Dose intensification of chemotherapy: An estimation of hematological toxicity and the effect of different G-CSF administration by model simulation

H. Franke 1, C. Engel 2, M. Loeffler 1, V. Diehl 2, S. Schmitz 2

1 Institute for Medical Informatics, Statistics and Epidemiology (IMISE), University of Leipzig, Germany
2 Clinic I for Internal Medicine, University of Cologne, Germany

INTRODUCTION

Objectives
- Model description of pharmacokinetic effects in granulopoiesis
- Model prediction regarding hematological toxicity over subsequent cycles (black curve)
- Residual damages lead thus to observed behaviour of granulopoietic recovery

Model prediction for BEACOPP14 standard

- BEACOPP escalated data, cycle duration 21 days, G-CSF administration
- Dose intensification of chemotherapy: An estimation of hematological toxicity
- Additional basal damage: reduced proliferation capability

MODEL PREDICTION FOR DOSE INTENSIFICATION BY SHORTENING OF CYCLE DURATION

Model prediction for dose intensification by shortening of cycle duration

- Cycle-dependent damage pattern described by Error
- Granulopoiesis: Characteristic of the mitotic amplification of PGB cells
- This is quantified by the parameter Gnor

MODEL PREDICTION FOR VARYING TIMING SCHEDULES OF G-CSF ADMINISTRATION

Model prediction for varying timing schedules of G-CSF administration

- Effect of G-CSF administration on the hematopoietic phase
- Effects of G-CSF application (red) and an additional 2 days dose, G-CSF administration during cycle day 2/3, were observed

CONCLUSIONS

Based on white blood cell data of patients treated for Hodgkin’s disease, simulation models may be used as estimation and optimization tool for dose intensification in BEACOPP.