Ubisol Q-10 in Combination with Methylene Blue as a Treatment for Alzheimer’s Disease in a Transgenic Mouse Model

Simon Anthony Pupulin A
University of Windsor, pupulins@uwindsor.ca

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**Introduction**

Alzheimer’s disease (AD) is a progressive neurodegenerative disorder often associated with memory impairment. According to the World Health Organization, approximately 48 million people worldwide live with the disease and this number is expected to triple by 2050.\(^1\)

As AD is a poorly understood disease, there is currently no cure for the degeneration it causes. However, some studies have shown a link between Alzheimer’s disease and oxidative stress. Elevated reactive oxygen species (ROS) are a result of inefficiency in the electron transport chain in the mitochondria and can induce premature cellular senescence. The death of these neurons can lead to the formation of neurofibrillary tangles and amyloid plaques, characteristic of the disease, in regions of the hippocampus and cerebral cortex.

It has been demonstrated that the water soluble formulation of the anti-oxidant CoQ\(_{10}\) (Ubisol-Q\(_{10}\)) can stabilize the mitochondria and prevent neuronal loss by ultimately reducing the generation of free radicals. The neuroprotective properties of Ubisol-Q\(_{10}\) have been tested in transgenic mouse models expressing the human amyloid precursor protein and mutant human presenilin-1. Methylene blue has also been found to improve cognitive function in AD patients and reduce amyloid plaque levels, providing successful neuroprotection.\(^3\)

**Objective:** Ultimately, the goal of this study is to use a combination of both Ubisol-Q\(_{10}\) and methylene blue to study how efficient this collage of treatments is in postponing premature cellular senescence in transgenic mouse models.

**Methodology**

<table>
<thead>
<tr>
<th>Group</th>
<th>Description</th>
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<tbody>
<tr>
<td>1. Control Group</td>
<td>No treatment</td>
</tr>
<tr>
<td>2. Ubisol-Q(_{10})</td>
<td>Oral-supplemented (6mg/kg/day)</td>
</tr>
<tr>
<td>3. Methylene Blue</td>
<td>Injected (4mg/kg/day)</td>
</tr>
<tr>
<td>4. Ubisol-Q(_{10}) and Methylene Blue</td>
<td>Both injection (MB) and oral-supplement (CoQ(_{10}))</td>
</tr>
</tbody>
</table>

- In partnership with Dr. Jerome Cohen’s psychology research lab, mice in various groups will be subject to various tests of memory and cognition
- After 1.5 years, mice will be sacrificed and blood cells will be analyzed for amyloid-\(\beta\) proteins through ELISA
- Various staining techniques will be implemented to quantitatively assess the presence of amyloid-\(\beta\) plaques through Congo Red and anti-human amyloid-\(\beta\) antibody staining
- Astrocites: detection of astrocites will be primarily through glial fibrillary acidic proteins (GFAP) identification
- Microglia: Iba1 (ionized calcium-binding adapter molecule 1) will be monitored for microglia activation

**Past Results (Ubisol-Q\(_{10}\))**

![Graph showing human amyloid-\(\beta\) levels](image)

**Past Results (Methylene Blue)**

![Graph showing human amyloid-\(\beta\) levels](image)

**References**