, Sprague-Dawley

Reactive Oxygen Species

Regression Analysis

Respiration

Tidal Volume

Time Factors

Tyrosine