

# Hepatic Nrf2 expression is altered by quercetin supplementation in X.irradiated rats

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Whole-body irradiation has been associated with liver function alterations. Ionizing radiation exposure increases oxidative stress and antioxidants can activate transcription of antioxidant target genes. In the present study, modifications of the liver antioxidant system were evaluated at 7 and 30 days following sub-lethal whole-body X.irradiation in male Wistar rats, which were intragastrically supplemented with quercetin or control solvent for 4 days prior to and 6 days following irradiation. Animal groups were as follows: CS, control, solvent-supplemented; CQ, control, quercetin-supplemented; RS, irradiated, solvent-supplemented; and RQ, irradiated, quercetin-supplemented. After 7 days, liver tissue from RS animals demonstrated marked hydropic panlobular degeneration with Mallory bodies in ballooning hepatocytes. These changes were mostly reversed in RQ rats. Lipid peroxidation in addition to copper/zinc superoxide dismutase (Cu/Zn.SOD), nuclear factor (erythroid.derived 2).like 2 (Nrf2) and Kelch-like ECH-associated protein 1 (Keap1) protein expression levels were all increased by X-irradiation, but significantly decreased by quercetin supplementation. Catalase (CAT) and NAD(P)H: quinone oxidoreductase 1 (NQO1) expression levels remained high in irradiated rats regardless of quercetin supplementation. After 30 days, the liver from RS animals had small portal infiltrates and diffuse cytoplasmic vacuolization, with reduced lipid peroxidation and reduced expression levels of CAT, NQO1, Nrf2 and Keap1, but consistently elevated Cu/Zn-SOD expression. RQ animals indicated reduced expression levels of Nrf2 and Keap1 30 days after irradiation. The present study demonstrated a quercetin-induced reduction of the oxidative stress-associated increase in Nrf2 expression that may

be useful for preventing cancer cell survival in response to ionizing radiation exposure.

Antioxidants

Liver

Nrf2

Oxidative Stress

Quercetin

Radiation

Rat

catalase

copper zinc superoxide dismutase

kelch like ECH associated protein 1

quercetin

reduced nicotinamide adenine dinucleotide (phosphate) dehydrogenase (quinone)

solvent

transcription factor Nrf2

antioxidant

biological marker

KEAP1 protein, rat

quercetin

signal peptide

transcription factor Nrf2

animal experiment

animal model

animal tissue

antioxidant activity

Article

cell degeneration

cell structure

cell vacuole

controlled study

diet supplementation

ionizing radiation

lipid peroxidation

liver

liver cell damage

liver function

male

Mallory body

nonhuman

oxidative stress

protein expression

radiation exposure

rat

whole body radiation

X irradiation

animal

drug effects

gene expression regulation

genetics

metabolism

pathology

radiation response

Animalia

Rattus

Rattus norvegicus

Animals

Antioxidants

Biological Markers

Gene Expression Regulation

Intracellular Signaling Peptides and Proteins

Lipid Peroxidation

Liver

Male

NF-E2-Related Factor 2

Oxidative Stress

Quercetin

Rats