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Análisis de la Expresión de los genes Bit1, Casp4 Y Pig3 en Pacientes hipertiroideos bajo tratamiento con yodo 131 y pacientes con sospecha de electrosensibilidad

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RESUMEN

El presente estudio, Comparo la Expresión de los genes BIT1, CASP4 Y PIG3 en pacientes con hipersensibilidad electromagnética que Viven en zonas en las que agencia nacional de espectrofotometría (ANE) determino exposición a radiación no ionizante y en pacientes con hipertiroidismo bajo tratamiento con I131 identificados en la consulta externa de la ciudad de Barranquilla en el periodo 2016-2017. Obteniendo información cuantitativa y cualitativa de la respuesta genética a estrés bioquímico y electromagnético. Se tomaron muestras de 4 pacientes, entre 25 – 35 años, en estadística se recomienda incluir para estudios pilotos entre 30 y 50 participantes, los cuales deben cumplir criterios de inclusión pero en estudio, debido a falta de presupuesto se seleccionaron dos pacientes hipertiroideos en manejo con Yodo-131 por vía oral no menor a 1 hora y no mayor a 7 días y dos pacientes con síntomas de electrosensibilidad que vivan en zonas que por el ANE fueran mayor a 3% identificados por un médico. descartando en estos pacientes mediante pruebas bioquímicas y estudios imagenológicos, alteraciones hematológicas, endocrinas, cardiovascular, neurológicas, psiquiátricas y alteraciones visuales complicadas.

Se tomaron las 4 muestras sanguíneas y se realizó extracción de ARN, mediante el método de Trizol, La cuantificación y pureza del ARN se determinó utilizando un Nanodrop. Posteriormente, se realizó RT-qPCR y se analizó la expresión de 3 diferentes genes: *BIT1*, promotor de apoptosis; *PIG3*, interviene en la regulación del proceso apoptótico y está relacionado con la respuesta al daño del ADN inducido por radiación ionizante; y *CASP4*, involucrado en la vía de señalización apoptótica, en señales de inflamación y la cascada de caspasas. Se identifica los genes y se mide su expresión génica en cada paciente.

En este artículo se comparó la expresión de genes asociados a la apoptosis y la respuesta al daño celular en muestras de pacientes expuestos a radiación ionizante o radiación no ionizante. En los pacientes expuestos a I-131 se observa una sobreexpresión de *CASP4*. La expresión de CASP4 se asocia a una respuesta inflamatoria y posterior apoptosis mediada por *CASP8* como se muestra en la red de interacciones proteína-proteína que se extrajo de la base de datos STRING, para entender mejor la función molecular de cada gen. La sobre activación de *CASP4* observada en pacientes expuestos a radiación ionizante sugiere que hay una circulación de I-131 fuera de la tiroides a tejidos periféricos, causando inflamación mediada por la liberación de citoquinas debido a la activación posiblemente de *CASP1,* caspasa ligada a *CASP4*. Esta secreción de citoquinas recluta a macrófagos y a linfocitos CD4+ y CD8+ entre otros, afectando a las células circulantes causando apoptosis. El paciente 3, aparentemente con signos de electrosensibilidad, presenta una sobreexpresión de *BIT1* y *PIT3*, ambos genes asociados con apoptosis. Sin embargo, no se puede inferir que esto sea causado por radiación electromagnética, debido a que este es un estudio piloto donde se muestra una expresión diferencial en personas expuestas a diferentes tipos de radiación donde se hace necesario un muestreo significativo para confirmar los resultados.

Palabras clave: expresión genética; radiación ionizante, electrosensibilidad.

ABSTRACT

The present study, I compare the expression of the BIT1, CASP4 and PIG3 genes in patients with electromagnetic hypersensitivity living in areas where the national spectrophotometry agency (ANE) determined exposure to non-ionizing radiation and in patients with hyperthyroidism under treatment with I131 identified in the external consultation of the city of Barranquilla in the period 2016-2017. Obtaining quantitative and qualitative information of the genetic response to biochemical and electromagnetic stress. Samples were taken from 4 patients, between 25 - 35 years, in statistics it is recommended to include for pilot studies between 30 and 50 participants, which must meet inclusion criteria but under study, due to lack of budget, two hyperthyroid patients were selected in management with Iodine-131 orally not less than 1 hour and not more than 7 days and two patients with electrosensitivity symptoms living in areas that by the ANE were greater than 3% identified by a doctor. ruling out in these patients through biochemical tests and imaging studies, haematological, endocrine, cardiovascular, neurological, psychiatric and complicated visual disturbances.

The 4 blood samples were taken and RNA extraction was performed using the Trizol method. The quantification and purity of the RNA was determined using a Nanodrop. Subsequently, RT-qPCR was performed and the expression of 3 different genes was analyzed: BIT1, apoptosis promoter; PIG3, intervenes in the regulation of the apoptotic process and is related to the response to DNA damage induced by ionizing radiation; and CASP4, involved in the apoptotic signaling pathway, in signs of inflammation and the caspasse cascade. The genes are identified and their gene expression is measured in each patient.

This article compared the expression of genes associated with apoptosis and the response to cell damage in samples of patients exposed to ionizing radiation or non-ionizing radiation. Overexpression of CASP4 is observed in patients exposed to I-131. CASP4 expression is associated with an inflammatory response and subsequent CASP8-mediated apoptosis as shown in the protein-protein interaction network that was extracted from the STRING database, to better understand the

molecular function of each gene. The over activation of CASP4 observed in patients exposed to ionizing radiation suggests that there is a circulation of I-131 outside the thyroid to peripheral tissues, causing inflammation mediated by the release of cytokines due to possibly activation of CASP1, caspase linked to CASP4. This cytokine secretion recruits macrophages and CD4 + and CD8 + lymphocytes among others, affecting circulating cells causing apoptosis. Patient 3, apparently with signs of electrosensitivity, has an overexpression of BIT1 and PIT3, both genes associated with apoptosis. However, it cannot be inferred that this is caused by electromagnetic radiation, because this is a pilot study where a differential expression is shown in people exposed to different types of radiation where significant sampling is necessary to confirm the results.

Keywords: genetic expression; ionizing radiation, electro sensitivity.

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