**Replies to the Author query sheet**

1. Please provide the relevant department/center for the affiliation ‡ if applicable.

For The Jackson Laboratory for Genomic Medicine, there is no relevant department/center information.

1. SJS: Please note that the URLs in the reference list had been deleted by the ME. Following the recent forum post I have reinstated these URLs. Please check that this is correct. Additionally, the overbar template was not used correctly within MathType per SG, these have been changed where needed.

The URLs are corrected.

1. Please verify styling of Greek and math symbols in text and equations throughout article. Check carefully for correct use of boldface, italics, operators, spacing, superscripts, and subscripts. Note: Journal style includes math variables italic and variable modifiers roman type.

We did find in several cases the mathematical equations were broken. We have listed them in a separate section: “Additional corrections”.

1. Any alternations between capitalization and/or italics in genetic nomenclature have been retained per the original manuscript. Please confirm that all genetic nomenclature has been formatted properly throughout.

We checked this and did not find issues.

1. Please confirm the corresponding authors’ address.

We confirm the address is correct.

1. Please check use of italics throughout your article, including all taxonomic and genetic nomenclature. Uppercase Greek letters should remain roman per journal style even when appearing in a term where the overall style is italic (e.g., a gene name such as kap108D). Note that, headings are set all Roman or all italics based on journal style and should not be changed.

We checked this and did not find issues.

1. Please verify all URLs in your article.

URL in line 55 links to a different paper.

1. Please verify all supplemental material links.

I could not open links to all supplementary materials (line 200 as an example). Error message was: **www.genetics.orglookup**’s server DNS address could not be found.

1. Please verify meaning is retained after edits to the sentence “t was further modeled by. . .”

We verify meaning is retained.

1. Please verify that the use of “MCMC” is correct in the sentence “The MLE method made a point. . .,” as the previous sentence specified an HMC method.

We verify this is correct. MCMC is more general, while HMC is a specific implementation of MCMC. It is also the case that MLE is more general, while L-BFGS is a specific implementation of MLE.

1. Please note that both “COL-IV” and “Col-IV” appear in the article, these have been retained as in the original manuscript, please indicate which is correct if applicable.

Please use “Col-IV” in all cases.

1. “PBT” has been expanded as “PBS/Tween 20” in the sentence “Anti-Col-IV was diluted in 0.5%...,” please verify if this is correct.

Greg – this looks right. Maybe contact the person in charge to further verify.

1. Please verify meaning is retained after edits to the sentence “Of the top 55 variants. . .”

We verify meaning is retained.

1. Please verify that “LD” has been correctly defined as “linkage disequilibrium” in the sentence “...rs140233081 and rs149372995 are in linkage. . .”

We verify “LD” stands for “linkage disequilibrium”.

1. Please verify edits to the sentence “..., (2) normally distributed mean and inverse-gamma SE distributions...,” the word “distributed” was removed before “SE.”

We agree with the edits.

1. Please verify meaning is retained after edits to the sentence “Simulation results showed our method. . .”

The meaning is retained.

1. In the author contributions section, please indicate which author is being referred to by ‘C.A.S.’ as this author does not appear to be in the reference list. Please also mention the authors C.C.W., D.A.B., and P.L.D.J. in this section.

Greg – can you check this?

1. In Table 1, please confirm that the abbreviations RSID, REF, and ALT have been defined/spelled out correctly. Additionally, the 95% C.I. column has been edited from all italics to (almost) all Roman font, with only the top four entries remaining in italics as these correspond to the significance threshold mentioned in the legend. Please verify if this is correct.

This is correct.

**Additional corrections**

1. Line 146: “although numerous loci have associated by GWAS”. I feel this sentence is problematic in grammar. Greg - what do you think?
2. There are extra spacing lines between formula, such as 172-187. Not sure if this is meant to be. I think it will look better by taking off the extra spacing lines.
3. There is always a dot symbol (.) at the end of each formula section, such as line 187. These dot symbols are not necessary.
4. Line 196: “first σ and σe followed inverse gamma distribution in prior”. The first σ should be σg.
5. Line 226: The formula was broken. Should be: .
6. Line 243: The formula was broken. Should be: .