Genetic predisposition of the severity of joint destruction in rheumatoid arthritis; a population based study

Rachel Knevel, Gerður Gröndal, Tom W J Huizinga, A Willemien Visser, Helgi Jónsson, Arnór Vikingsson, Árni Jón Geirsson, Kristján Steinsson, Annette H M van der Helm-van Mil

Department of Rheumatology, Leiden University Medical Center, Leiden, The Netherlands; Department of Rheumatology, Landspítali, National University Hospital Center for Rheumatology Research, Reykjavik, Iceland

Background The susceptibility to rheumatoid arthritis (RA) is partly heritable, whether the severity of RA is also influenced by genetics is not determined. Evaluation on the heritability of the severity of RA is basic to further studies on genetic factors. The authors aimed to determine whether joint destruction is heritable.

Methods Iceland has an unique comprehensive genealogy database covering today’s population and stretching back to ≥1000 years ago, as well as genome wide SNP data of a large part of the population. Hand and feet radiographs of 325 RA patients of Iceland were scored according to the Sharp–van der Heijde method. The degree of relatedness between patients was estimated in two ways. First kinship coefficients (KC) on the genealogic data were expressed; second the identical-by-descent (IBD) was estimated applying long-range phasing on the genetic profile of the patients. The degree of relatedness was tested against the similarity in joint destruction rates by linear regression analysis and the heritability of joint destruction was calculated.

Results Significant associations between degree of relatedness and similarity in joint destruction rates were observed for both methods of determining relatedness ($P_{KC}=0.018$, $P_{IBD}=0.003$). The estimated heritability was 45% using KC and 58% using the estimated IBD data.

Conclusions The severity of joint destruction in RA is influenced by genetic factors.