

**EKSPRESI RELATIF mRNA *IL-10*, *IFN-γ*, DAN *TNF-α*
OTAK TIKUS (*Rattus norvegicus* BERKENHOUT, 1769) TANPA DAN
DENGAN TUMOR PAYUDARA SETELAH PAPARAN MEDAN LISTRIK
STATIS FREKUENSI MENENGAH**

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INTISARI

Electro-capacitive cancer therapy (ECCT) merupakan salah satu metode baru dalam terapi kanker payudara yang memanfaatkan medan listrik statis dengan frekuensi arus menengah dan intensitas rendah. Penelitian ECCT terdahulu dilakukan untuk mengetahui pengaruh ECCT terhadap tumor payudara. Fokus penelitian pada kali ini merupakan penelitian praklinis yang dilakukan untuk mengetahui keamanan alat pada jaringan otak. Penelitian ini dilakukan menggunakan metode evaluasi level ekspresi gen *IL-10*, *IFN-γ* and *TNF-α* pada jaringan otak tikus tanpa dan dengan tumor payudara setelah terpapar dengan medan listrik frekuensi menengah dan intensitas rendah. Pada penelitian ini digunakan empat perlakuan pada tikus terapi, yaitu tikus tidak diinduksi DMBA dan tidak diterapi (NINT), tikus diinduksi DMBA dan tidak diterapi (INT), tikus tidak diinduksi DMBA dan diberikan terapi (NIT), dan tikus diinduksi DMBA dan diberikan terapi (IT). Sampel dari masing-masing perlakuan tikus dikoleksi dan disimpan dalam larutan RNAlater di freezer bersuhu -20°C. Sampel tersebut kemudian akan diekstrak total RNA-nya. Dari sampel total RNA dibuat cDNA melalui mekanisme *reverse transcription*. Level ekspresi gen *IL-10*, *IFN-γ* and *TNF-α* diuji menggunakan metode qRT-PCR. Data dari qRT-PCR berupa banyaknya cDNA gen dibaca menggunakan Bio-Rad CFX96TM *Real-Time System*. Analisis data kemudian dilakukan menggunakan formula Livak. Signifikansi ekspresi relatif dianalisis menggunakan *One-way ANOVA* dan *T-test*. Hasil penelitian yang telah dilakukan menunjukkan bahwa paparan medan listrik frekuensi menengah intensitas rendah tidak menginduksi perubahan ekspresi relatif *IL-10*, *IFN-γ* dan *TNF-α* jaringan otak secara signifikan ($p > 0,05$) untuk semua kelompok tikus perlakuan.

Kata Kunci : ECCT, *IFN-γ*, *IL-10* , *TNF-α* qRT-PCR

RELATIVE EXPRESSION OF *IL-10*, *IFN- γ* , AND *TNF- α* mRNA IN RAT (*Rattus norvegicus* BERKENHOUT, 1769) BRAIN WITH AND WITHOUT BREAST TUMOR AFTER THE EXPOSURE TO INTERMEDIATE FREQUENCY STATIC ELECTRIC FIELD

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ABSTRACT

Electro-capacitive cancer therapy (ECCT) is one of the new methods in breast cancer therapy that utilizes static electric fields with intermediate frequency and low intensity. The previous ECCT study has been focusing on the effect of ECCT in breast's tumor. This current study is focusing on praclinic study to assess the safety of ECCT in rat's brain. In order to prove it, this study was conducted to evaluate the expression levels of *IL-10*, *IFN- γ* and *TNF- α* genes in mice brain with or without breast tumors after the exposure to electric fields. In this study, four treatments group were used. The four treatment groups were non-DMBA induced and untreated (NINT) rats, non-DMBA induced and untreated (INT) rats, DMBA induced and untreated rats (NIT), and DMBA induced and treated rats. (IT). Samples from each treatment rat were collected and stored in RNAlater solution in a freezer at -20°C. The samples were extracted for the total RNA. From the sample's total RNA, cDNA was synthesized using reverse transcriptase method. The *IL-10*, *IFN- γ* , and *TNF- α* expression level were tested using the qRT-PCR method. The data from qRT-PCR which was the amount of the cDNA in the sample was analyzed using the Bio-Rad CFX96™ Real-Time System. The data analysis was performed using the Livak formula. The significance of relative expressions was then analyzed using One-Way ANOVA and T-test. From the conducted research, it is concluded that the static electric field with intermediate frequency and low intensity doesn't significantly affect the relative expression of *IL-10*, *IFN- γ* and *TNF- α* ($p > 0,05$) in all treatment groups.

Keywords : ECCT, *IFN- γ* , *TNF- α* , *IL-10*, qRT-PCR