

# Efek hipoksia pada jaringan plasenta dan korelasinya dengan ekspresi mRNA relatif carbonic anhydrase-9 dan hypoxia inducible factor-1a = The effect of hypoxia in placental tissue and its correlation with the mrna relative expression of carbonic anhydrase-9 and hypoxia inducible factor-1a

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## Abstrak

Latar Belakang: Jumlah kematian ibu karena komplikasi selama kehamilan tetap tinggi di seluruh dunia. Hipoksia plasenta diduga mengakibatkan komplikasi seperti penyakit iskemik plasenta (IPD), yang terdiri atas preeklampsia, plasenta abruptio dan pembatasan pertumbuhan intrauterin (IUGR). Selain itu, hipoksia plasenta juga diduga mengakibatkan prematuritas. Beberapa penelitian telah berkembang terhadap penggunaan biomarker untuk mendeteksi hipoksia. Sebuah master pengatur homeostasis oksigen adalah Hypoxia Inducible Factor-1 (HIF-1), yang terdiri atas ?oxygen sensor? -subunit (HIF-1). HIF-1 mengaktifkan Carbonic Anhydrase-9 (CA9), sehingga mempertahankan cell survival di kondisi hipoksia. Penelitian ini bertujuan untuk mendeteksi plasenta yang hipoksia dengan mengukur ekspresi relatif mRNA HIF-1 dan mRNA CA9.

Metode: Sampel merupakan bahan biologis tersimpan dari jaringan plasenta neonatus hipoksia dan non-hipoksia (n=6) yang disimpan pada suhu -80° C. Untuk melihat ekspresi relatif mRNA HIF-1 dan CA9 digunakan Real time RT-PCR.

Hasil dan diskusi: Terdapat perbedaan bermakna antara ekspresi relatif mRNA HIF-1 (p=0.010) dan CA9 (p=0.001) pada jaringan plasenta neonatus hipoksia dibandingkan nonhipoksia. Ekspresi relatif mRNA HIF-1 (0.34) dan CA9 (0.19) lebih rendah di jaringan plasenta neonatus hipoksia dibandingkan dengan non-hipoksia. Hasil ini bertentangan dengan teori bahwa ekspresi seharusnya meningkat pada hipoksia. Namun, terdapat bukti hubungan korelasi antara ekspresi HIF-1 dan CA9 yang kuat dan signifikan (p=0.987). Kesimpulan: Ekspresi HIF-1 dan CA9 di jaringan plasenta neonatus hipoksia lebih rendah dibandingkan non-hipoksia. Terdapat korelasi yang kuat antara ekspresi HIF-1 dan CA9.

*Background:* Maternal death numbers due to complications during pregnancy are still high worldwide. Hypoxia of the placenta is suspected to lead to complications such as ischemic placental disease (IPD), comprising of preeclampsia, placental abruptio and intrauterine growth restriction (IUGR). Moreover, hypoxia of the placenta is also suspected to lead to prematurity. Research has deviated towards use of biomarkers to detect hypoxia. A master regulator of oxygen homeostasis is Hypoxia Inducible Factor-1 (HIF-1), comprising of an ?oxygen sensor? -subunit (HIF-1). HIF-1 activates Carbonic Anhydrase-9 (CA9), allowing cell survival under hypoxia. This study aims to detect hypoxic placenta by measuring mRNA relative expression of HIF-1 and CA9.

*Method:* Samples were maternal placental tissue of hypoxic and non-hypoxic neonates (n=6) stored in -80° C. To measure mRNA relative expression of HIF-1 and CA9 real time RTPCR was used.

*Results and discussion:* There was a significant difference between mRNA relative expression of HIF-1 (p=0.010) and CA9 (p=0.001) in maternal placental tissue of hypoxic neonates compared to non-hypoxic. mRNA relative expression HIF-1 (0.34) and CA9 (0.19) was lower in maternal placental tissue of hypoxic

neonates compared to non-hypoxic. These results oppose the theory that HIF-1 and CA9 mRNA relative expression should increase in hypoxia. However HIF-1 and CA9 mRNA relative expression were strongly correlated in each condition ( $p=0.987$ ).

Conclusions: The mRNA relative expression of HIF-1 and CA9 in maternal placental tissue of hypoxic neonates was lower compared to non-hypoxic. There was a strong correlation between mRNA relative expression of HIF-1 and CA9.