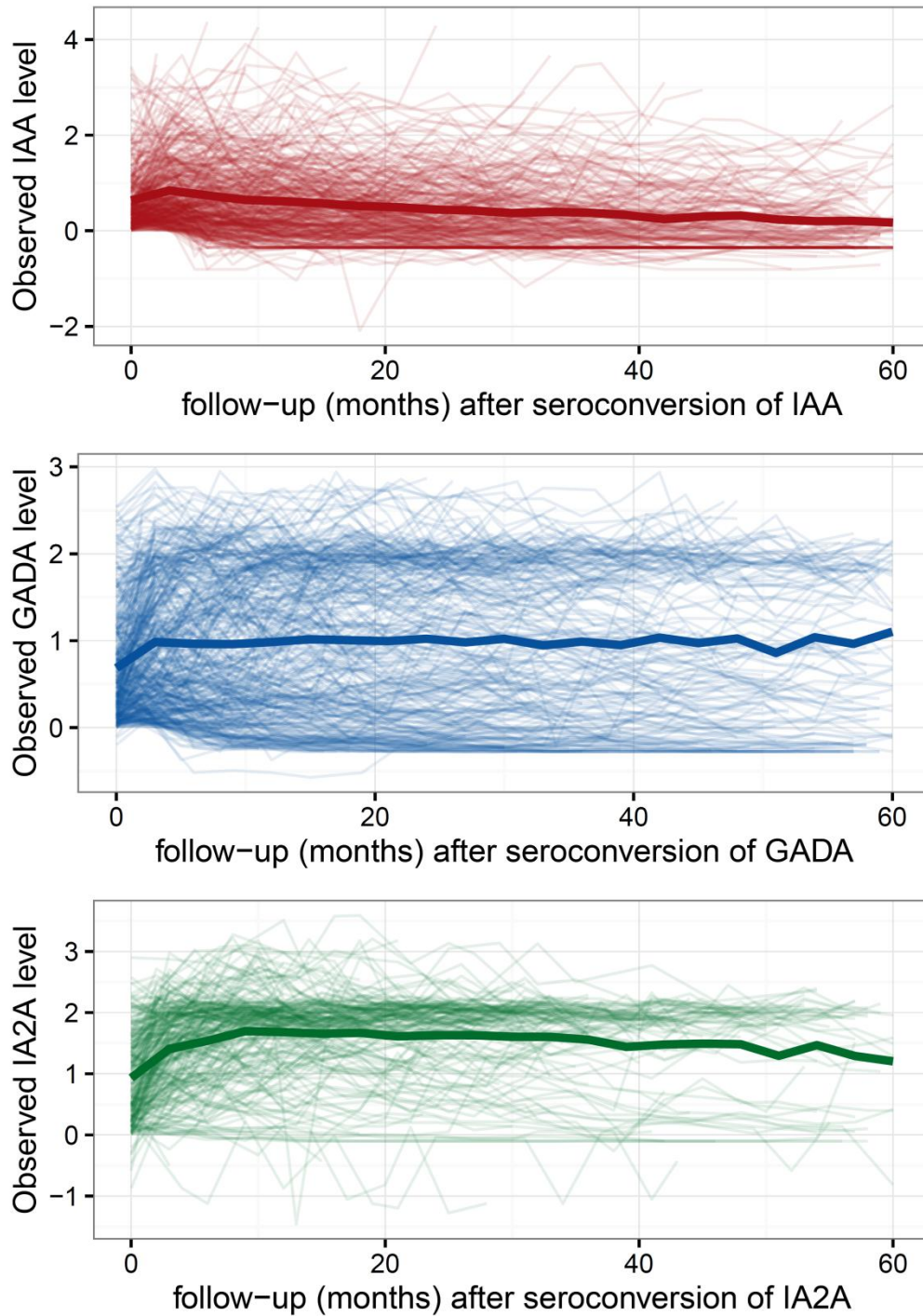


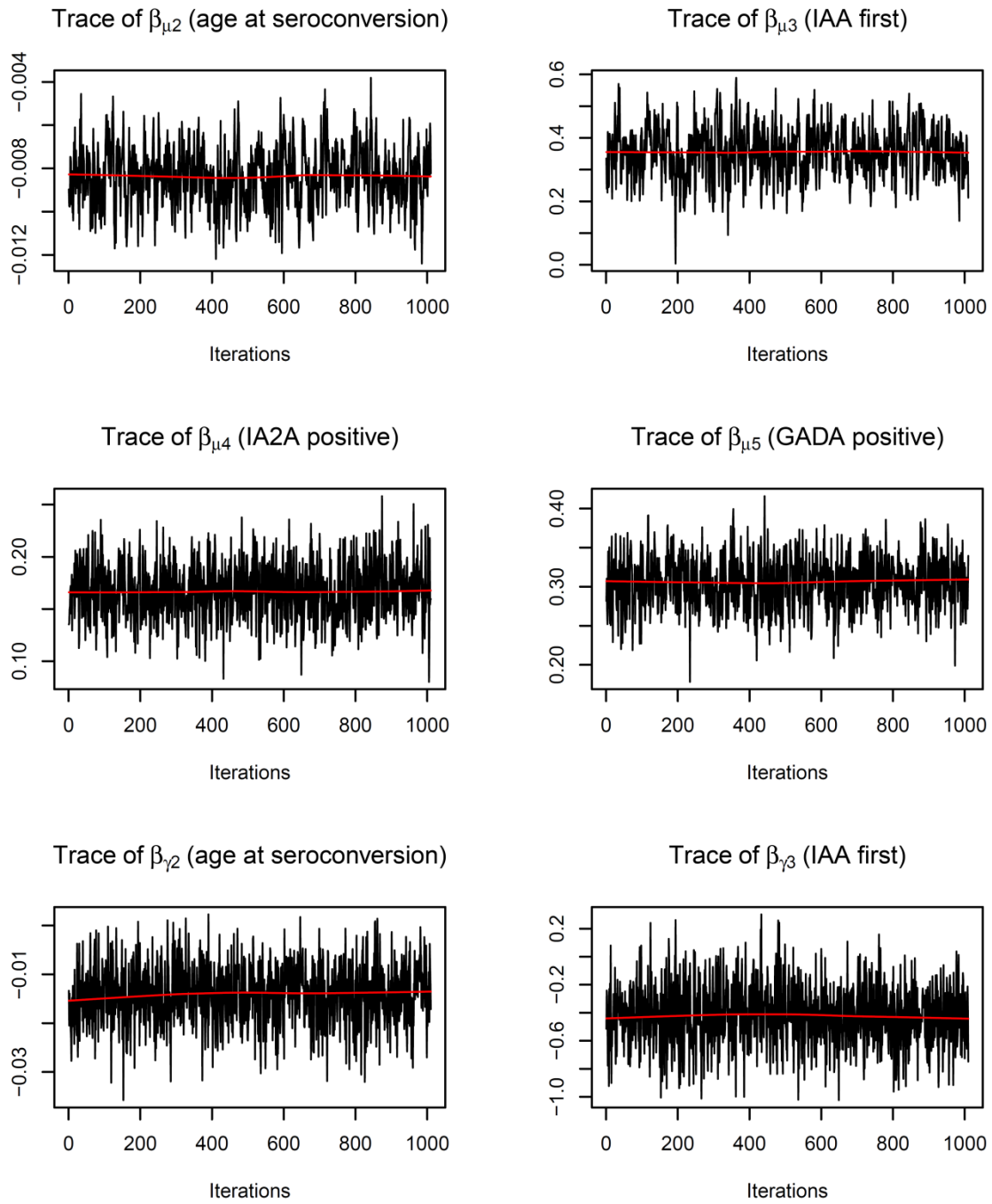
SUPPLEMENTARY MATERIAL

Joint modeling of longitudinal autoantibody patterns and progression to type 1 diabetes: results from the TEDDY study

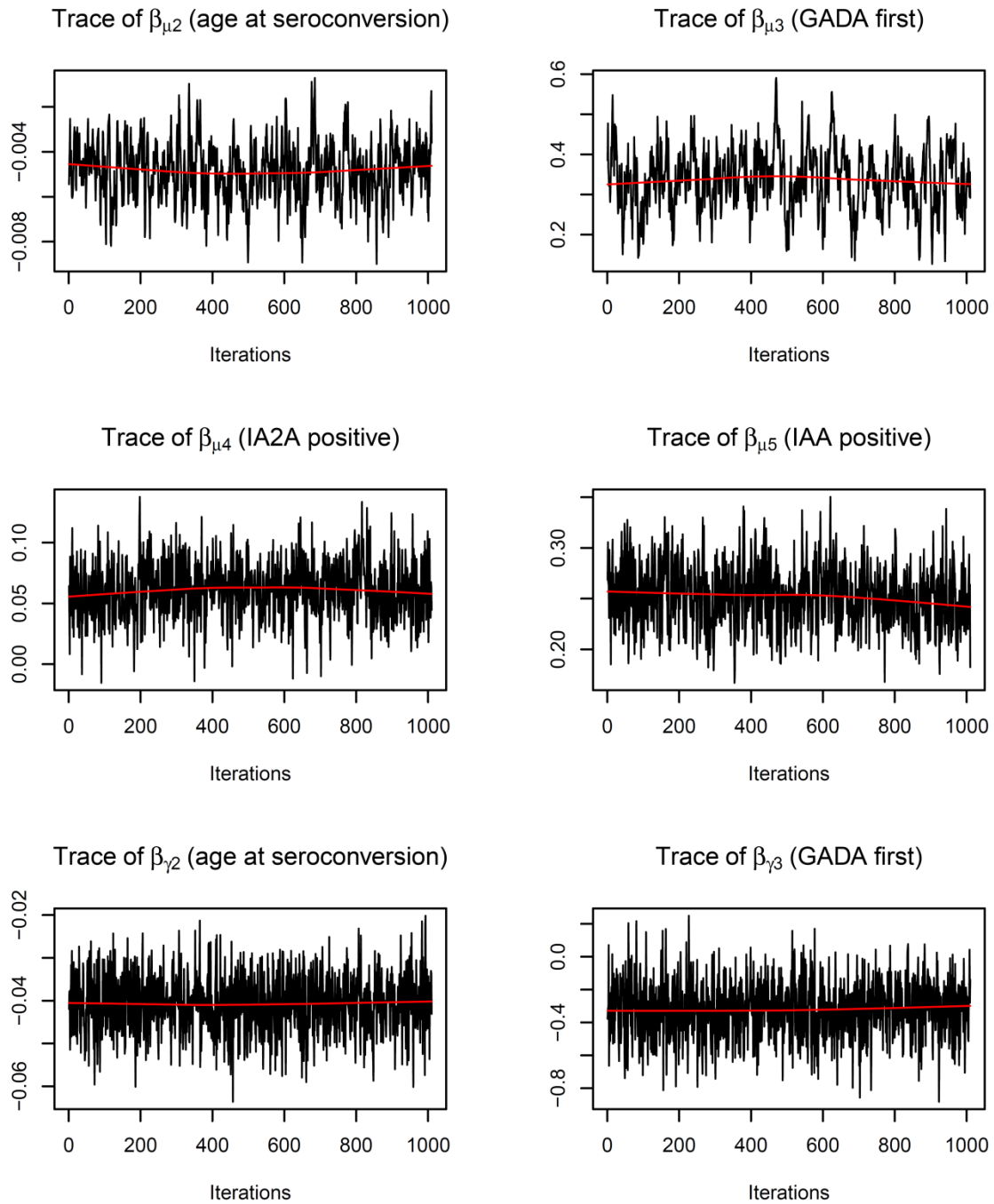
Meike Köhler; Andreas Beyerlein; Kendra Vehik; Sonja Greven; Nikolaus Umlauf; Åke Lernmark; William A. Hagopian; Marian Rewers; Jin-Xiong She; Jorma Toppari; Beena Akolkar; Jeffrey P. Krischer; Ezio Bonifacio; Anette-G. Ziegler; TEDDY study group



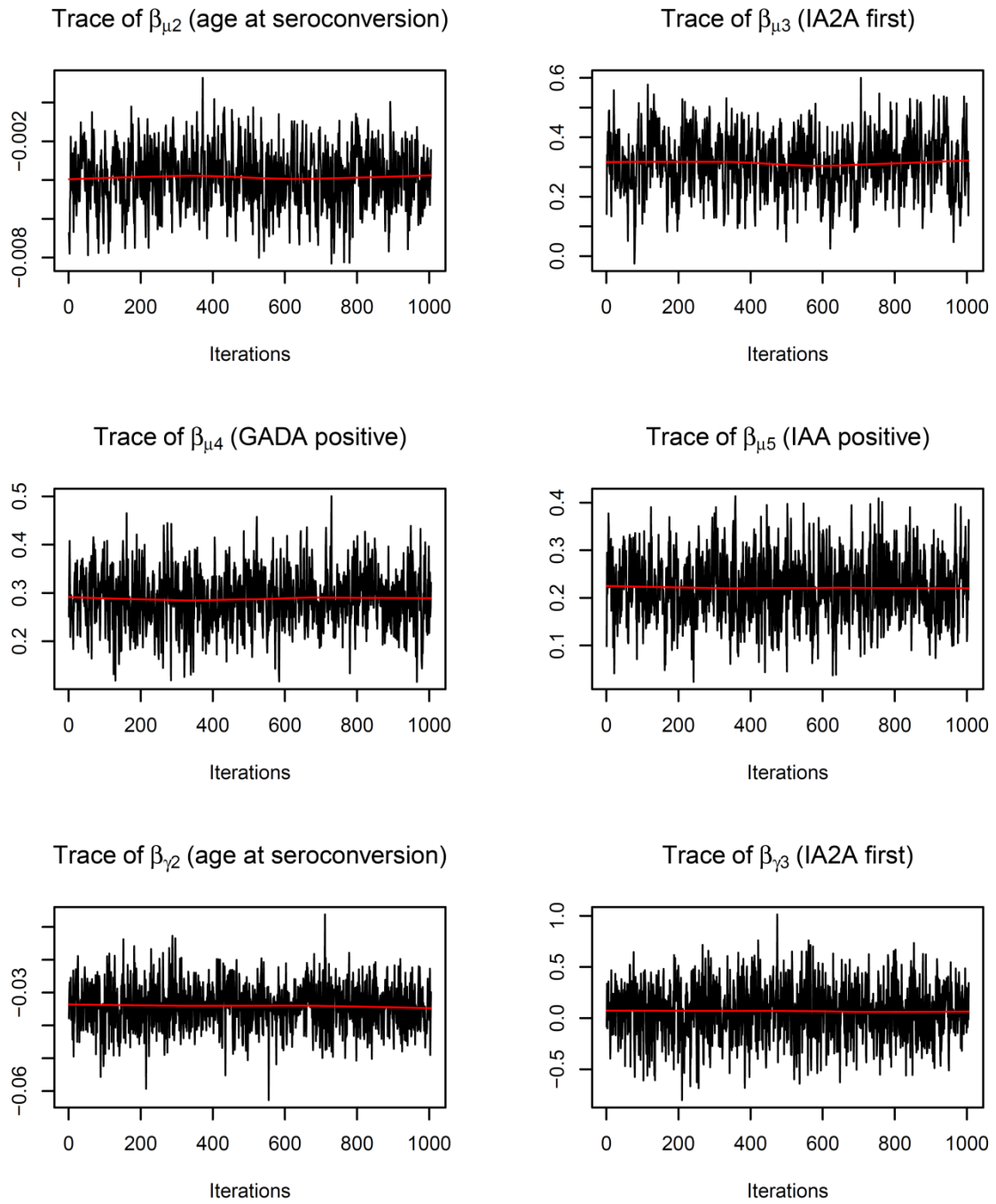
Supplementary Fig. 1 Individual and mean transformed titers of IAA, GADA and IA2A autoantibodies after seroconversion to the respective autoantibody.



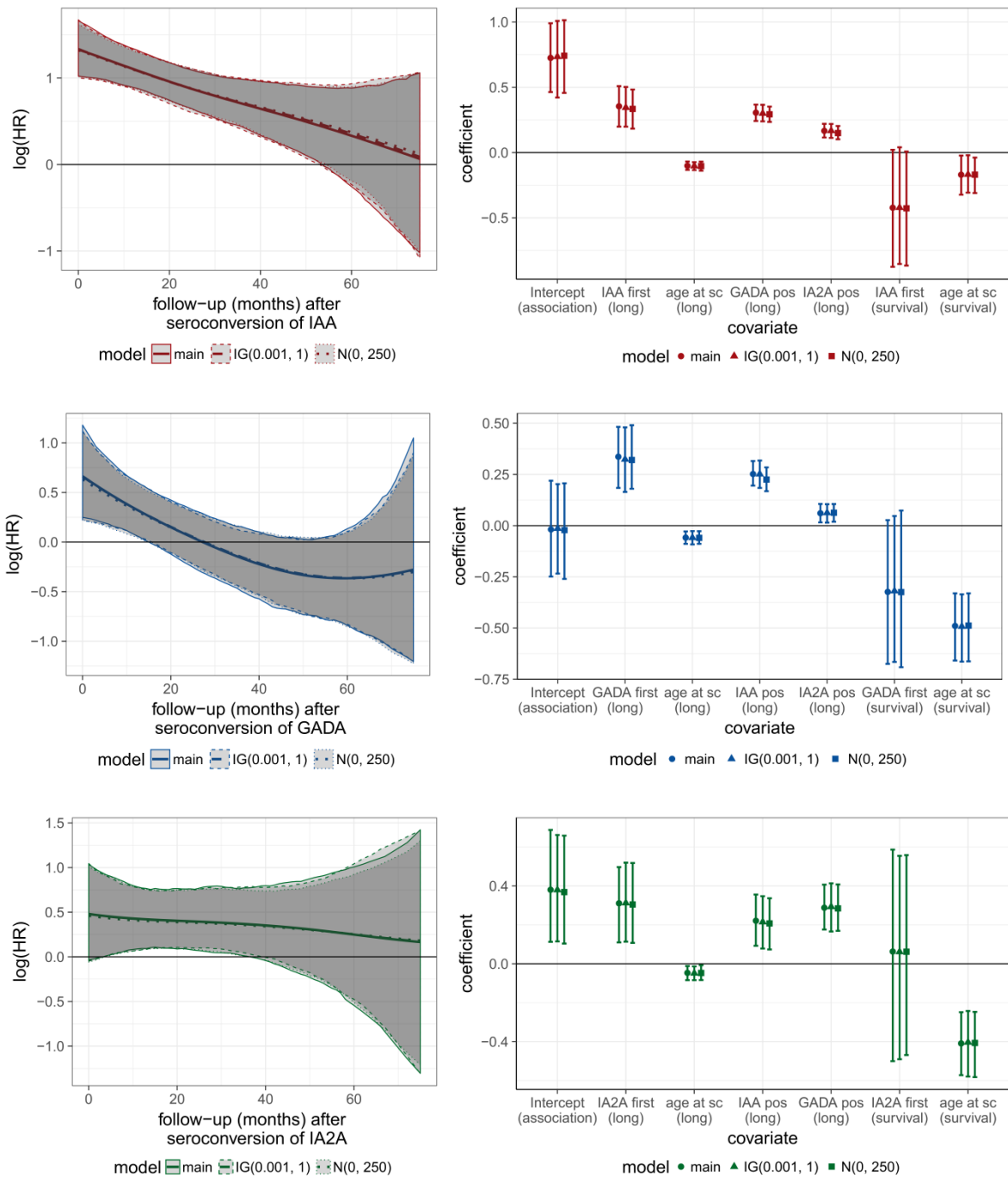
Supplementary Fig. 2 Convergence plots for exemplary coefficients from the joint model of IAA trajectories and progression to T1D. Coefficients with index μ represent the longitudinal submodel and γ the survival submodel (see also Appendix).



Supplementary Fig. 3 Convergence plots for exemplary coefficients from the joint model of GADA trajectories and progression to T1D. Coefficients with index μ represent the longitudinal submodel and γ the survival submodel (see also Appendix).

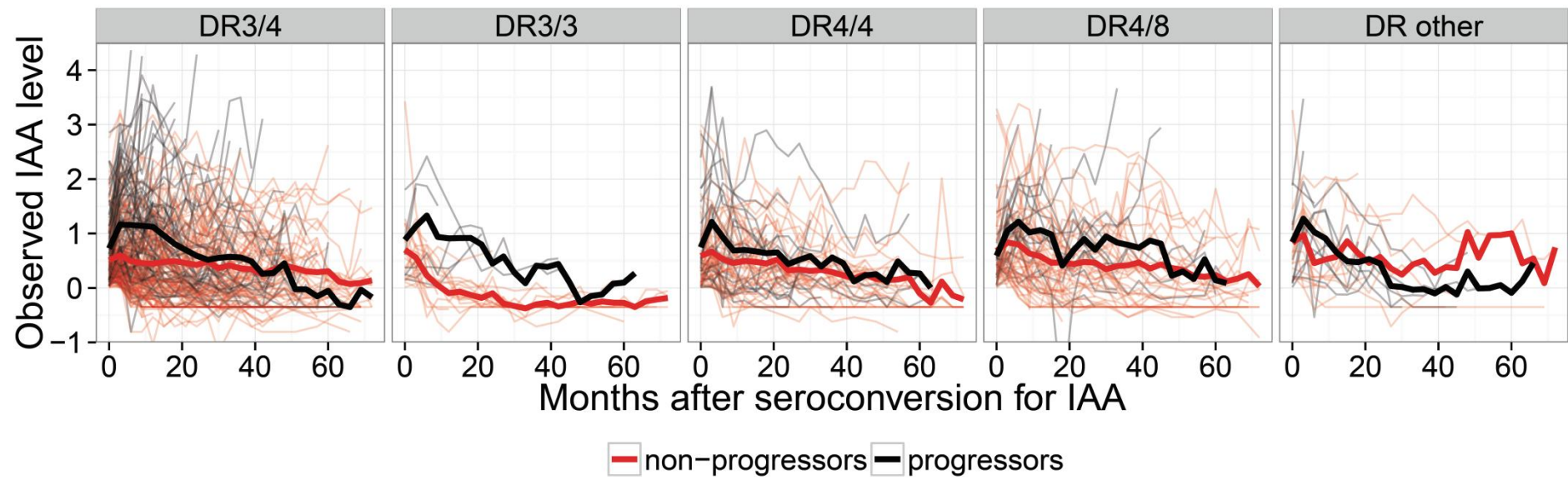


Supplementary Fig. 4 Convergence plots for exemplary coefficients from the joint model of IA2A trajectories and progression to T1D. Coefficients with index μ represent the longitudinal submodel and γ the survival submodel (see also Appendix).

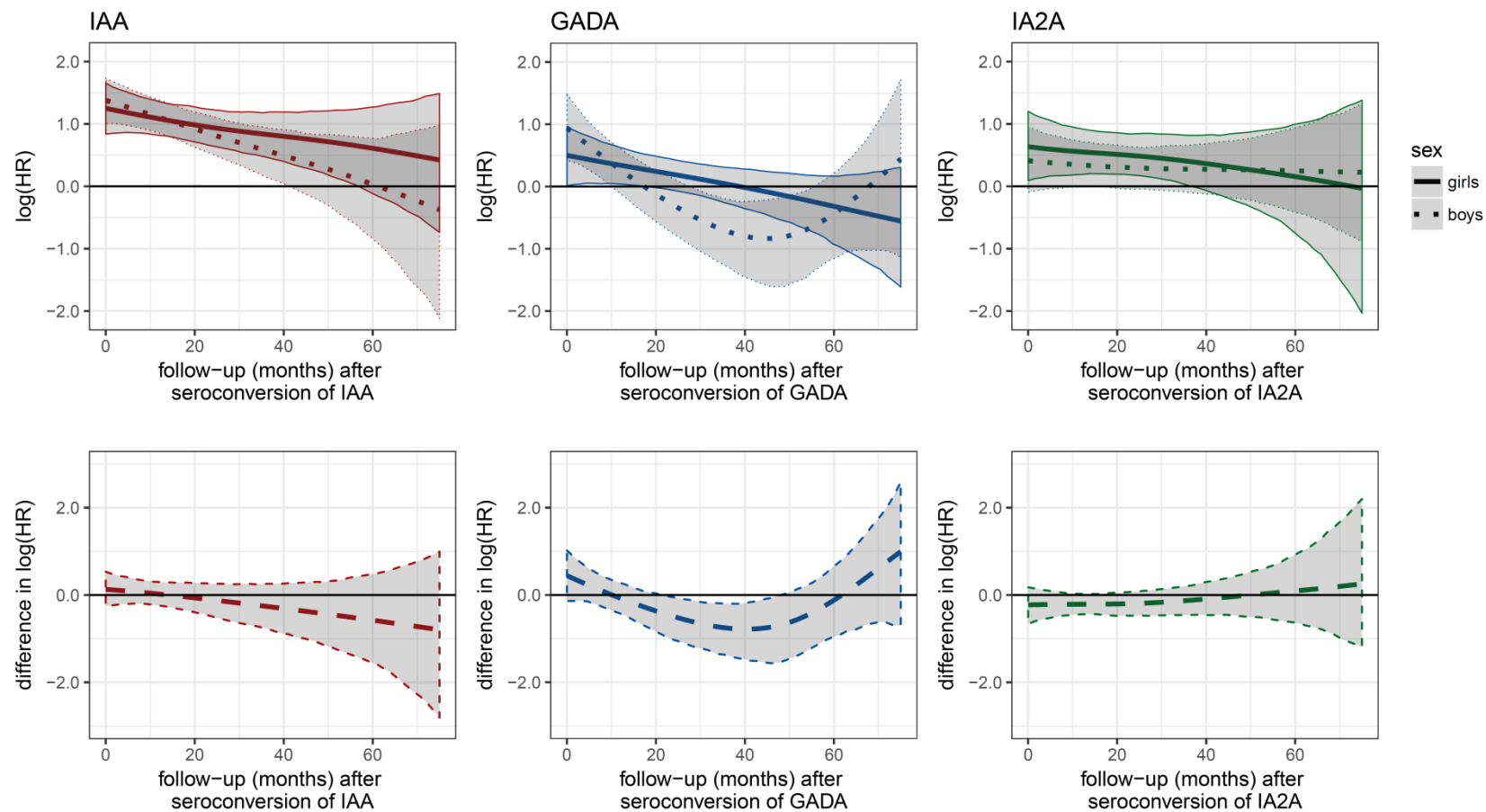


Supplementary Fig. 5 Results from the sensitivity analysis for the joint models of autoantibody trajectories (IAA, GADA and IA2A) and progression to T1D data. Estimated coefficients from model fits based on (i) the main model as presented in the Application section with $IG(0.0001, 0.00011)$ as prior distribution for the variance parameters and $N(0, 1000^2)$ as weakly informative prior for the parametric terms, (ii) with $IG(0.001, 1)$ as prior distribution for the variance parameters, and (iii) $N(0, 50^2)$ as prior for the parametric terms. *Left panel:* Posterior mean estimates (lines) and 95% pointwise credibility intervals (shaded areas) of $\eta_\alpha(t)$. *Right panel:* Posterior mean estimates of coefficients and hazard ratios with corresponding 95% credibility intervals.

Association denotes the intercept of $\eta_\alpha(t)$, *long* the coefficients of the longitudinal submodel and *survival* the coefficients (i.e. the log hazard ratio) of the survival model.



Supplementary Fig. 6 Individual and mean transformed titers of IAA autoantibodies after seroconversion per HLA genotype, stratified for progression to T1D.



Supplementary Fig. 7 Posterior mean estimates (lines / dots) and 95% credibility intervals (shaded areas) of $\eta_\alpha(t, SEX)$, the time-varying log hazard ratio (HR) of the association between longitudinal autoantibody trajectories and T1D progression stratified for girls and boys (upper panel) and of the difference of the association between the groups over time, $\eta_\alpha(t, boys) - \eta_\alpha(t, girls)$ (lower panel).