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In Adenocarcinomas (ACs) high Nitric Oxide (HNO) leads to adaptation of Tumor Stem Cell (TSC)

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Hypothesis: Adaptation of adenocarcinomas (ACs) after exposure to consistently high concentrations of Nitric Oxide (NO) after adaptation evokes a transformation to an aggressively physical composition identical to cancer stem cells. This is owed to the varying expression of specific biochemical pathways, in particular, cellular respiration being altered.

Objective: Cells modified to large concentrations of High Nitric Oxide (HNO) portray a more vigorous phenotype of AC homologous to cancer stem cells in contrast to non-modified cells. The exact molecular and cellular mechanisms that occur during HNO exposure are not fully understood. Further knowledge of these mechanisms can lead to the development of new drugs targeted against these tumor stem cells.

Methods: The five human cell lines (Lung: A549; Breast: BT20, Hs578, MCF7, and T47D) were exposed gradually by increasing quantities of HNO to the NO donor, DETA-NONOate. Parent and HNO cell lines were tagged with red/green fluorescent markers and the isolated mRNA from both were used to compete in a human genome gene chip analysis experiment.

Results: HK1 and COX7C were up-regulated genes whereas LDHB, LDHBP, PDHA1, AC004490.1, and LSM7 were continuously down-regulated.

Conclusion: On exposure to high concentrations of NO, the enzyme in the cellular respiration pathway that was most affected in ADC cell lines was the PDHA1 (Pyruvate Dehydrogenase Alpha 1). This specific enzyme functions by breaking down Pyruvate into Acetyl-CoA, affecting both Glycolysis as well as the Krebs Cycle. The decrease in the number PDHA1 enzymes implies that AC cells have alternate pathways for energy (ATP) formation.

Biography

Juel Chowdhury began his professional education at the Gulf Medical University where he received his Bachelor of Medicine and Bachelor of Surgery degree. Since then, his works have led him to partner and study with Nobel laureate Dr. Ferid Murad and many well-known scientists such as Dr. Robert Winn, Director of UI Health. He is the Founder and President of Oncomarks.org, an online professional network with an open access journal for the oncologists. His innovative iGenX Lab is a genetical research lab based on data-mining and data analysis of the gene-chip experiment. He is an Editorial Board Member for many international journals like Tumor Biology, JCMT, JUMD, and many professional societies like ASCO and ISOBM. He was the Director of ISOBM (International Society of Oncology and Biomarkers)-2016 Congress held in Chicago and also the upcoming ISOBM 2017 Congress in Brazil. He is an expert in Botulinum Toxin and Dermal Fillers, Facial Reconstruction and Hair Transplant procedures. He is a faculty member of National College of Health. His research interests are as follows: Head & Neck Cancer, Lung & Upper Aero Digestive Tumors, Human Tumor Stem Cells, Nitric Oxide in Tumor Environment.

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