Analisis Ekspresi Gen T-box 15 dan Uncoupling Protein-1 pada Jaringan Adiposa Mencit Obesitas yang Dipajan Static Magnetic Field = Analysis of T-box 15 and Uncoupling Protein-1 Gene Expression in Adiposa Tissue of Obese Mice Exposed to Static Magnetic Field

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Abstrak

T-box 15 (Tbx15) merupakan faktor transkripsi yang mempengaruhi ekspresi gen Uncoupling protein 1 (Ucp1). Interaksi antara protein Tbx15 dan gen Ucp1 telah dilaporakan terlibat dalam aktivasi termogenesis adaptif dan pencoklatan jaringan adiposa putih, yang menawarkan pendekatan baru dalam mengobati obesitas. Paparan static magnetic field (SMF) meningkatkan Ca2+ sitosol yang dapat menghambat adipogenesis in vitro. Studi eksperimental untuk menganalisis efek SMF pada pencoklatan belum banyak dilaporkan. Oleh karena itu, penelitian ini bertujuan untuk menganalisis efek pajanan SMF secara in vivo pada jaringan adiposa mencit obesitas yang ditinjau dari ekspresi protein Tbx15, gen Ucp1, serta ukuran sel adiposa inguinal. Mencit C57BL/6J diinduksi obesitas melalui pemberian pakan tinggi lemak (HFD). Mencit dipajan SMF selama 21 hari diferensiasi adiposit, durasi pajanan 1 jam/hari dengan intensitas 2 mT. Indeks Lee, protein Tbx15, gen Ucp1 dan ukuran sel adiposa dianalisis. Ekspresi Tbx15 meningkat secara signifikan ($p<0,05$) setelah 2 dan 7 hari pajanan SMF dan indeks Lee menurun sejak 2-21 hari pajanan SMF. Ekspresi gen Ucp1 meningkat setelah pajanan SMF walaupun secara statistik tidak ada perbedaan signifikan. Ukuran sel adiposa lebih kecil setelah 14-21 hari pajanan. Oleh karena itu, pajanan SMF dengan intensitas 2 mT durasi 1 jam/hari sudah optimal mempengaruhi proses pencoklatan melalui ekspresi Tbx15 dan Ucp1 yang meningkat setelah 2-7 hari pajanan dan secara fenotip ukuran sel adiposa mengecil dihari 14-21.

.....T-box 15 (Tbx 15) is a transcription factor that regulates the expression of the Uncoupling protein 1(Ucp1) gene. Tbx15 protein and Ucp1 gene interaction has been reported to be involved in thermogenesis and browning process of white adipose tissue, which offers a novel approach to treat obesity. Increased Ca2+ cytosolic concentrations caused by static magnetic field (SMF) exposure inhibit adipogenesis in vitro. Experimental studies to determine effect of SMF on the browning process have not been widely reported. Hence, we investigated its effect towards Lee index, Tbx15 and Ucp1 expression, as well as adipose cell size in obese mice inguinal adipose tissue. We generated C57BL/6J obese mice by inducing high fat diet (HFD). Mice were exposed to SMF at a 2 mT intensity for one hour per day for 21 days of adipocyte differentiation. Lee index, Tbx15 protein, Ucp1 gene, and histological inguinal adipose histology were all investigated. Tbx15 expression increased after 2-7 days of SMF exposure and Lee index decreased significantly since 2- 21 days of SMF exposure. Ucp1 gene expression increased after SMF exposure, however there was no significant change following SMF exposure. After 14-21 days of exposure, adipose cell size was slightly reduced. Therefore, we can conclude that the SMF exposure at 2 mT intensity for one hour per day could improve browning process by increasing Tbx15 dan Ucp1 expression after 2-7 days and adipose cell size phenotypically reduced at 14-21 days of SMF exposure.