

**Level Ekspresi mRNA Gen CD4, CD8 Alfa, dan IFN-Gamma
Jaringan Tumor Payudara Tikus (*Rattus norvegicus* Berkenhout,
1769) dengan Perlakuan Paparan Medan Listrik Statis**

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INTISARI

Sel T *cluster of differentiation* 4 (CD4), sel T *cluster of differentiation* 8 (CD8), dan sitokin *interferon gamma* (IFN- γ) diketahui memiliki kemampuan penekanan pertumbuhan tumor. Paparan medan listrik frekuensi menengah dengan intensitas rendah diduga dapat meningkatkan infiltrasi sel-sel imun dan mendorong terjadinya apoptosis melalui jalur ekstrinsik. Penelitian ini bertujuan untuk mengetahui ekspresi gen CD4, CD8 α dan IFN- γ pada jaringan payudara normal dan jaringan tumor payudara tikus *Rattus norvegicus* galur Sprague-Dawley dengan terapi paparan medan listrik statis frekuensi 150 kHz dengan intensitas 18Vpp. Sampel penelitian berupa jaringan payudara tikus kelompok perlakuan Non Induksi - Non Terapi (NINT) dan Non Induksi - Terapi (NIT), serta jaringan tumor tikus kelompok Induksi - Non Terapi (INT), dan Induksi - Terapi (IT) yang disimpan dalam *RNA later*. RNA total diisolasi dari sampel jaringan payudara maupun jaringan tumor payudara, kemudian dilakukan sintesis cDNA menggunakan metode RT-PCR. Selanjutnya diukur level ekspresi relatif mRNA gen target menggunakan metode qPCR. Analisis data dilakukan dengan metode Livak untuk menentukan ekspresi relatif mRNA gen terkait pada kelompok NIT, INT dan IT terhadap kelompok NINT. Kemudian data diuji statistik dengan *T-test* dan Anova. Berdasarkan hasil yang diperoleh, diketahui bahwa ekspresi relatif mRNA gen CD4 kelompok NIT, INT dan IT cenderung mengalami *downregulation* ($p > 0,05$) terhadap NINT. Ekspresi mRNA gen CD8 α cenderung mengalami *upregulation* dibandingkan NINT ($p > 0,05$), dan Ekspresi relatif mRNA gen IFN- γ NIT, INT cenderung sama terhadap NINT ($p > 0,05$), dan IT cenderung mengalami *upregulation* terhadap NINT. Kesimpulan yang diperoleh yakni paparan medan listrik frekuensi 150 kHz dan intensitas 18Vpp tidak mempengaruhi ekspresi relatif mRNA gen CD4, CD8 α , dan IFN- γ pada jaringan tumor payudara, namun terdapat kecenderungan peningkatan relatif ekspresi mRNA gen IFN- γ ditunjukkan pada jaringan tumor yang diterapi medan listrik.

Kata kunci: CD4, CD8 α , IFN- γ , tumor payudara, medan listrik

mRNA Level Expression of CD4, CD8 Alpha, and IFN-Gamma Genes in Rat's (*Rattus norvegicus* Berkenhout, 1769) Breast Tumor Tissue with Static Electric Field Exposure

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ABSTRACT

T cells cluster of differentiation 4 (CD4), T cells cluster of differentiation 8 (CD8), and cytokine interferon gamma (IFN- γ) are known to have the ability to suppress tumor growth. Exposure to low intensity and medium frequency electric fields is thought to increase the infiltration of immune cells and promote apoptosis via extrinsic pathways. This study aims to determine the expression of CD4, CD8 α and IFN- γ genes in normal breast tissue and breast tumor tissue in Sprague-Dawley rats *Rattus norvegicus* strain with exposure therapy to a static electric field frequency of 150 kHz with an intensity of 18Vpp. The research samples were rat breast tissue from the Non-Induction - Non-Therapy (NINT) and Non-Induction-Therapy (NIT) groups, as well as the induction - Non-Therapy (INT) and Induction-Therapy (IT) group rat tumor tissue which were stored in RNAlater. Total RNA was isolated from breast tissue samples and breast tumor tissue, then cDNA was synthesized using the RT-PCR method. Furthermore, the relative expression level of target gene mRNA was measured using the qPCR method. Data analysis was performed using the Livak method to determine the relative expression of mRNA associated genes in the NIT, INT, and IT groups against the NINT group. Then the data was tested statistically by T-test and Anova. Based on the results obtained, it is known that the relative expression of CD4 gene mRNA in the NIT, INT, and IT groups tend to downregulate ($p > 0.05$) against NINT. CD8 α gene mRNA expression tends to upregulate compared to NINT ($p > 0.05$), and the relative expression of IFN- γ NIT, INT mRNA tend to be the same to NINT ($p > 0.05$), and IT tend to upregulate against NINT. The conclusion obtained was that exposure to 150 kHz frequency electric fields and 18Vpp intensity did not affect the relative expression of CD4, CD8 α , and IFN- γ mRNA genes in breast tumor tissue, but there was a tendency to increase the relative expression of IFN- γ mRNA expression in the field treated tumor tissue.

Key words: CD4, CD8 α , IFN- γ , breast tumor, electric field.