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Tiivistelmä-Referat-Abstract
Bacterial meningitis (inflammation of brain lining) caused by Neisseria meningitidis (meningococcus) may be life-threatening, meningococcus of serogroup B being the predominant agent of disease in industrialized countries. Natural immunity against disease develops with age associated with an increase in serum bactericidal activity. Although bacterial MenB meningitis is relatively rare, its severity and possible sequelae necessitate search for efficient vaccine.

Since human clinical trials are costly and are often limited by ethical considerations there is a need for animal model, in which disease development and protection would depend on the same mechanism as in humans. This experiment is part of the study to access the relevance of infant rat animal model.

The experiment was randomised at two levels: human volunteers were randomly assigned Norwegian, Cuban, or placebo vaccines and outbred rat pups were randomly assigned into 6-rat groups. Each day of the trial 1 group was injected with saline solution and 1-3 groups were injected with heated human serum samples taken before and after the vaccination with interval of 6 month. Thus two sources of random variation must to be taken into account: the human sera variation and variation between rat pups.

It is often the case in dose response studies, that the observed effect is a combination of latent natural and treatment responses, where the treatment effect is of interest. A common way to model a binary situation is Abbott's formula. It can be extended to account for a situation with ordinal response. The treatment effect was assigned proportional odds model with strain and treatment covariates, and a full Bayesian model with vague priors was set-up. Two outcomes were examined: the proportion of protected rats (binary) and proportional reduction of bacteremia (ordinal). Both models were estimated using programme WinBUGS12beta.

Large variability was apparent both between human sera and between individual rats. Probability of natural response occurrence was high in both models, but no significant treatment effects was found. In order to access the relevancy of this infant rat model to human sera protective immunity, the results of this experiment should be compared with the results of human clinical trials.

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