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화학과 Colloquium Seminar

Selective Generation of Reactive Oxygen and Nitrogen Species for Cancer Therapy: The Newly Designed Plasma Platform Approach

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○ **초록**

In this study, we fabricated various types of reactive oxygen (ROS) and nitrogen species (RNS) selectively through a newly designed bioplasma platform, which was the integration of double barrier dielectric plasma and droplet-based microfluidics. Through the new platform, ROS and RNS could qualitatively, quantitatively, and selectively be produced depending on the components inside the solution. Analyzed ROS including hydrogen peroxide (H_2O_2), hydroxyl radicals ($^{\bullet}OH$) and singlet molecular oxygen ($^1O2$) showed the same phenomenon that the amount formed decreased as the components such as inorganic salt, vitamin, and amino acids were steadily included. Interestingly, RNS including nitric oxide ($^{\bullet}NO$), peroxynitrite ($ONOO^-$) and nitrite/nitrates ($NO2^-/NO3^-$) was only formed when amino acids were dissolved under the solution, indicating that RNS can selectively be formed by simply adding specific types of amino acids. Various plasma-activated solutions were further treated to colon cancers and analyzed the cell death signaling pathway. Plasma-activated solutions with ROS itself led the apopototic cell death while them with ROS and RNS led the immunogenic cell death, indicating that cells treated by ROS and RNS showed different pathway. Therefore, we believe that various reactive species can be selectively formed through the newly designed bioplasma platform, and by determining the cell death pathway of the generated reactive species, reactive species will be applied in future cancer treatment studies.

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