

# Alterations of rat liver mitochondrial oxidative phosphorylation and calcium uptake by benzo[a]pyrene

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We report that oxidative phosphorylation and  $\text{Ca}^{2+}$  uptake processes are enhanced in liver mitochondria isolated from benzo[a]pyrene (B[a]P)-treated rats. The carcinogen did not affect either the respiratory control index or the  $\text{Ca}^{2+}$  control ratio. B[a]P treatment increased the oxidation rate of several substrates that donate electrons at the level of all three coupling sites, either the ADP- or  $\text{Ca}^{2+}$ -stimulated rates or those observed after ADP or  $\text{Ca}^{2+}$  exhaustion. However, the efficiency of energy coupling was maintained because both ADP/O and  $\text{Ca}^{2+}$ /site ratios remained unchanged. The electron flow through NADH-oxidase, NADH-uroquinone reductase, NADH-juglone reductase, NADH-cytochrome c reductase, succinate-cytochrome c reductase, and cytochrome c oxidase was enhanced by B[a]P; however, succinate dehydrogenase activity was not affected. All these effects depended on the time post B[a]P administration, with a greater increase close to 48 h after administration of the carcinogen. The cont