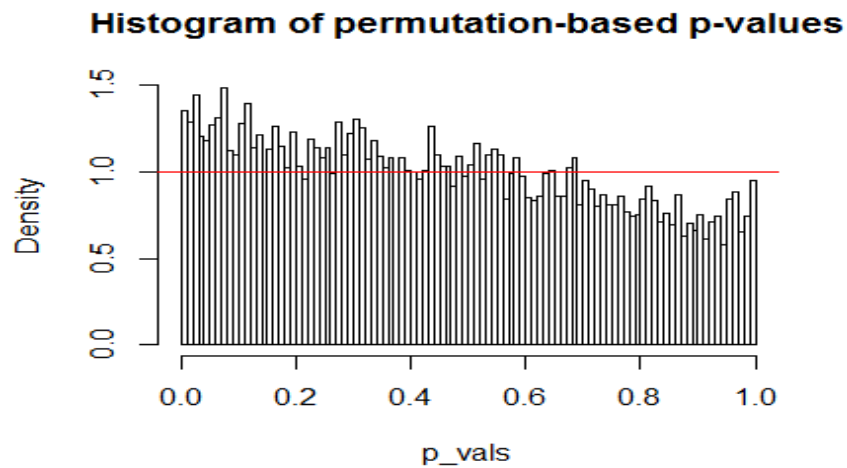


For each simulation: 100 Y realizations, 100 sets of 50 RV/realization

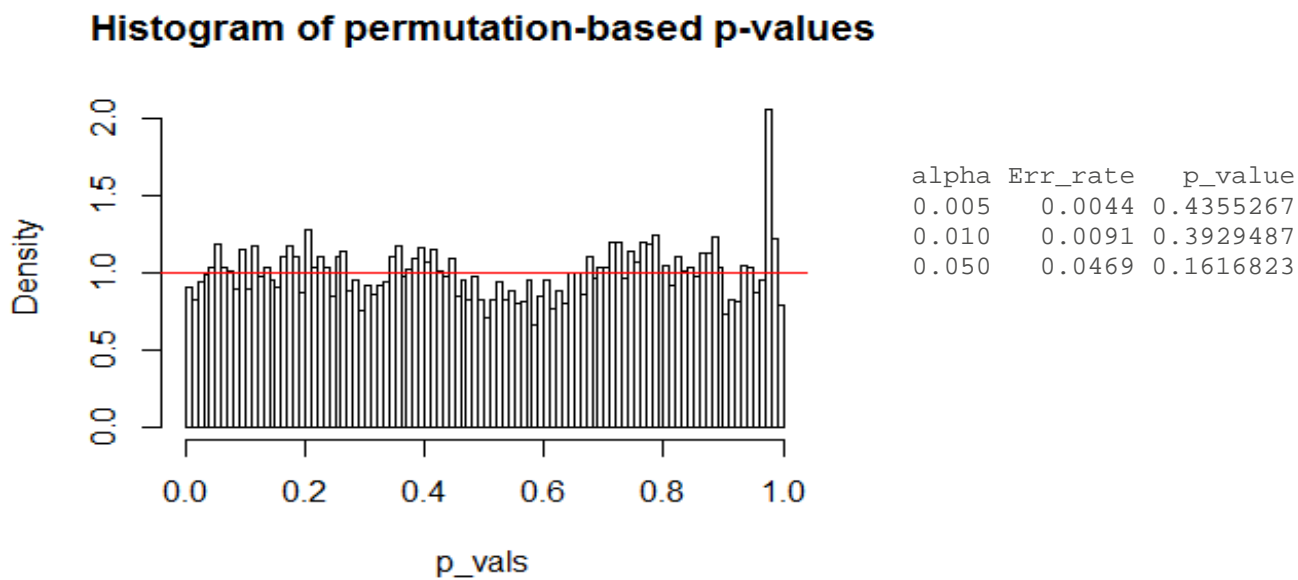
LMM method: continuous response (15000 permutations, 2-sided VT test)

$Y = 1.5 + .5 \text{ gender} + .05 \text{ age} + E$ where E is $N(0, 4\Phi + 25 I)$



EE method: liability threshold model for Y (15000 permutations, 1-sided VT)

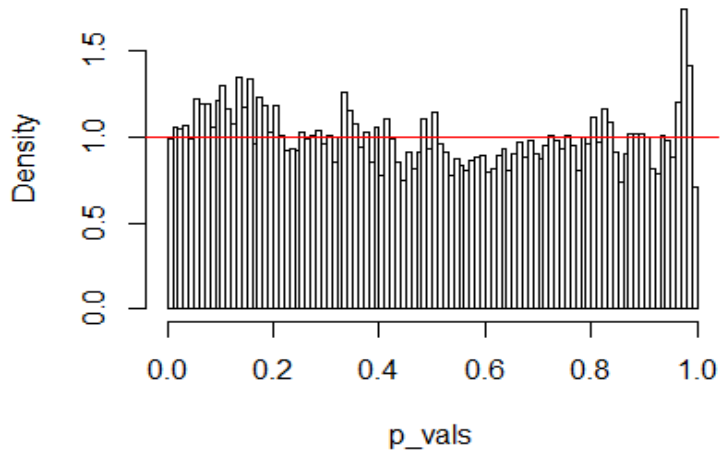
$Liab = 1.5 + .5 \text{ gender} + .05 \text{ age} + E$ where E is $N(0, \Phi + 25 I)$



EE method: logistic model for Y (15000 permutations, 1-sided VT)

Logit(mean)= $b_0 + .5 \text{ gender} + .05 \text{ age} + E$ where E is $N(0, \Phi)$

Histogram of permutation-based p-values

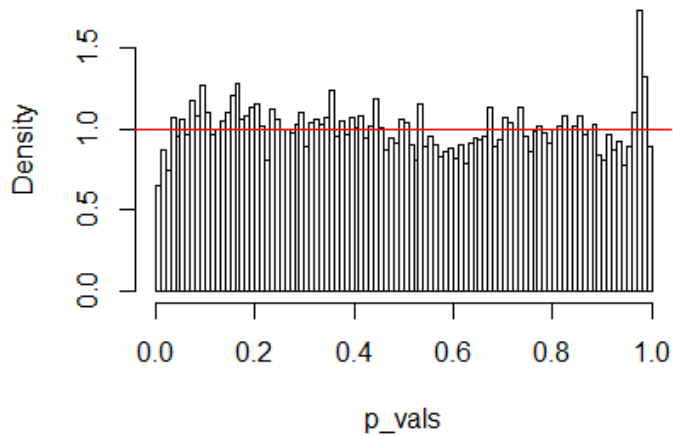


alpha	Err_rate	p_value
0.005	0.0049	0.9434868
0.010	0.0099	0.9599217
0.050	0.0516	0.4769673

EE method: logistic model for Y (25000 permutations, 1-sided VT)

Logit(mean)= $b_0 + .5 \text{ gender} + .05 \text{ age} + E$ where E is $N(0, 0.1*\Phi)$

Histogram of permutation-based p-values

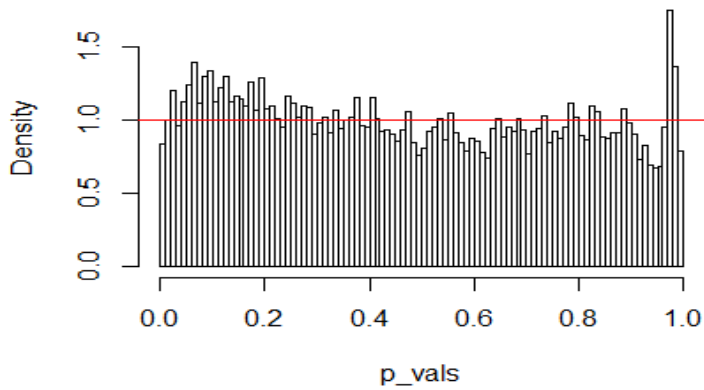


alpha	Err_rate	p_value
0.005	0.0034	0.0279825
0.010	0.0067	0.0010893
0.050	0.0429	0.0012174

EE method: logistic model for Y (15000 permutations, 1-sided VT family based stat)

Logit(mean)= $b_0 + .5 \text{ gender} + .05 \text{ age} + E$ where E is $N(0, \Phi)$

Histogram of permutation-based p-values



alpha	Err_rate	p_value
0.005	0.0041	0.2281655
0.010	0.0084	0.1192786
0.050	0.0515	0.5058550

EE method: logistic model for Y (25000 permutations, 2-sided VT family based stat)

Logit(mean)= $b_0 + .5 \text{ gender} + .05 \text{ age}$ (no additive polygenic effect)

Histogram of permutation-based p-values

