

Protective effect of glutathione on A549 cells treated with different concentrations of 1.4-naphthoquinone

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Introduction: Air pollution is a worldwide recognized threat to the health of humans, since it has been associated with cardiovascular and respiratory diseases. Naphthalene nanoparticles were characterized as one of the constituents of the aerosol produced by the combustion of fuel, the prominent pollutant in urban areas. In naphthalene nanoparticles 1.4-naphthoquinone (1,4 NQ) is the—most abundant chemical. Our objective was to test the toxicity 1,4 NQ. **Material and methods:** Lung alveolar A549 cells were exposed to increasing concentrations of 1.4-NQ (Sigma): 12.5, 25, 50, 100 μ M. To test whether 1.4-NQ acts through oxidative stress, glutathione was added at 10mM. Cell proliferation was measured on xCELLigence®, a noninvasive electrical impedance monitoring system, for 1.4-NQ at 12.5, 25, 50 and 100 μ M. Behavioral (migration, motility, motility speed) and structural (area, perimeter, volume, thickness) parameters of the cells were measured using a live cell imaging time-lapse cytometer (Holomonitor M4), or 1.4-NQ at 25 and 50 μ M. **Results:** 1.4-NQ reduced cell proliferation at all the concentrations tested. Glutathione antagonized the effects of 1,4-NQ on cell proliferation at 25 and 12.5 μ M, but at 50 and 100 μ M. The study of the cell behavioral and structural parameters confirmed that glutathione fully protected the cells from the two lowest concentrations of 1.4-NQ in all studied parameters. **Conclusion:** Results suggests that 1,4-NQ is one of the most toxic molecule present in atmospheric nanoparticles from naphthalene. Glutathione protected the cell against the lowest concentrations of 1,4-NQ, suggesting that oxidative stress is the main mechanism of action on cells. Interestingly, not only cell proliferation was altered by 1,4-NQ but also physical and behavioral parameters of cells. Thus, a strong anti-oxidative capacities offers a better protection against atmospheric urban pollutants.