Tracheal Transplantation
I. The Immunogenic Effect of Rat Tracheal Transplants* **

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Summary. To clarify contradictory information in the literature about the immunogenic effect of the trachea, tracheal transplantations were performed orthotopically and heterotopically in two combinations of inbred rat strains. In all in vivo experiments it was possible to demonstrate a considerable systemic immunisation by transplantation antigens. There were no indications of even slight organospecific immunogenicity of the trachea. Thus, the trachea is subject to the same immunological laws for transplantation as all other tissues.

Key words: Tracheal transplantation – Inbred rat strains

Introduction

Tracheal replacement represents an important but clinically unsolved problem. Only a limited number of immunological investigations have been performed and show different results [14, 20].

Our in vivo experiments with two combinations of inbred rat strains with varying, genetic differences between transplant donor and recipient aimed find out what level of immunogenicity the tracheal transplant has and if it is subject to the same immunological laws as other tissues.
Materials and Methods

Animal Strains

Experiments were performed on the following inbreeding rat strains:
1. LEW: continued Kiel breeding of a Lewis strain obtained after 45 generations of inbreeding from Microbiological Associates. Allele at RT1-locus: 1 [9].
2. CAP: continued Kiel breeding of a strain obtained after 37 generations of inbreeding from O. Stark (Prague), originating from the Academy of Sciences in Kraków (Poland). Allele at RT1-locus: c [9].
3. AS: continued Kiel breeding of a strain obtained after 28 generations of inbreeding from E. Günter (Max Planck-Institute, Freiburg/Breisgau, FRG). Allele at RT1-locus: 1 [9].
The Lewis animals were used as donees, the AS and CAP rats as donors.
Throughout the experiment the animals were kept in macrolon cages (size 3) on wood shavings and fed ad libitum using Altromin-pelleted feed and water.

Tracheal Transplantations

Orthotopic Tracheal Transplantations. After being etherised, the animals were fastened to some sort of support in a supine position. The median splitting of the cervico-longitudinal muscles and the exposure of the trachea occurred after a skin incision. The two recurrent nerves and the ambient connective tissue of the trachea were exposed and the windpipe mobilised on all sides in a subtle manner, carefully staunching any blood. After resection of a segment, the trachea was reconstructed using an adequate transplant. At both anastomoses, suturing was performed using three Vicryl interrupted button sutures, size 7/0. The incised skin wounds were then closed by means of clamps.

Heterotopic Tracheal Transplantations. After preparation of a subcutaneous pocket, the tracheal segments were transplanted under the animals' right thigh skin and the wounds closed by means of clamps.

Skin Transplantations

After carefully shaving the abdominal skin, a 1- × 2-cm piece of abdominal skin was transferred from the donor to the donee and fastened with four interrupted button sutures of a non-absorbable material (Ethilon, 5/0). Thereupon, the transplants were supported by circular bandages using Adaptic, sterile gauze and a wire net. They were regularly inspected from the 4th day onward. Vascularisation of the transplant was verified by repeated intravenous injections of disulfine blue [16]. Any discontinued vascularisation of the transplant, swelling, discoloration, easy detachability of the epidermis or any drying up of the transplanted tissue were assumed to be indicative of acute rejection.

Statistical Mode of Calculation

A statistical test (log-rank test) was used to compare survival times. Based on the Kaplan-Meier estimation for survival curves, this test enables a statistical comparison of two survival curves. One starts from the hypothesis that the risk of mortality in two groups is equal at any given time. A Z-value is determined in order to verify whether the expected numbers differ from one another. Large Z-values point to a difference between the actual and the expected number of deaths, thus rejecting the assumption that in both groups the risk of mortality is equally high. The method of probability calculus defines as the critical value for Z the one that would most probably not be