

Table S1. Summary of abbreviations.

Abbreviation	Full name
CM-step	conditional-maximization step
ECM	expectation-conditional-maximization algorithm
EM	expectation-maximization algorithm
E-step	expectation step
HWD	Hardy-Weinberg disequilibrium
HWE	Hardy-Weinberg equilibrium
IEM	expectation-maximization algorithm for inbreeding model
IM	inbreeding model
LRT	likelihood ratio test
M-step	maximization step
NARAC	North American Rheumatoid Arthritis Consortium
NM	Niu's model
PS	population stratification model
RA	rheumatoid arthritis
SAD	sum of absolute differences
SNP	single nucleotide polymorphism