Testing the hypothesis that chronic stress accelerates brain aging in a mouse model

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Introduction

Epidemiology studies state that chronic stress can increase the risk of age-related neurodegenerative disease. In addition, studies on animal models demonstrate that chronic stress create cognitive and histological effects that show parallel effect during normal aging. This result implies that chronic stress leads to permanent damages and accelerate brain aging. Here our aim is to directly test the hypothesis that chronic stress accelerates brain aging in a young adult mouse model. We planned to measure the effects of chronic stress on short term memory, serum corticosterol level and transcriptome measurements of prefrontal cortex during aging and compare it with control young adult mice. While on human and macaques Short term memory and attention managed by dorsolateral prefrontal cortex, on rodents these managed by medial prefrontal cortex.

Methods

A radial maze (Figure 2) test was applied before and after chronic stress exposure on ten, three months years old swiss albino mice (Figure 1) for two months. Partially bated Radial maze helped to determine short and long term memory changes simultaneously. In our chronic stress model, restraint stress (Figure 3) and predator stress (Figure 4) or rat exposure stress was applied periodically 4 hours everyday during 2 months without harming mice; And the control group preserve intact. At the end of each day, during radial maze test and stress test the weight of each mice measured. At molecular level, once before stress and twice during the stress period, the blood of the animals was collected to detect corticosterol levels. When mice reach late age, we plan to collect transcriptome data which will aid us to see the effects of chronic stress and aging on brain and blood transcriptoms. The telomere length changes will also examined.

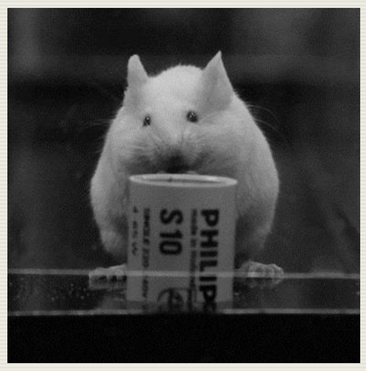

Figure 1

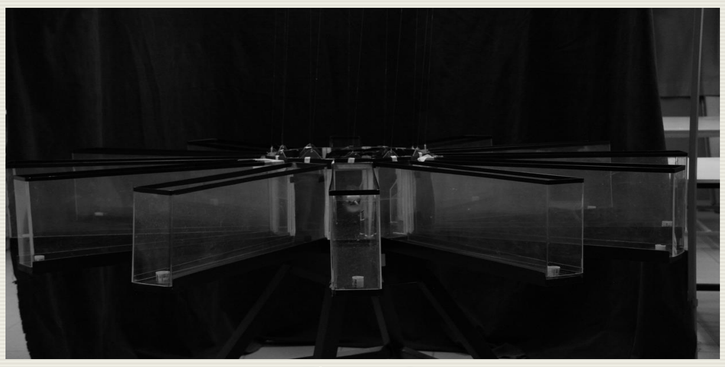

Figure 2

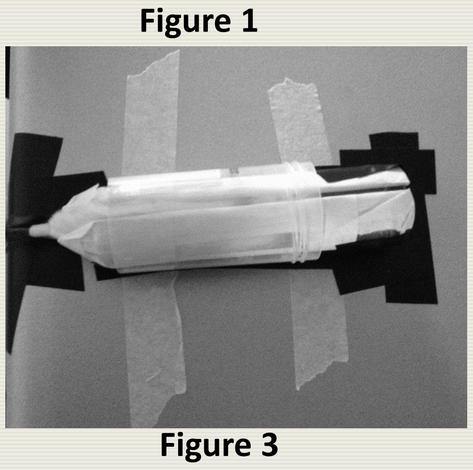

Figure 3

Figure 4

Results & Discussion

Mice M1, M5 and Y2 are control group. The Table 1 shows the long term, short term and true arms. It is expected to observe the increase on long term and short term errors after applied stress on stress groups, In addition the number of true arms stress groups enter expected to decrease after the stress period. However these conditions could not observed clearly. Table 2 shows the number of true arms each mouse enter before and after stress. The rumor that there is a difference between man and woman observers is reject by Table 3. There is not obvious difference in mice performance between observers. The weights of each mice changes as we expected. Start of the stress cause the loose of the mice weight. The weight loose can be observed also after the blood take.

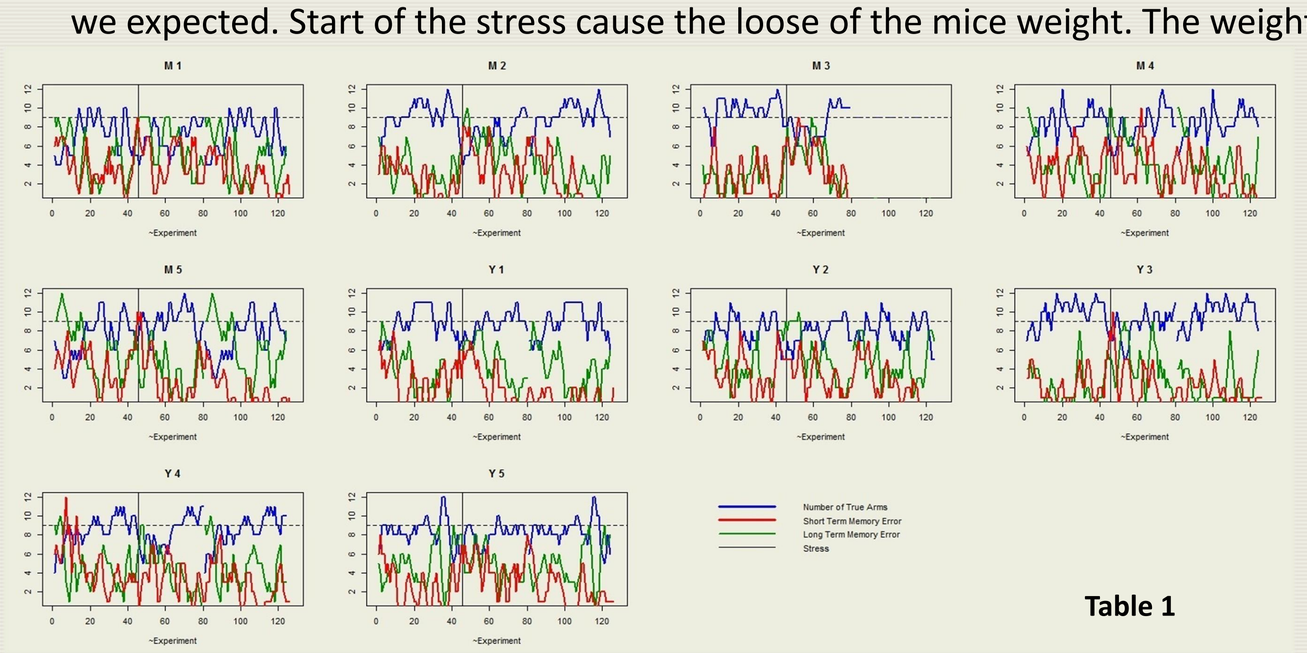

Table 1

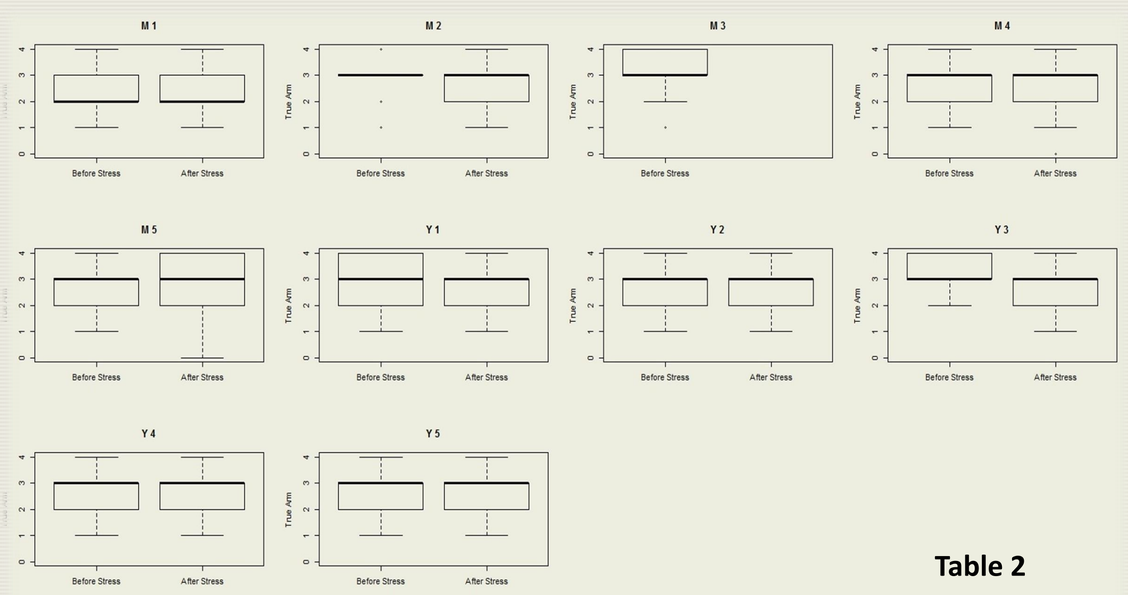

Table 2

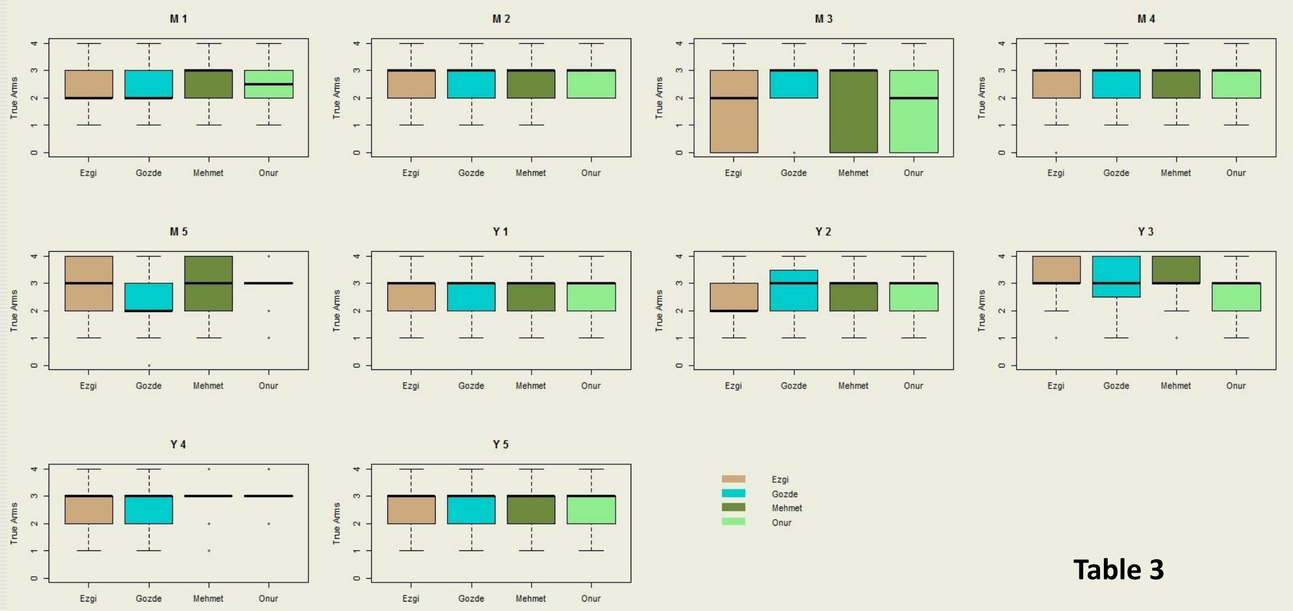

Table 3

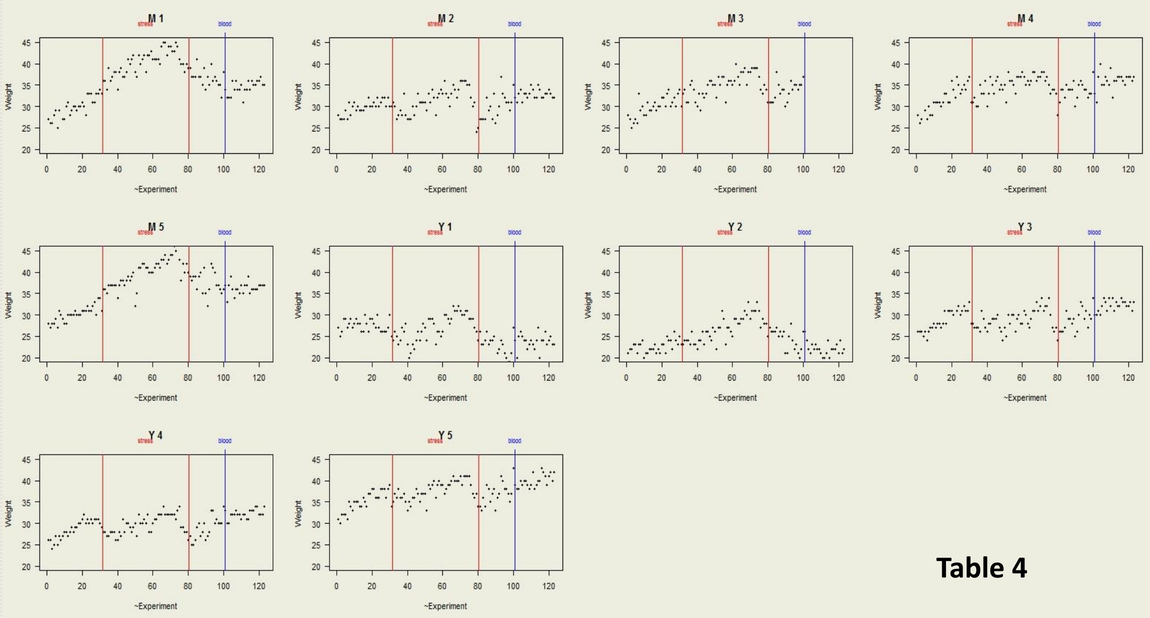

Table 4