

Researchers use nitric oxide 'scavengers' to target triple-negative breast cancer

August 26 2022

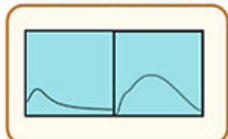


1. NO-measurements

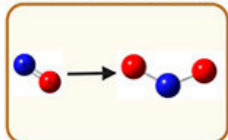
Electrochemical



Chemiluminescence

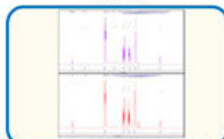


Nitrite measurement

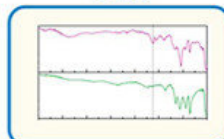


2. Characterization of HA products

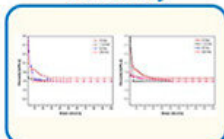
NMR



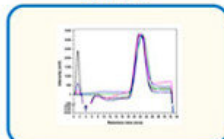
FTIR



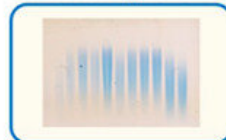
Viscosity



HPLC

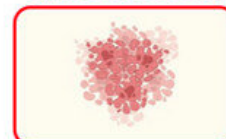


Gel electrophoresis

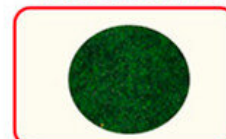


3. *In vitro* testing

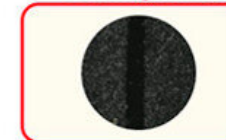
Cytocompatibility



Intracellular NO



Cell migration



Biomacromolecules DOI: 10.1021/acs.biomac.2c00545

Researchers are exploring a potential new therapeutic approach for triple negative breast cancer treatment. Amir Abdo Alsharabasy, a CÚRAM doctoral candidate working in the laboratory of Professor Abhay Pandit,

is working on the design of nitric oxide scavengers to form a new treatment approach for this aggressive form of breast cancer.

Triple-negative breast cancer is invasive breast cancer that does not respond to hormonal therapy medicines or the current medicines that target the HER2 protein. Triple-negative breast cancer is usually more aggressive, harder to treat, and more likely to recur than cancers that are hormone receptor-positive or HER2-positive.

"Nitric oxide is one of the prominent free radicals produced by the tumor tissue", explains Amir, "It, at certain concentrations, plays a significant role in breast cancer progression by inducing the cancer cells to spread to other parts of the body Our goal is to develop injectable hydrogel formulations, which can reduce the levels of, or 'scavenge' the [nitric oxide](#), while enhancing the generation of carbon monoxide, so that we can potentially design a new treatment approach for triple negative breast cancer."

Nitric oxide interacts with different components of the large network of proteins and other molecules that surround, support, and give structure to [tumor cells](#) and tissues in the body. Hyaluronic acid is one of the main components of this network and is the material of choice for fabricating these hydrogels.

"HA plays multiple roles in tumor tissues," says Amir. "However, its interactions with nitric oxide have not been thoroughly investigated. The study, recently published in *Biomacromolecules*, attempts to understand the mechanism of these interactions and the different effects on nitric oxide levels and migration of breast cancer cells."

The study is supervised by Prof Abhay Pandit, Scientific Director of CÚRAM, and was published with collaborators Dr. Sharon Glynn from the Lambe Institute for Translational Research and Dr. Pau Farras from

the School of Biological and Chemical Sciences in the Ryan Institute at the National University of Ireland Galway,

The work investigated the ability of HA to scavenge nitric oxide. The team found that the conversion of nitric oxide to certain nitrogen centered [free radicals](#) causes the HA to break down, which further inhibits the nitric oxide induced migration of [cancer cells](#) in the tumor environment.

Collectively, these results help toward understanding the involvement of HA in nitric oxide induced cell migration and suggests the potential use of modified HA, as a key material in different biomedical applications.

Commenting on the study, Professor Abhay Pandit, says that "while the recent progress in research about the roles of nitric oxide with tumor progression resulted ultimately in a number of ongoing clinical trials for evaluating the effects of NO-synthase inhibitors, we are focusing on NO itself trying to avoid the side effects/reactions of these inhibitors."

More information: Amir M. Alsharabasy et al, Interactions between Nitric Oxide and Hyaluronan Implicate the Migration of Breast Cancer Cells, *Biomacromolecules* (2022). [DOI: 10.1021/acs.biomac.2c00545](https://doi.org/10.1021/acs.biomac.2c00545)

Provided by National University of Ireland, Galway

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