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Coexposure of polycyclic aromatic hydrocarbons and heavy metals: Identification of biomarkers from the metabolome of HaCaT cells treated with benzo[a]pyrene and nickel

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Modern day living environments entail considerable exposures of humans against a variety of potentially toxic compounds. Examples are polycyclic aromatic hydrocarbons (PAHs) as well as a multitude of different heavy metals or organometallic compounds. Especially nickel compounds were shown in the past to act as co-carcinogens with PAHs by exhibiting synergistic effects on cell morphology. Nickel is a known allergen, which can migrate from various consumer goods like jewelry. However, only little is known about metabolic changes after coexposure of human cells to PAHs and nickel compounds. Therefore we investigated the influence of nickel sulfate, a known allergen and the organometallic compound nickel 2-ethylhexanoate during cotreatment of human HaCaT cells together with benzo[a]pyrene for possible metabolic changes in their metabolome. The results show that a set of 30 metabolites are sufficient to separate HaCaT cells treated with benzo[a]pyrene alone, benzo[a]pyrene and nickel sulfate and benzo[a]pyrene and nickel 2-ethylhexanoate from untreated controls. The developed model could ultimately be used to screen various heavy metal salts as well as organometallic compounds for possible synergistic effects as co-carcinogens.

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