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POTENTIAL OF HERBAL MEDICINE IN PROTECTING NEURONS IN NEURODEGENERATIVE DISEASES

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Alzheimer's disease (AD) is a multi-factorial disease in which β-amyloid peptide, oxidative stress, and inflammatory factors contribute to certain level of toxic effects to neurons. Similar to multi-hit theory in cancer cell development, neurons receive different endogenous toxins at different pathological states. It is important to find neuroprotective agent that can fight against different toxins. Therefore, we focus on finding certain chemicals from herbal medicine that can provide neuroprotection.

From small molecules to large molecular weight compound, we have followed traditional pathway-specific drug discovery program to find out certain neuroprotective drugs. However, we are surprised that those chemicals extracted from herbs have multi-functional effects to fight against different toxins. One small molecule from *Alpinae Oxyphyllae* has been found to improve cognitive function. Our recent data show that it provides neuroprotection against glutamate neurotoxicity. While most of the investigations in herbal medicine focus on small molecules fight against oxidative stress, we find that another nature of chemical, glycoconjugates, provides neuroprotection. One example we have been working for the last five years is glycoconjugates from anti-aging Wolfberry (*Lycium barbarum*). By using primary cultured of cortical neurons, glycoconjugates from Wolfberry provide neuroprotection against β-amyloid peptide, glutamate and hyperhomocysteine toxicity. Activation of c-Jun N-terminal kinase (JNK) by the above toxins is attenuated. Not only experimental model of AD, we find that it can attenuate neuronal injury in animal models of other neurodegenerative diseases.

Taken together, increasing lines of evidence show that pathogenesis of AD and even other neurodegenerative diseases are complex and in multi-factorial. Pathway-specific drug may not be sufficient to overcome different stresses towards neurons. Herbal medicine will provide numerous beneficial effects because they are usually multi-targets.

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