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Gene Fusion Process in MCF7 Breast Cancer Cell Line Models under Early Estradiol Stimulation for Assessing Estrogen Receptor β (Erβ) Tumor Suppressor Activity

Dago Dougba Noel[1*], Aka Jordane[1], Dagnogo Dramane[2], KablanGnonanAka Justin[1], Diarrasouba Nafan[1] and Giovanni Malerba[2]

*[*1]Unité de Formation et de Recherche (UFR), des Sciences Biologiques, Département de Biochimie Génétique, Université Peleforo Gon Coulibaly, Korhogo, Côte d'Ivoire.*

[2]Department of Neurological Biomedical and Movement Sciences, University of Verona, Italy.

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ABSTRACT

Cancers are genetic and epigenetic diseases in which cells divide and grow in uncontrolled ways due to mutations or molecular alterations. Gene fusion phenomena are recurrent in cancer cells. One of the most common cancers is breast cancer, representing worldwide public health concern. Several studies showed the involvement of estrogens and estrogen nuclear receptors in monitoring breast cancer. Herein, we performed a transcriptomic analysis aiming to assess gene fusion events in MCF7 breast cancer cell line models that expressed estrogen nuclear receptors α/β under early (2h) estradiol (E2) stimulation. Reads sequences were aligned on GRCh38 human genome, by using RNA STAR (Version 2.7.8a) allowing detecting gene fusion events. Gene fusion calling were executed by star-fusion package. Results showed a non-significant variability regarding gene fusion happening events between estradiol-stimulated (MCF7E) and non-stimulated (MCF7noE) MCF7 breast cancer cells lines ($p>0.05$). Common detected genes fusions between these two (2), breast cancer cell line models result to be biomarkers of several cancers and as well breast cancer, and characterized by the intra-chromosomic interactions. Findings revealed five (5) gene fusion events specific to breast cancer cells lines non-stimulated (MCF7noE), and recognized as breast cancer biomarkers. Interestingly, our results exhibited estrogen nuclear receptor beta (Erβ) as inhibiting the expression of these breast cancer biomarkers in MCF7 breast cancer cells lines under estradiol stimulation (MCF7E). In conclusion, even if early estrogen hormone stimulation by inducing nuclear estrogen receptor β has non-significant impact on gene fusion variability between MCF7noE and MCF7E breast cancer cell line models by contrast to the alternative splicing event, our study highlighted onco-suppressor activity of Erβ in breast cancer.

Keywords: Breast cancer, Gene fusion, Estradiol (E2), Estrogen nuclear receptor α and β (Erα and Erβ), MCF7

Corresponding author: Dago Dougba Noel, Unité de Formation et de Recherche (UFR), des Sciences Biologiques, Département de Biochimie Génétique, Université Peleforo Gon Coulibaly, Korhogo, Côte d'Ivoire, E-mail: dougbanoeldago@gmail.com

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