Penghambatan aktivitas anhidrase karbonat menurunkan proliferasi sel mononukleus (SMDT) manusia yang distimulasi dengan phytohaemagglutinin dan interleukin-2 = Inhibition of carbonic anhydrase activities decreased cell proliferation of human peripheral blood mononuclear cells (PBMC) stimulated by phytohaemagglutinin and interleukin-2

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Abstrak

Penghambatan proliferasi sel diaplikasikan dalam berbagai bidang kedokteran. Banyak di antara penghambatan proliferasi dilakukan dengan cara menghambat sintesis DNA, yaitu mengintervensi pembentukan basa nukleotida purin atau pirimidin. Dalam sintesis purin de novo terdapat peran enzim anhidrase karbonat yang merupakan pemasok CO2 dalam proses karboksilasi. Penghambatan enzim anhidrase karbonat diduga kuat dapat menghambat proliferasi. Pada penelitian ini model proliferasi sel adalah SMDT yang distimulasi dengan PHA, IL-2, serta PHA dan IL-2. Penghambat enzim anhdirase karbonat yang digunakan adalah asetazolamid. Dilakukan analisis efek pemberian asetazolamid pada saat puncak sintesis DNA sel, puncak viabilitas sel, serta analisis terhadap siklus sel. Hasil penelitian ini, asetozolamid menghambat sintesis DNA serta menurunkan viabilitas SMDT yang distimulasi PHA dan IL-2. Terjadi hambatan masuknya progresi SMDT dari fase G0/G1 ke fase S. Penelitian ini menunjukkan bahwa penghambatan enzim anhidrase karbonat dapat menyebabkan hambatan proliferasi sel.
.....Inhibition of cells proliferation are widely used in various medical fields. Most of cell proliferation inhibition can be done by inhibiting the DNA synthesis, notably by intervening the formation of purine or pyrimidine. In purine de novo synthesis, it was assumed that CO2 plays a role as a source of carbon in carboxylation reaction, one of the pivotal steps in the purine de novo pathways. The aim of this study was to see the acetazolamide potency to inhibit carboxylation reaction. Peripheral blood mononuclear cell (PBMC) was cultured in RPMI-1640 medium and stimulated by phytohemagglutinin (PHA) and interleukin-2 (IL-2), with or without acetazolamide. The effect of acetazolamide addition was observed at the peak of cell proliferation, cells viability, and cell cycle. Statistical analysis was done by one-way ANOVA. Acetazolamide inhibited cell proliferation and viability in PBMC culture stimulated by PHA and IL-2. Cell cycle analysis showed that acetazolamide arrested the progression of PBMC in G0/G1 phase. Inhibition of CO2 production by acetazolamide inhibitory effect to carbonic anhydrase can halt cell proliferation.