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Electrochemically reduced water exerts superior reactive oxygen species scavenging activity in HT1080 cells than the equivalent level of hydrogen-dissolved water

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Abstract

Electrochemically reduced water (ERW) is produced near a cathode during electrolysis and exhibits an alkaline pH, contains richly dissolved hydrogen, and contains a small amount of platinum nanoparticles. ERW has reactive oxygen species (ROS)-scavenging activity and recent studies demonstrated that hydrogen-dissolved water exhibits ROS-scavenging activity. Thus, the antioxidative capacity of ERW is postulated to be dependent on the presence of hydrogen levels; however, there is no report verifying the role of dissolved hydrogen in ERW. In this report, we clarify whether the responsive factor for antioxidative activity in ERW is dissolved hydrogen. The intracellular ROS scavenging activity of ERW and hydrogen-dissolved water was tested by both fluorescent stain method and immuno spin trapping assay. We confirm that ERW possessed electrolysis intensity-dependent intracellular ROS-scavenging activity, and ERW exerts significantly superior ROS-scavenging activity in HT1080 cells than the equivalent level of hydrogen-dissolved water. ERW retained its ROS-scavenging activity after removal of dissolved hydrogen, but lost its activity when autoclaved. An oxygen radical absorbance capacity assay, the 2,2-diphenyl-1-picrylhydrazyl assay and chemiluminescence assay could not detect radical-scavenging activity in both ERW and hydrogen-dissolved water. These results indicate that ERW contains electrolysis-dependent hydrogen and an additional antioxidative factor predicted to be platinum nanoparticles.

Figures

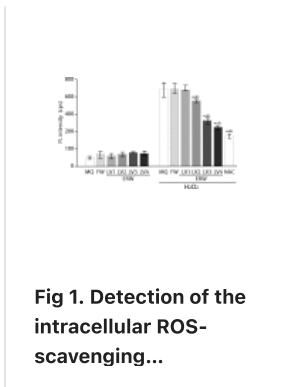


Fig 1. Detection of the intracellular ROS-scavenging...

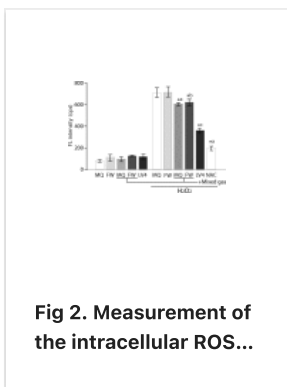


Fig 2. Measurement of the intracellular ROS...

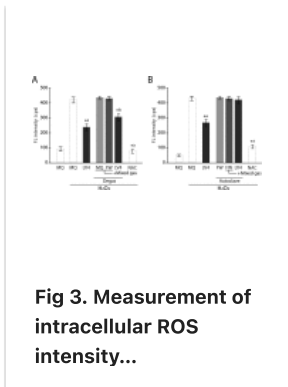


Fig 3. Measurement of intracellular ROS intensity...

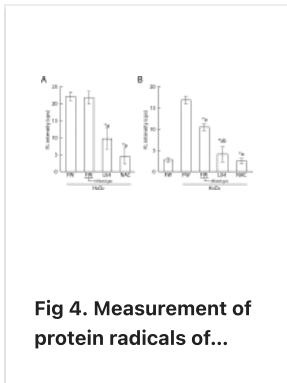


Fig 4. Measurement of protein radicals of...

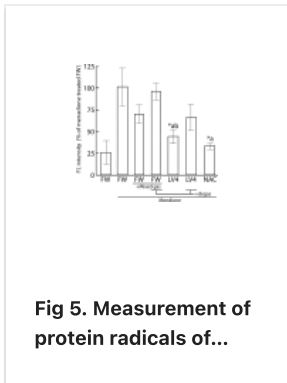


Fig 5. Measurement of protein radicals of...

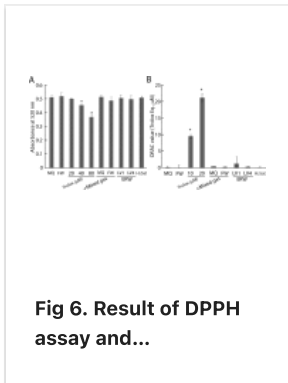


Fig 6. Result of DPPH assay and...

All figures (7)

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