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Infection hazards in transgenic animals

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The microbiological quality of laboratory animals, especially mice and rats, has improved in the last few years. In contrast to the situation about 10 years ago, the majority of rat and mouse strains (outbred, inbred, mutants, congenic) from large commercial breeders is free from rodent-specific pathogens.

Similarly, the microbiological quality of laboratory animals in experimental colonies has also improved. Nevertheless, there are many experimental colonies in which various infectious agents occur or which lack reliable information about health Status, because regular microbiological monitoring is not performed. Simultaneously with the introduction of transgenic techniques, a situation began to evolve which was contrary to the general trend towards better microbiological quality. As these animals are required in small numbers by relatively few scientists, they are produced only exceptionally by large commercial breeders. A wide variety of transgenic animals is now produced in scientific institutions and exchanged by scientists among themselves. This brings with it a high risk of introducing unwanted micro-organisms, because these animals originate from very different, and mainly experimental colonies. Frequently, monitoring data are lacking for these animals or rodent specific pathogens are discovered.

Transgenic animals are artificial mutants resulting from insertion of DNA from another eukaryotic organism into the genome. Through such manipulation a multitude of physiological characteristics can be influenced. Changes of the immune status arise frequently, i.e. immunodefects or immunosuppression occur. As a consequence, there may be not only enhanced sensitivity toward pathogenic agents but also a suppression or lack of antibody response and therefore false negative results of monitoring can occur. I is therefore imperative to introduce and examine normal, sentinel animals in transgenic animal colonies.

Last but not least, it should be borne in mind that some transgenic animals carry genetic information for animal-pathogenic or human-pathogenic infections (e.g. transgenic mice bearing the receptor for polio virus-TgPVR). Such animals represent a general health hazard and therefore, according to the recommendations of an expert group of the WHO (November 1992), they should be sterilized (gonadectomized) prior to shipping to minimize the risk of spreading infection to the general population.

Not every pathological condition has an infectious cause. In about 10 to 15% of all transgenic animals such conditions can be introduced as (un)wanted side effects by so-called insertion mutagenesis. These conditions are relevant, not from a hygienic but from a differential-diagnostic point of view.

In order not to endanger the overall improvement in laboratory animal health, the following have been recommended in recent years:

1 Prior to the introduction of transgenic animals from outside sources a health report (including number of animals, frequency of monitoring, list of agents, methods of examination, results performing laboratory) should be requested in order to assess better the hygiene risk from such animals.

2 Transgenic animals originating from experimental colonies should, if possible, be accommodated away from other animals. Isolators are most suitable for this.

3 For longer-lasting requirements, rederivation (redevelopment) of such animals is advisable, using reliable and recognized methods to obtain uninfected offspring from contaminated parents.

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