

## A CHRONIC GASTRIC FISTULA FOR RATS

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Translated from *Byulleten' Éksperimental'noi Biologii i Meditsiny*, Vol. 55, No. 6,  
pp. 111-113, June, 1963

Original article submitted July 19, 1962

In long-term experiments on the gastric pathology of rats many difficulties are encountered when the fistulae described in the literature are used [1, 3-6], and the same thing is true of implanted balloons [5, 7, 8]. The main difficulty is the comparatively short time for which these devices can be used as compared with the time required to establish firmly the initial conditions and for subsequent observations on the pathological processes and recovery. The use of balloons enables only the motor activity to be observed, and the period of observation is also comparatively short because the animals damage the tubes, despite the special cages in which they are contained and which hold them in position.

It is therefore no result of chance that in the many numerous works on this subject there is no mention of the times for which the various devices may normally function; in physiological investigations the times are of no special importance because the comparatively short duration is compensated by the large number of animals.

We have set out to develop a method for the simultaneous recording of motility and gastric secretion in rats in long-term experiments during which pathological processes slowly develop. For this purpose, for 11 months we tested three kinds of fistulae for rats, each of which was assembled in 2-3 different ways, and was made of different materials. We tried perspex, polythene, duralumin, duralumin with increased anticorrosive properties (AMG) and stainless steel. We were interested chiefly in the time for which the fistula functioned.

The tubes of the fistulae were either gnawed by the rats or else fell out of the stomach. As protection against gnawing we used external metal coverings. To protect the fistulae from rubbing against the serous gastric membrane we used special polythene "feet." As a result of experiments carried out on three groups of 50 rats it was found that

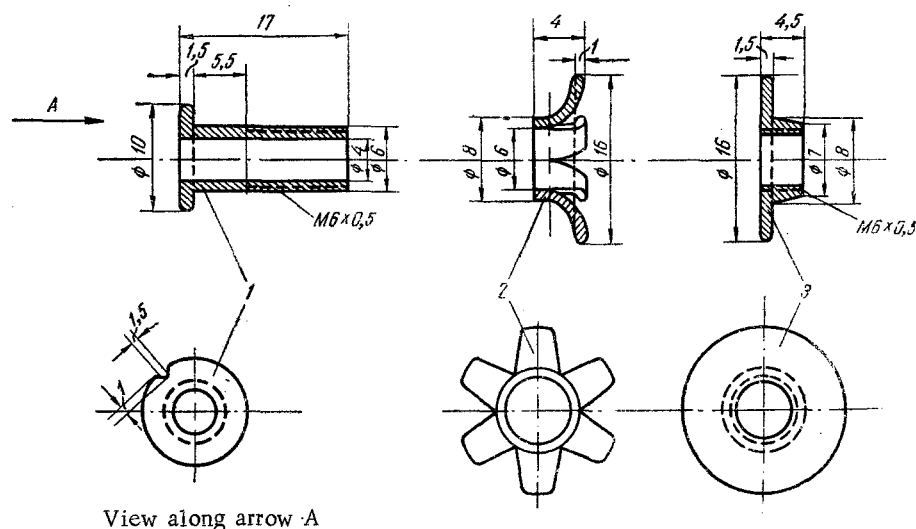


Fig. 1. Construction of a tube for long-term study of the rat stomach.

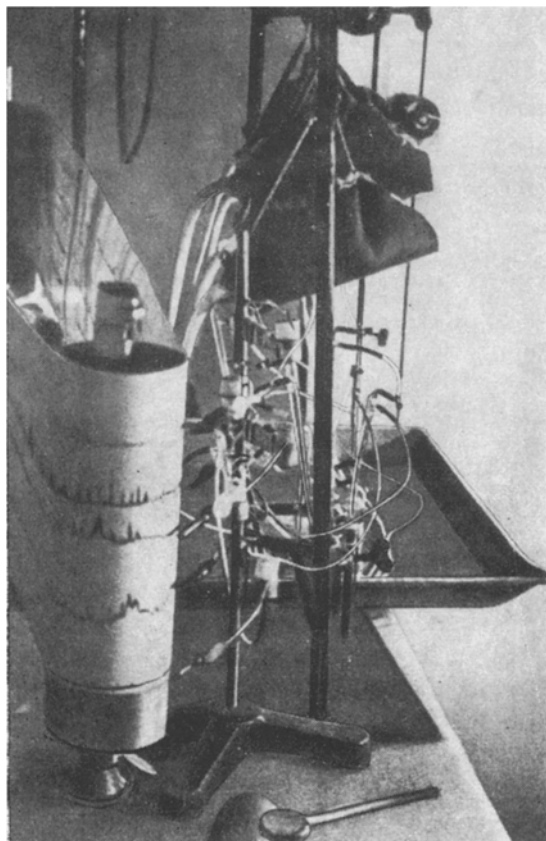


Fig. 2. Arrangement for fixation of rat (in experiment for recording gastric motility).

although the tubes of polythene were light and supplied with various kinds of protective covering sooner or later, (usually within 3-4 weeks) they were damaged by the rats, and that sewing the fistula tubes to the serosa of the stomach did not prevent them from falling out, particularly when the protective coverings were made from stainless steel.

Therefore in the next set of 28 rats we used broader polythene "feet" turned so that their elastic surface faced the abdominal wall. There was no need for these "feet" to be sewn to the wall. They pressed lightly on it from within and were completely prevented from falling out, and the arrangement caused no distress.

The final design of the fistula tube is shown in Fig. 1. The body (1) is made of perspex. The notch on the edge of the flange is specially necessary because of the very small size of the rat stomach. The "feet" (2) were made from polythene tube. The pieces were cut from one end in the form of several strips which were then bent back (in hot water) to a thickness of 0.5 mm. The outer covering (3) was made from AMG duralumin. The lumen of the fistula was closed for approximately half its length with a cylindrical rubber plug; this plug was removed from the fistula with the end of a sewing needle. The weight of the fistula was 1.3 g.

The fistula tube was placed in the stomach by means of the ordinary operative technique and was fixed to the wall with a single purse-string suture. Then the omentum was placed over it and the polyethylene "feet" were pressed firmly up against it. After the tube had been removed to

one side by means of a trocar on to the abdominal wall, the protective covering was placed on the outside, and the wound sewn up. After the operation a single infection of 50,000 units of penicillin was given.

The operated rats required no special quarters or regime. Even on the day after the operation they were returned to the normal conditions of the animal house. The only point which needed attention was to see that the fistula tube was permanently closed.

Rats on which this operation had been performed have been under observation in our experiments for more than six months. During the whole of this time the fistula functioned normally.

For simultaneous recording of gastric motility and secretion the balloon is fixed to the fistula tube by a fine polythene tube and a thin steel spring. The gastric contents flow freely into a test-tube suspended below. Other arrangements of the balloon enable only gastric motility to be recorded, but at the same time various stimulants may be introduced into the stomach. For recording the gastric movements we used an air-water-air line to a Mostun capsule [2].

In experiments lasting for many hours and to record gastric motility the most successful method was to fix the rat by suspension in special tarpaulin sacks bound together at the top and having holes for the head and tail and for the fistula. This method neither fatigues nor disturbs the animals (the rats sleep or remain quiet) and it enables subcutaneous or intravenous injections to be made during the course of the experiment without interrupting the recording. The general appearance of the experimental set-up and arrangements for recording gastric motility in the rat are shown in Fig. 2.

## SUMMARY

We tested various kinds of gastric fistulae (for rats) made of different materials, and a sturdy model was designed capable of functioning for many months. Its main part consisted of polythene "feet" placed between the serous coat and the internal surface of the abdominal wall.

For a study of gastric function we used special "hammocks" made of thick tarpaulin, and found that they afforded the most favorable conditions for fixing the rat, and were superior to hard extensible sliding cages.

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All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of this issue.

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