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BIOGRAPHY

Bahr BA completed his PhD in 1989 from the University of California–Santa Barbara, USA, helping to identify a target for the early diagnosis of Alzheimer's disease. He was appointed as the William C Friday Chair and distinguished Professor at University of North Carolina-Pembroke, USA in 2009. He has over 140 publications with a publication H-index of 44. He received the North Carolina Governor O Max Gardner Award in 2017.

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PLANT EXTRACTS AMPLIFY A PROTEIN CLEARANCE PATHWAY AND PRESERVE SYNAPTIC INTEGRITY IN A BRAIN SLICE MODEL OF PROTEIN ACCUMULATION STRESS

Brain aging can slowly lead to synaptic and cellular vulnerabilities, influencing cognitive function and dementia risks. Removal of old and altered proteins becomes less efficient with age, causing neuronal stress as protein clearance systems depreciate. A growing number of studies point to natural products and a healthy diet to avoid poor cognitive aging. Here, we examined a group of plant extracts for their effects on a protein clearance pathway that has been linked to protection against Alzheimer-type cognitive decline. When applied to hippocampal slice cultures for 3 days, two of the extracts were found to markedly enhance cathepsin B (CatB), a key protein clearing enzyme of the autophagy-lysosomal pathway. American ginseng *(P. quinquefolius)* produced a 4-fold increase in the 30-kDa active form of CatB (CatB-30). Interestingly, a close correspondence between CatB-30 levels and improved levels of the postsynaptic protein GluR1 was found in brain slices treated with American ginseng. Extracts of bacopa *(B. monnieri)* caused similar CatB-30 modulation in the tissue slices, but in the absence of correlated GluR1 levels. Small increases in CatB-30 were produced by extracts from Panax ginseng and wild blueberry *(V. myrtillus)*. When extracts were tested for protection in a brain slice model of protein accumulation stress, American ginseng was found to be the most effective. The extract significantly protected synap-

tic integrity in chloroquine-treated slice cultures, chloroquine being a well-known lysosomal disruptor used to model age-related compromise of the autophagy- lysosomal pathway and producing the typical synaptic decline associated with such stress. These results indicate that natural products can positively influence a protein clearance pathway in the brain to promote synaptic maintenance. The findings suggest that CatB positive modulation leads to enhanced synaptic health, indicating a natural preventative strategy to attenuate early proteinopathy and reduce the risk of age-related cognitive impairment.

Note: