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CORRECTION



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Bayesian meta-analytical methods to incorporate multiple surrogate endpoints in drug development process

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I would like to report an erratum to the paper titled 'Bayesian meta-analytical methods to incorporate multiple surrogate endpoints in drug development process' by Bujkiewicz, Thompson, Riley and Abrams, Statistics in Medicine.¹

Unstructured covariance model

There were a couple of errors in the formulae (11) for the relationships of the parameters of the trivariate between-study model (10) with the elements of the covariance matrix **T** in Eq (2). The correct formulae for the conditional variance ψ_3^2 and the coefficients λ_{31} and λ_{32} should read:

$$\psi_3^2 = \tau_3^2 - \lambda_{31}^2 \tau_1^2 - \lambda_{32}^2 \tau_2^2 - 2\lambda_{31}\lambda_{32}\lambda_{21}\tau_1^2,$$
$$\lambda_{31} = \frac{\tau_3 \left(\rho_b^{13} - \rho_b^{12}\rho_b^{23}\right)}{\tau_1 \left(1 - \left(\rho_b^{12}\right)^2\right)}, \quad \lambda_{32} = \frac{\tau_3 \left(\rho_b^{23} - \rho_b^{12}\rho_b^{13}\right)}{\tau_2 \left(1 - \left(\rho_b^{12}\right)^2\right)}$$

The same formulae should be replaced in equations (21) and (22), where also the formulae corresponding to the N-dimensional case should read:

$$\psi_N^2 = \tau_N^2 - \sum_{i=1}^{N-1} \lambda_{Ni}^2 \tau_i^2 - 2 \sum_{1 \le i < j \le N-1} \lambda_{Ni} \lambda_{Nj} Cov(\mu_i, \mu_j)$$
$$\lambda_{NQ} = \left(\rho_b^{QN} \tau_Q \tau_N - \sum_{P=1, P \ne Q}^{N-1} \lambda_{NP} Cov(\mu_P, \mu_Q)\right) / \tau_Q^2$$

The corresponding parts of the bugs code in the online supplement should read:

```
gammaD.sq<-pow(sd.dis,2) - pow(lambdaD1,2)*pow(sd.mri,2) - pow(lambdaD2,2)
            *pow(sd.rel,2) -2*lambdaD1*lambdaD2*lambdaR1*pow(sd.mri,2)
lambdaD1<-(corr.dis.mri-corr.rel.mri*corr.dis.rel)*sd.dis/sd.mri
            /(1-pow(corr.rel.mri,2))
lambdaD2<-(corr.dis.rel-corr.rel.mri*corr.dis.mri)*sd.dis/sd.rel
            /(1-pow(corr.rel.mri,2))</pre>
```

This error had a negligible impact on the results. We are grateful to Dr Georgios Nikolaidis and Anastasios Tasoulas at IQVIA for bringing this to our attention.

Structured covariance model

We also note that there was a typographical error in the online supplement; in the bugs code for the structured model corresponding to ψ_3^2 in eq. (13) (with no impact on any results). The correct line in the code should read:

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gammaD.sq<-pow(sd.dis,2) - pow(lambdaD2,2)*pow(sd.rel,2)</pre>

We thank Valentine Barboux (at the time at Servier) for bringing this to our attention.

DATA AVAILABILITY STATEMENT

The data are included in Table 1 of the original manuscript: Stat Med 2016, v35, 1063–1089.

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REFERENCE

1. Bujkiewicz S, Thompson JR, Riley RD, Abrams KR. Bayesian meta-analytical methods to incorporate multiple surrogate endpoints in drug development process. *Stat Med.* 2016;35(7):1063-1089.