

Studi pembentukan 8-OHdG secara in vitro dan in vivo pada tikus (rattus norvegicus) dan kajian efek sinergis akibat paparan akrilamida dengan logam cu (I) = The study of the formation of 8-ohdg through in vitro and in vivo in rat (rattus norvegicus) and synergistic effect caused by exposure of acrylamide with copper (I).

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Abstrak

Akrilamida merupakan monomer hasil depolimerisasi poliakrilamida akibat adanya pengaruh suhu, cahaya dan pH. Akrilamida juga dapat ditemukan pada produk pangan dengan pengolahan suhu tinggi. Akrilamida dapat menginduksi terbentuknya Reactive Oxygen Species (ROS) seperti radikal hidroksil. Radikal hidroksil dapat berinteraksi dengan basa guanin membentuk DNA adduct 8-hidroksi 2'-deoksiganin (8-OHdG). Penelitian ini bertujuan untuk mengetahui pembentukan 8-OHdG akibat paparan akrilamida yang berinteraksi dengan logam Cu (I). Penelitian ini dilakukan secara in vitro dan in vivo. Studi dilakukan secara in vitro melalui reaksi Fenton antara 2'-deoksiganosin (2dG) dengan akrilamida dan Cu (I). Reaksi dilakukan pada suhu 37 °C, variasi pH 7,4 dan 8,4, serta variasi waktu inkubasi 4, 8, 12 dan 24 jam. Studi in vivo dilakukan pada tikus putih jantan (Rattus norvegicus) galur Sprague-Dawley yang diberikan paparan akrilamida serta kombinasi akrilamida dan Cu (I) dengan dosis yang berbeda selama 21 hari. Hasil studi in vitro dianalisis menggunakan LC-MS/MS QTOF dan plasma darah hasil studi in vivo dianalisis menggunakan ELISA. Inkubasi pada pH 7,4, suhu 37 °C dan waktu inkubasi 24 jam memberikan konsentrasi 8-OHdG tertinggi sebesar 19,09 ng/mL. Konsentrasi tertinggi 8-OHdG dalam plasma darah terdapat pada kelompok paparan akrilamida 25 mg/kg BB dan Cu (I) 10 mg/kg BB sebesar 1,31 ng/mL. Berdasarkan hasil studi in vitro dan in vivo yang telah dilakukan, hal ini menunjukkan terdapat sinergisitas antara akrilamida dan Cu (I) dalam pembentukan 8-OHdG.

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Acrylamide is a monomer as depolymerization results caused by the effect of temperature, light and pH. Acrylamide can be found on food products processed with high temperature. Acrylamide can induce the formation of reactive oxygen species (ROS), e.g. hydroxyl radical. Hydroxyl radical can interact with guanine to form DNA Adduct 8-hydroxy-2'-deoxyguanosine (8-OHdG). The aim of this study is to investigate the formation of 8-OHdG due to co-exposure of acrylamide and copper (I). The study was carried out in vitro through the Fenton reaction and in vivo. In vitro study was undergone through Fenton reaction between 2'-deoxyguanosine and acrylamide at temperature 37 °C, various of pH 7,4 and 8,4, and time of incubation 4, 8, 12 and 24 hours. While in vivo study was carried out by administering orally of acrylamide single dose and combination of acrylamide and copper (I) to male rats (Rattus norvegicus) strain Sprague-Dawley for 21 days exposure. The results of in vitro study were analyzed by LC-MS/MS QTOF and plasma resulted from in vivo study were analyzed by ELISA to determine the concentration of 8-OHdG. Incubation on pH 7,4, 37 °C and time of incubation 24 hours gave highest concentration of 8-OHdG. Meanwhile the highest concentration of 8-OHdG in plasma found in group with the exposure of acrylamide 25 mg/kg BW and copper (I) 10 mg/kg BW. According to the results from in vitro and in vivo studies, it was shown that both acrylamide and copper (I) gave synergistic effect towards the formation of 8-OHdG.