Reviewer #1:

The current study investigates the effects of simulated galactic cosmic radiation on memory in aging mice. The study used AppNL-F/NL-F knock-in mouse model, in which the brain exhibit AD-like pathology. The study should be considered novel and correctly performed. Minor errors do not affect my high evaluation of the work.

We thank the reviewer for taking the time to review our manuscript and appreciate their positive assessment. We have incorporate their suggested changes as described below.

Line 32 - please define what CNS stands for.

We apologize for leaving out this abbreviation and have now defined it in Line 33.

Line 97 - the first use of the abbreviation AD is in line 94.

Thank you for pointing out the AD abbreviation. We have corrected it in Lines 100 and 103.

Line 143 - similarly, the first “knock-in” term appears in line 138 and there it should be shortened to KI.

Again, thank you for pointing out the use of KI instead of knock-in after the first use of this term. We have corrected it in Lines 145 and 149.

Line 152 - please define more precisely what the authors' research hypothesis is.

We have more explicitly defined our hypothesis in Line 156.

Line 715, 717 - in some cases the number n = 3 or 4. Did the authors do a power test to justify such small research groups (in my opinion too small to get reliable statistical results).

A power analysis was conducted for all groups except the “no travel” controls. These mice were a result of exceptionally productive breeding and were added the study as an extra set of controls to discern travel effects. We recognize that the number of mice is low, however we still found some interesting effects of travel.

Line 812 - anatomically the term “gastrointestinal block” does not exist. Please provide the correct names of the organs harvested

We apologize for any confusion and have rephrased this sentence in Line 831 to include the stomach, small intestine and large intestine.

Line 838 - the term “anti-Aβ anti-serum” sounds ridiculous. Either “antibodies raised against Aβ” or “ anti-Aβ sera”.

We agree and rephrased this sentence to anti-Aβ sera in Line 858.

Line 838 - how did the authors check the specificity of this antibody?

This antibody was generated by Dr. Dominic Walsh when he worked at Brigham & Women’s Hospital. It was fully characterized for specificity to human beta-amyloid protein by biochemical and -pathological means and has previously been used by many labs including our own [1].

[1] Bathini P, Sun T, Schenk M, Schilling S, McDannold NJ, Lemere CA. Acute Effects of Focused Ultrasound-Induced Blood-Brain Barrier Opening on Anti-Pyroglu3 Abeta Antibody Delivery and Immune Responses. Biomolecules. 2022;12(7):951. Published 2022 Jul 6. doi:10.3390/biom12070951

Line 838 - please attach any photographs (documentation) of the stains performed.

We thank the reviewer for this suggestion. We now include images of the hemosiderin and amyloid-beta stains in the supplementary materials (Supplemental Figures 1-3).

Line 989 - did the authors check the normal distribution at all? With what test?

We did check for normal distribution using the following tests: D'Agostino-Pearson omnibus, Anderson-Darling, Shapiro-Wilk, and Kolmogorov-Smirnov.