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PERFORMANCE OF A DIAGNOSTIC METHOD WITH SAMPLE POOLS

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The diagnostic of sets on randomly pooled samples for the detection of diseases in a population is always taken into consideration, if especially the efficient prove of an existing disease at low level of prevalence is to be shown. But in terms of an imperfect diagnostic several problems of interpretation occur, in the sense that the performance of diagnosis in context with pools is unknown. By using appropriate models, this problem can be solved theoretically. Still remains the question of practical relevance for an adequate reflection of reality by the underlain model. If pools are made from random samples, the binomial distribution is the appropriate distribution for a theoretical analysis of the problem. Moreover, the binomial distribution of the sensitivity and specificity of the diagnosis needs to be considered for the determination of the performance parameters of the diagnosis as applied to the formed pools. The performance of a diagnostic method thus established is then given by the convolution of all distributions. This means that the expected sensitivity will increase unlike the ordinary diagnostic and the expected specificity will decline. These theoretical considerations are practical dilution effects opposed by pooling. Therefore it will have an impact on the detection of the considered agent. As practical consequences a decrease of sensitivity and an increase of specificity, while increasing the pool size, will occur.

This, however, shows a contrary behavior to the above explained theoretical behavior of detection dependently of the concentration of the questioned agent. Since last part can only be understood through experiments, two questions raise:

1. What effect does the concentration of the considered agent on the capability of the diagnostic method?
2. Does exist an optimal pool size and how can this be determined, if it should exist?

Both questions will be analyzed exemplarily.

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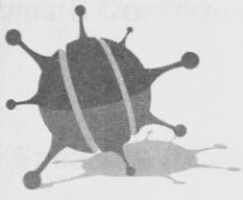

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