

**EKSPRESI GEN *AIF*, *ENDO G*, DAN *BAX* PADA JARINGAN TUMOR  
PAYUDARA TIKUS (*Rattus norvegicus* Berkenhout, 1769) DENGAN  
PERLAKUAN TERAPI MEDAN LISTRIK STATIS FREKUENSI  
MENENGAH DAN INTENSITAS RENDAH**

Daniel Saputra Wahyudi

17/411688/BI/09828

**INTISARI**

*Electro-Capacitive Cancer Therapy* (ECCT) merupakan sebuah metode terapi kanker yang sedang dikembangkan di Indonesia. Metode ini memanfaatkan medan listrik statis frekuensi menengah (150 KHz) dan intensitas rendah (18 Vpp) untuk mempengaruhi sel kanker. Penelitian yang telah dilakukan membuktikan bahwa paparan medan listrik statis ECCT memberikan efek menghambat sel kanker, namun metode ini belum dapat diaplikasikan secara langsung pada pasien secara bebas karena diperlukan penelitian pra- klinis lebih lanjut. Berdasarkan hal tersebut, penelitian ini dilakukan untuk mengetahui dampak paparan medan listrik ECCT terhadap ekspresi gen *AIF*, *Endo G*, dan *BAX* yang berperan pada proses apoptosis sel jalur *caspase-independent*. Sampel yang digunakan pada penelitian ini adalah jaringan payudara tikus (*Rattus norvegicus* Berkenhout, 1769) yang dibagi menjadi 4 kelompok perlakuan, yaitu Non Induksi Non Terapi (NINT), Non Induksi Terapi (NIT), Induksi Non Terapi (INT), dan Induksi Terapi (IT). Metode utama yang dilakukan berupa isolasi RNA sampel jaringan payudara dan tumor payudara, sintesis cDNA, serta pengukuran ekspresi relatif gen target menggunakan qPCR. Analisis nilai ekspresi relatif gen dilakukan menggunakan metode Livak dan dilakukan pengujian statistik dengan *T-test* ( $\alpha = 0,05$ ). Hasil yang diperoleh yaitu terjadi peningkatan ekspresi gen *AIF* secara signifikan pada kelompok perlakuan IT jika dibandingkan dengan kontrol NINT. Ekspresi gen *Endo G* mengalami peningkatan secara signifikan pada kelompok perlakuan IT jika dibandingkan dengan kontrol INT. Selain itu, terjadi peningkatan ekspresi gen *BAX* pada kelompok perlakuan IT dibandingkan kontrol NINT dan INT meskipun tidak secara signifikan. Hal ini mengindikasikan bahwa terapi medan listrik ECCT mampu memicu apoptosis sel tumor jalur *caspase-independent*.

Kata kunci: ECCT, AIF, Endo G, BAX, apoptosis, tumor payudara

**AIF, ENDO G, AND BAX GENE EXPRESSION IN RAT  
(*Rattus norvegicus* Berkenhout, 1769) BREAST TUMOR TISSUE WITH  
MEDIUM FREQUENCY AND LOW INTENSITY STATIC ELECTRICAL  
FIELD THERAPY**

Daniel Saputra Wahyudi  
17/411688/BI/09828

**ABSTRACT**

Electro-Capacitive Cancer Therapy (ECCT) is a cancer therapy method that is being developed in Indonesia. This method utilizes a medium frequency (150 KHz) and low intensity (18 Vpp) static electric field to affect cancer cells. Previous research has proven that exposure to ECCT static electric fields has the effect of inhibiting cancer cells, but this method cannot be applied directly to patients because further pre-clinical research is needed. Based on this, this study was conducted to determine the impact of ECCT electric field exposure on the expression of *AIF*, *Endo G*, and *BAX* genes that play a key role in the process of cell apoptosis through caspase-independent pathway. The samples used in this study were rat breast tissues (*Rattus norvegicus* Berkenhout, 1769) which were divided into 4 treatment groups, consists of Non Induction Non Therapy (NINT), Non Induction Therapy (NIT), Induction Non Therapy (INT), and Induction Therapy (IT). The main methods used were isolation of RNA samples from breast tissues and breast tumors, synthesis of cDNA, and measurement of relative target gene expression using qPCR. Analysis of the relative expression value of genes were carried out using the Livak method and statistical testing were carried out with T-test ( $\alpha = 0.05$ ). The results obtained, there was a significant increase in *AIF* gene expression in the IT treatment group compared to the NINT control. *Endo G* gene expression increased significantly in the IT treatment group compared to the INT control. In addition, there was a not significant increase in the expression of the *BAX* gene in the IT treatment group compared to the NINT and INT control. It has been shown that ECCT electric field therapy is capable of triggering caspase-independent tumor cell apoptosis pathway.

Keywords: ECCT, AIF, Endo G, BAX, apoptosis, breast tumor