

## Head and neck cancer treatment with plasma activated medium

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Biomedical applications of low-temperature plasmas are of growing interest. These plasmas jet are an interesting source of active species (charged particles, radicals, long-lived excited species, UV photons, electric field, etc.) that can easily be launched on any prokaryote or eukaryote cells, living tissues, biomaterial surfaces. The present work is aimed at investigating the regionalized antiproliferative effects plasma activated medium (PAM) on multicellular tumor spheroid (MCTS), a model that mimics the 3D organization and the regionalization of a microtumor region. A homemade helium plasma jet was used to produce PAM. In the case of multicellular tumor spheroids, results indicate that PAM can induce cell detachment in the first day in a PAM time-dependent manner associated with the regionalized accumulation of DNA damage detected by histone H2AX phosphorylation. This DNA damage is due to

the presence of hydrogen peroxide in PAM. However, a cellular protective response that defends FaDu cells against H<sub>2</sub>O<sub>2</sub> is observed and a rapid spheroids regrowth is occurring. After multiple PAM treatments of FaDu, MCTS growth inhibition is obtained. Finally, this study underlines the importance of working with MCTS instead of 2D cells. Indeed, after PAM treatment, monolayer culture using a high number of cells has a response at day one close to the MCTS one. But in the following days, cells behaviors diverge. Contrary to MCTS that have a high proliferation rate at day two, cells in 2D culture continue to die. Observations on 2D cell culture can suggest that a single PAM treatment is enough to kill cancerous cells. Our results clearly demonstrate that MCTS models, closer to an *In vivo* tumor, displayed a defense response leading to a growth increase of spheroids which requires adaptation of treatment with PAM.

### Biography

Merbahi N has completed his PhD from Paul Sabatier University, France. He is the professor in Toulouse University, France. He has over 60 publications that have been cited over 300 times, and his publication H-index is 15.

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