

Correlation between hypoxia inducible factor -1 and renin expression in rats kidney induced by cobalt chloride

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Abstrak

Kobalt klorida dapat digunakan sebagai senyawa yang dapat menimbulkan kondisi mimikri hipoksia tanpa kadar rendah oksigen di dalam tubuh, dan menstabilkan hypoxia inducible factor-1. Kami memutuskan untuk mengobservasi apakah terdapat regulasi ekspresi renin oleh HIF-1. Dengan demikian kami menyelenggarakan beberapa penelitian untuk memastikan kemungkinan dan memulai dengan penelitian induksi tikus secara intraperitoneal kobalt klorida (CoCl₂) untuk membangkitkan kondisi mimikri hipoksia dan mendapatkan konsentrasi dan pola ekspresi HIF-1 dan mRNA.

Metode: Dua puluh empat ekor tikus dibagi menjadi 4 grup: kontrol, 2, 8, dan 24 jam inkubasi pasca injeksi intraperitoneal 30 mg/kg berat badan CoCl₂. Setelah tikus dikorbankan, organ ginjal digunakan untuk pemeriksaan parameter berat ginjal, kadar RNA, kadar protein HIF-1 (ELISA) dan mRNA renin (RT-PCR).

Hasil: Hasil menunjukkan bahwa terdapat perbedaan rasio berat ginjal/berat badan tikus, namun secara statistik tidak bermakna ($p > 0,05$). Secara statistik tidak terdapat perbedaan bermakna kadar protein HIF-1 antar kelompok ($p > 0,05$). Ekspresi relatif mRNA renin meningkat tajam (30 x kontrol), mulai pada 8 jam inkubasi pasca induksi intraperitoneal CoCl₂ dan terus meningkat sampai inkubasi 24 jam (2465 x kontrol). Korelasi antara protein HIF-1 dan ekspresi relatif mRNA renin menggunakan analisis Pearson menunjukkan positif kuat ($R = 0,91$) ($p = 0,09$). Kesimpulan: Terdapat kemungkinan yang besar bahwa gen renin diregulasi oleh HIF-1.

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Background: Cobalt chloride can be used as an agent to stabilize hypoxia inducible factor-1 (HIF-1) and to imitate hypoxia without low levels of oxygen inside the body. We intended to investigate if there was any regulation of renin expression by HIF-1. Therefore, we conducted several studies to clarify this possibility starting with the induction of hypoxic mimicry in rats by intra-peritoneal (IP) injection of cobalt chloride (CoCl₂) to obtain the levels and pattern of HIF-1 and renin mRNA and protein expression.

Methods: Twenty-four rats were randomly divided into four groups, control group and incubation groups 2, 8, and 24 hours after intra-peritoneal injection of 30 mg CoCl₂ per kg BW. After the rats were sacrificed, kidneys were excised, weighed and kidney weight compared to BW. Tissue parameters were measured such as RNA concentration, HIF-1 protein by ELISA, and renin mRNA by RT-PCR.

Results: Differences between the groups in the ratios of kidney weight to BW and in the concentrations of HIF-1 protein were statistically not significant ($p > 0.05$). Relative expression of renin mRNA increased markedly starting 8 hours after CoCl₂ IP injection (30 times over controls) and further rising until 24 hours (2465 times over controls). Correlation between HIF-1 and renin mRNA by Pearson analysis was strongly positive, but not significant ($R = 0.91$; $p = 0.09$).

Conclusion: Renin gene regulation in renal hypoxic mimicry strongly correlates with HIF-1