The Effect of L-Arginine and Cisplatin on hSOD1 for Treating Amyotrophic Lateral Sclerosis

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The purpose of this investigation was to measure the effect of L-arginine on cisplatin's ability to disaggregate human superoxide dismutase 1 enzymes (hSOD1), which are found to aggregate in amyotrophic lateral sclerosis patients. A chromene detecting agent for thiols was synthesized measure the degree of oligomer aggregation. Solutions with varying concentrations of L-arginine with cisplatin, hSOD1 oligomers, and the detecting agent were tested using spectrophotometry. Absorbance values were converted into thiol concentrations to determine the degree of aggregation. Between the sixth and fortieth day, the thiol concentrations of the positive control (cisplatin treatment only), 0.04 mM L-arginine solution, 0.08 mM L-arginine solution, and 0.2 mM L-arginine solution increased by 0.8157, 2.5059, 3.3314, and 4.1026 micromoles/L respectively, while the thiol concentration of the negative control (no treatment) decreased by 0.0063 micromoles/L. These results occurred because L-arginine and cisplatin, with their antioxidant properties, were able to break disulfide bonds that formed from aggregation. The negative control's thiol concentration did not increase because there was no antioxidant to break the disulfide bonds. The thiol concentration increase of the 0.2 mM L-arginine was 402.9563% more than the thiol concentration increase of the positive control between the sixth and fortieth day. The thiol concentration of the 0.2 mM L-arginine was 420.2465% more than that of the positive control on the fortieth day. At the given concentrations, cisplatin and L-arginine (especially high concentrations of L-arginine) can more effectively disaggregate hSOD1 than just cisplatin. L-arginine may be tested on ALS patients to extend their lives by disaggregating hSOD1 oligomers.

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