Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **4144** Type: **Invited Speaker / Conférencier(ère) invité(e)**

Application of non-thermal plasma during tumorectomies to improve local control of triple-negative breast cancer.

Wednesday 29 May 2024 10:30 (30 minutes)

In patients with triple-negative breast cancer, the most difficult form of breast cancer to treat, local recurrence rates are as high as 15%, despite the addition of adjuvant radiotherapy to surgery. Non-thermal plasma (NTP) could be used to treat the tumor bed immediately after the removal of the tumor, to eliminate any remaining tumor cells and thus reduce the risk of recurrence, even with positive margins. NTP can be applied directly to cancer cells to increase the intracellular content of reactive oxygen species, leading to cell death.
Human triple-negative breast cancer line MDA-MB-231 were grown in immunocompromised mice and the tumors were then either untreated (control), treated with gas alone (gas control), or treated with NTP. The NTP device used in this study is the Convertible Plasma Jet (CPJ) from Montreal startup NexPlasmaGen. Here, NTP is sustained by a helium flow +/- the addition of oxygen, passing through electrodes in a coaxial configuration driven by a 13.56 MHz electric field.
At necropsy, tumors treated with NTP were on average 50% smaller than those untreated or treated with gas alone. Moreover, of 46 tumors treated with plasma, 3 had completely disappeared (6.5%). These results show that NTP is capable of killing triple-negative breast cancer cells in vivo in a single treatment and could therefore help secure the tumor bed post surgery.
A first-in-human clinical study on 24 breast cancer patients is being prepared at CHUM for 2024. Its goal will be to determine the safety of the CPJ and the potential cosmetic effects associated with its use.

Keyword-1

non-thermal plasma

Keyword-2

breast cancer

Keyword-3

Author: GLORY, Audrey (CR-CHUM)

Co-authors: Dr BOISVERT, Jean-Sébastien; Dr LAFONTAINE, Julie (CR-CHUM); Dr WONG, Philip (CR-CHUM / UHN); Prof. COULOMBE, Sylvain (McGill)

Presenter: GLORY, Audrey (CR-CHUM)

Session Classification: (DPP) W2-5 Plasma Physics and Technology | Physique et technologie des plasmas (DPP)

Track Classification: Symposia Day (Wed May 29) / Journée de symposiums (Mercredi 29 mai): Symposia Day (DPP - DPP) - Plasma Physics and Technology | Physique et technologie des plasmas