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Sanitary aspects of handling non-human primates during transport

Report of the Federation of European Laboratory Animal Science Associations (FELASA) Working Group on Non-human Primate Health accepted by the FELASA Board of Management, April 1997

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1. Preamble

Biomedical research has a need to use non-human primates in cases where no other species offer the specific scientific information required or the necessary predictability of results for the development of medications and vaccines. Biomedical research would prefer purpose-bred animals of known history, with an amount of background information necessary for the interpretation of findings from animal experiments. However, the existing breeding centres cannot completely fulfil the requirements of biomedical research and for some species no breeding centres of importance have yet been created due to the difficulty in predicting requirements and the high investment costs of such an endeavour. Therefore, a certain—eventually diminishing—demand for feral animals will continue in the near future. However, even such animals should be delivered in good health and after a quarantine period at the supplier institution.

Most of the large breeding centres—for macaques at least—exist in Asia, Mauritius and to a certain extent in the USA. Breeding

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establishments need to have a size that is adequate to be able to supply sufficient numbers of animals of standardized quality at a given time. Moreover they should avoid inbreeding. In addition, primate breeding requires specially trained personnel and appropriate housing conditions. It is therefore rarely feasible for any research institution to breed primates for its own use alone. Thus, even if more non-human primates were to be bred in Europe the necessity of transporting these from large breeding centres to the user would exist. For long distances transport by air, wherever possible with direct flights, is the least stressful to these species, as is also stated by a report of the UK group of EUPREN (1997) published in this issue.

The principal species (excluding apes) used in biomedical research are:

- Cynomolgus monkeys (*Macaca fascicularis*)
- Rhesus monkeys (*Macaca mulatta*)
- Green monkeys or vervets (*Cercopithecus aethiops*)
- Baboons (*Papio*, various species)
- Squirrel monkeys (*Saimiri sciureus*)
- Marmosets (generally *Callithrix jacchus*)

Of the principally used species only three are bred in quantities to meet requirements exceeding those of individual institutes.

These are:

- Cynomolgus monkeys, bred in the Philippines, Mauritius, in some South East Asian countries and in the USA.
- Rhesus monkeys, bred in China, USA and to a lesser extent in Europe.
- Marmosets of which a number of breeding establishments also exist in Europe.

Of the other species no, or only small, breeding colonies for internal use exist.

At present no recognized health control programme exists for laboratory primates. According to those tests having already been performed on request, some breeding colonies are free of certain disease agents but usually not of all the agents potentially transmissible to humans. Besides, monkeys are often susceptible to the same agents as humans and, therefore, may acquire agents which they do not have in their natural environment through close contact with humans. FELASA is currently working on recommendations for the health monitoring of simian-breeding colonies.

In the following list a grading of the hazard risk for humans, provided an infection does occur, is given. The list is based on the Directive 90/679/CEE of 26 November 1990 concerning the protection of workers against the risk related to exposure to biological agents at work (amended by the Directive 93/88/CEE of 29 October 1993). However, the risk of actual disease transmission is in most cases not greater than when visiting a tropical country provided minimal hygienic measures are observed.

2. Diseases encountered in primates potentially transmissible to man

(See Table 1).

3. Safety measures

Certification of health status of animals through supplier

Non-human primates used for biomedical research should as a rule be obtained from

suppliers keeping their colonies under permanent veterinary supervision. This involves thorough clinical or pathological examinations including the use of regular appropriate laboratory tests. Breeding establishments should provide for adequate sanitary and medical prevention. They should be able to control and document the health status of their colonies and the animals supplied. Animals of other provenance than breeding institutions should be kept under quarantine at the supplier centre and undergo the same examinations for the presence of disease. It must be remarked, however, that single serological tests turning out to be negative for antibodies only indicate that the animal had not developed antibodies at the time of blood sampling. An infection shortly before blood samples were collected may not show up for up to a few weeks later. Negative laboratory tests, therefore, are of more relevance if animals have been prevented from contact with potentially infected animals (or humans) for the incubation period of the disease. If this is not the case it would be more informative to know the incidence of positive animals within the group in which the monkeys were kept before transport. As a rule all individuals of a unit with seropositive animals should be considered as potential carriers of the infectious agent if not otherwise proven.

Precautions against infections during transport

Most of the monkey diseases transmissible to humans can only be acquired through direct contact with the excreta of the animals and oral or conjunctival contamination. Some diseases are only transmitted through bites and scratches (or needle punctures) or need a vector (e.g. mosquitoes); penetration through the intact skin is rare. Airborne transmission is known for tuberculosis and monkey pox. It can also not be excluded for the Reston virus which is, however, not known to be pathogenic for humans. Nevertheless, in view of the fact that for the time being for most species it is hardly possible to obtain monkeys for research purposes from disease-free breeding centres and that for some species

Table 1 Diseases encountered in primates potentially transmissible to man

Agent	Occurrence in			Transmissions	Diagnosis in monkeys	Risk class (EEC Dir.)
	Species	Supplier centres	Supplier centres			
Viral infections						
Hepatitis A	All species	Occasional	Occasional	Contact with excreta	Serology	2
Hepatitis B	Reported in macaques	Extremely rare; to be confirmed	Extremely rare; to be confirmed	Blood contact; skin lesions	Serology	3
Herpes B	Macaques	Common; only few centres negative	Common; only few centres negative	Saliva in bites and scratches	Serology	3
Marburg virus	Vervets	Rare	Rare	Contact with excreta	Clinical symptoms; serology	4
Reston virus	<i>Macaca fascicularis</i>	Occasional in the Philippines	Occasional in the Philippines	Contact with excreta; aerogenic transmission not observed	Clinical symptoms; serology	No known pathogenicity in man
Simian immunodeficiency virus	Old World monkeys; species-specific	Occasional	Occasional	Blood contact; skin lesions	Serology	(3) no human cases known
Yellow fever	New World species	Occasional	Occasional	Mosquitoes	Clinical symptoms, serology	3
Monkey pox	Various species in Central Africa/Zaire	No supply centres known to export primates from this area	No supply centres known to export primates from this area	Contact with excreta; airborne possible	Specific lesions	3
Bacterial infections						
<i>Campylobacter jejuni</i>	Various species	Occasional	Occasional	Ingestion after direct contact with excreta	Symptoms rare; serology	2
Leptospirosis	All species	Rare	Rare	Contact with excreta	Serology	2
Salmonellosis	All species	Occasional	Occasional	Ingestion after direct contact with excreta	Clinical symptoms; faecal culturing	2 or 3 depending on style
Shigellosis	All species	Rare; except for individual colonies	Rare; except for individual colonies	Ingestion after direct contact with excreta	Clinical symptoms; faecal culturing	2 or 3 depending on type
Tuberculosis	Old World species; others less sensitive	Rare	Rare	Contact with excreta; airborne possible	Lethal disease; Mantoux test	3
Protozoan infections						
Amoebiasis	All species	Common, but normally apathogenic type	Common, but normally apathogenic type	Ingestion after contact with faeces	Coproscopy with specific typing	(2) if pathogenic
Malaria	Seen in macaques	Rare	Rare	Through vectors (mosquitoes)	Immunofluorescence	(2 or 3) evidence for transmission lacking
Nematodes						
<i>Strongyloides stercoralis</i>	All species	Occasional	Occasional	Contact with faeces; larvae can penetrate intact skin	Coproscopy	2
Trichurias	All species	Occasional	Occasional	Ingestion after contact with faeces	Coproscopy	2
Ectoparasites						
Lice	All species	Not uncommon	Not uncommon	Handling	Clinical examination	Not classified

animals not bred in captivity will still be required, a certain risk that transported monkeys may carry infectious agents transmissible to man cannot be excluded. This requires the observation of some minimal safety precautions to avoid disease transmission during transport.

The International Air Transport Association (IATA) guidelines for container requirements as outlined below are fully sufficient to prevent disease transmission — even for airborne agents — from transported monkeys to personnel involved in their transport:

- Transport cages must be well constructed and able to withstand damage.
- They must be leak proof and contain an absorbent bedding.
- Construction should prevent animals from escaping through seams and joints.
- Door construction should prevent from accidental opening through personnel or through animals from the inside.
- Animals should be protected from unauthorized access.
- Containers should be easy to handle and protect the handlers from being clawed or bitten.
- Ventilation openings must be small enough so that any part of the animal cannot protrude from the container.
- Ventilation openings must be covered with light material such as muslin.
- Food and water containers should be accessible without danger of personnel getting bitten or scratched.
- Laboratory monkey consignments from different sources should be kept separated from each other.

In addition to the IATA guidelines:

- Any handling of animals and cages should be performed with adequate clothing and protective gloves. Even simple latex gloves will prevent infections from excreta through skin lesions; they are, however, likely to tear easily.
- If monkeys are shipped in passenger planes it is recommended that they be kept in holds in which air flow to the passenger compartment is excluded.

- Handling, feeding and watering during transfer stops should be performed by trained personnel. The shipment should be accompanied with the necessary instructions including a certification of the health status of the supplier's colony.

Precautions in case of accidents

In case of injury due to cage handling, scratches or bites, immediate wound cleansing with medical disinfectant sponges and visit to the doctor thereafter is mandatory. Medical treatment should be prescribed according to the case history of the animals involved (certificate). If necessary (risk of herpes B infection) laboratory investigations of appropriate material from the animal involved and from the injured person should be ordered.

In the case of the escape of an animal no attempt should be made to catch it by hand. Smaller monkeys may be caught with nets, however, if in the other cases the animal cannot be trapped with baits it is better to have the animal immobilized by a specialist.

4. Conclusions

Though no cases of disease acquisition through personnel handling non-human primates during transport have been reported, the possibility that in shipments of monkeys, carriers of infectious agents transmissible to humans may be present has to be taken into account. Observing the safety measures mentioned will practically exclude a transmission during transport.

Although these recommendations for safety precautions were chiefly conceived for air transport they are appropriately applicable for ground transport of non-human primates.

This document was compiled using the expertise of the members of the Working Group and their personal literature resources. For further reading we refer to the following documents:

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- work [seventh individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC]. *Official Journal of the European Communities* No. L 268 pp 71–82
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