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## Longitudinal Data Analysis of a Study of Early Rheumatoid Arthritis

Ernst Schuster<sup>1</sup>, I. Bär<sup>1</sup>, S. Kaltenhäuser<sup>2</sup>, H. Sauer<sup>2</sup> and M. Löffler<sup>1</sup>

<sup>1</sup>Institut für Medizinische Informatik, Statistik und Epidemiologie, Universität Leipzig, 04103 Leipzig, Liebigstr. 27, Germany

<sup>2</sup>Medizinische Klinik and Poliklinik IV, Universität Leipzig

This study deals with a monocentric, controlled, prospective observation study of patients suspected to develop chronic polyarthritis. The aim of the study is to find prognostic factors which allow to distinguish patients with rapidly advancing disease from those with slow (or no) progressive development at an early stage of disease.

Such prognostic factor would permit to tailor therapy. One of the main tasks therefore is to examine the impact of a spectrum covariates on longitudinal variables of response.

Examinations of the patients (clinical findings and laboratory tests) were done monthly in the first six months and every three months later on. Moreover, standardized X-ray photographs of hands and feet were taken at intervalls of 6 months and analysed according to the score by Larsen (irreversible damages and score can only increase). Therefore, data have a typical longitudinal structure for each subject. The evaluation of the progress of observed variables takes place with freely available "Object-oriented Software for the Analysis of Longitudinal Data" (OSWALD) by David M. Smith and Peter J. Diggle in S-Plus.

As an example the mean response profiles of the Larsen-Score was grouped by a genetically fixed epitope with DR4 [yes (1)/ no (0)].

Mean Parameters:

	(Intercept) time	group:time	
PARAMETER	2.27	1.74	0.69
STD.ERROR	0.78	0.27	0.23

The results mentioned above show that all parameters are significantly different from zero. Patients with an DR4-epitope show a steep rise of the Larsen score; that means those patients have a more aggressive development of rheumatoid arthritis. Hence the absolute term of both lines hardly differed, a common value was estimated. This shows, that the patients in an early stage of rheumatoid arthritis were recruited into the study.

Because some of the measured variables are highly correlated at the beginning of the study the covariance structure of all covariates was examined with latent-variable models (LISREL8, EQS5). Thus, good representatives for all essential biological processes that describe appropriate response variables for a longitudinal data analysis could be found.

## Mean of Larsen-Score grouped by DR4 and Linear model

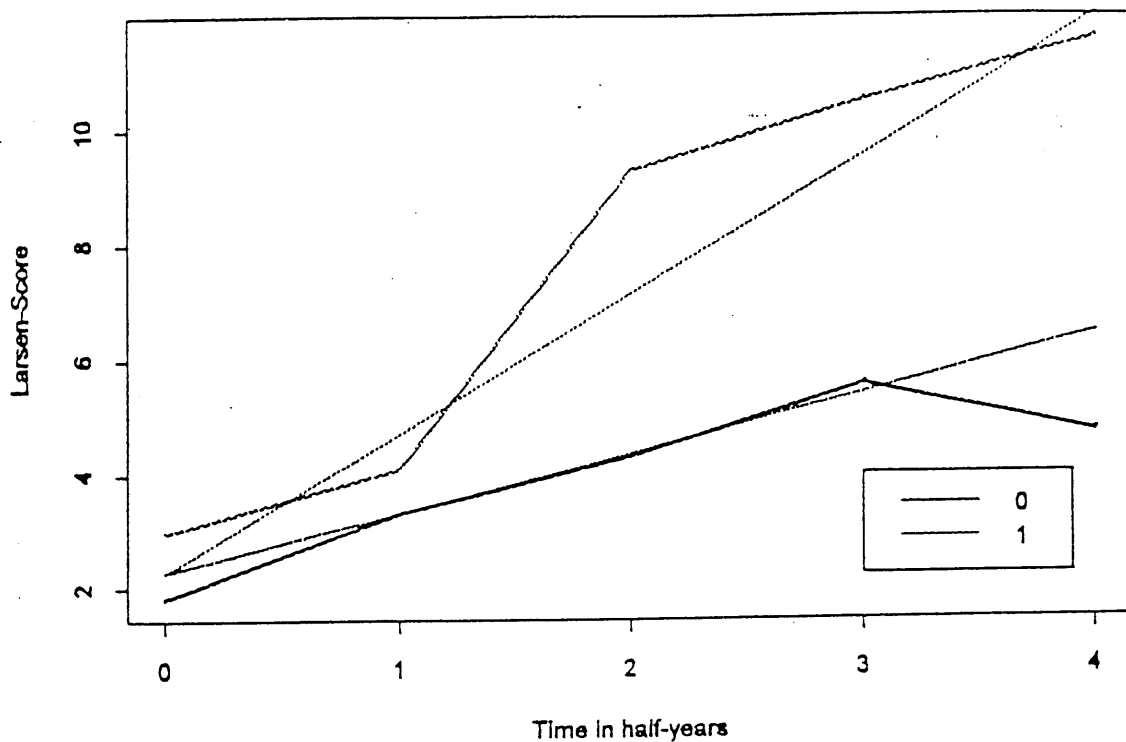


Fig1. Mean of Larsen-Score grouped by DR4 and Linear model

Variograms were used for examinations of time correlation of covariates. Characteristics that strongly fluctuate over the time course are not suitable as prognostic factors because the first observed value is very accidental. The random intercept in a variogram was requested to be big for prognostic factors so that high values at the beginning correspond to high values in the long run.

## References

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