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IDENTIFICATION AND MOLECULAR REGULATION OF NEURODEGENRATION IN THE AGING ADULT MAMMALIAN CNS

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BACKGROUND: Biological aging is an integrated and complicated process. Stress-related protein and anti-apoptotic protein have long been thought of as pivotal factors in the aging process. Hsp90 and bcl-2 were chosen as markers to identify the extent of aging in vivo. We are interested in central mechanisms such as symmetry for biological aging. Screening the whole brain, hippocampus is among the best-characterized cortical structures and ideally suited for anatomical investigations. In this study, we focus on this area to compare young adults with aged rats concerning the different patterns of hsp90 and bcl-2 expression. If there are asymmetrical characteristics, it provides us with a guideline to approach underlying mechanisms for aging and anti-aging.

AIM: To investigate whether there are structure-based asymmetries in aged hippocampus

METHODS/RESULTS: In our previous observation, normal adult and aged rat hippocampus contained abundant heat shock protein 90 (hsp90). Hippocampus is an assembly and independent structure which, amongst other structures, also comprises of the dentate gyrus and hippocampus proper (CA1-CA4). This evidence led us to investigate stress protein hsp90 and anti-apoptotic protein bcl-2 distribution pattern in aged hippocampus. For this project, normal aged adult (20 months old) Sprague-Dawley rats were used. Serial sections, especially of the hippocampal formation, were processed with immunohistochemical staining for hsp90 and bcl-2 to determine the patterns distributed in dentate gyrus with CA1-CA4. Results from aged rats showed that there are intense reactions for hsp90 in the CA1-CA4 and bcl-2 in the CA3-CA4. Conversely, there are faint hsp90 and bcl-2 signals in the dentate gyrus. To summarize the findings, the aged hippocampus has a structure-based internal asymmetry character.

CONCLUSION: Aged hippocampus exhibits internal asymmetrical character. It paves the way to further understanding the entire process of aging. Furthermore, accumulated data may accelerate building of anti-aging strategies.

Keywords: Aging. Stress Protein. Neurodegeneration.