Expression of hypoxia inducible factor-1a (HIF-1a) gene and apoptosis in the heart induced by systemic hypoxia

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Abstrak

Tujuan Studi ini adalah untuk mengetahui pengaruh hipoksia terhadap pola ekspresi gen HIF-1α pada jantung tikus serta mengamati timbulnya apoptosis pada kardiomiosit akibat hipoksia sistemik.
Metode Hewan coba (tikus Sprague-Dawley) dibagi secara acak menjadi 7 kelompok (n= 4 per kelompok): kelompok kontrol normoksia (oksigen atmosfir), dan beberapa kelompok hipoksia yang ditempatkan dalam sungkup-hipoksik (kadar O2 8%) selama 1, 3, 7, 14, 21, dan 28 hari. Pemeriksaan ekspresi gen HIF-1α dilakukan dengan real-time PCR dan apoptosis dengan metode TUNEL.
Hasil Dibandingkan dengan kelompok normoksia, ekspresi gen HIF-1α meningkat secara bertahap sejalan dengan lamanya hipoksia dan mencapai puncak pada hari ke-21. Tidak ada sel yang terlabel dengan cara TUNEL pada kelompok kontrol. Dibandingkan dengan kontrol, indeks apoptotik meningkat sejalan dengan lamanya hipoksia. Tidak ada hubungan bermakna antara peningkatan ekspresi HIF-1α dengan peningkatan indeks apoptotik.
Kesimpulan Hipoksia sistemik kronik mengakibatkan peningkatan ekspresi mRNA HIF-1α dan apoptosis pada kardiomiosit.
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Abstract
Aim This study explored the expression of HIF-1α in hypoxic cardiac muscle in mice, and observed the evidence of apoptosis in hypoxia induced cardiomyocyte.
Methods Male Sprague-Dawley rats, were randomized into 7 groups (n= 4 per group): control normoxia group that was exposed to atmospheric oxygen and hypoxia groups that were housed in hypoxic chambers (O2 level 8%) for 1, 3, 7, 14, 21, and 28 days respectively. Animals were sacrificed, hearts were rapidly excised, total RNA was extracted with an mRNA isolation kit and the expression of HIF-1α mRNA was then detected by real-time RT-PCR. Apoptosis was assessed by TUNEL method.
Results For rat in hypoxia group, the expression of HIF-1α mRNA in cardiac myocytes was clearly up-regulated compared to the control normoxia group. Further, HIF-1α expression level elevated gradually and reached a peak at 21 days of hypoxia. No cell labeled by the TUNEL method was detected in the control group. Compared with the control group, the apoptotic index was significantly increased in the hypoxia group ($P < 0.05$). There was no significant correlation between the elevation of HIF-1α mRNA and the elevation of apoptotic index.
Conclusion Systemic chronic hypoxia caused the elevation of HIF-1α mRNA and apoptosis in cardiac myocytes.