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ORIGINAL ARTICLE

Testicular perfusion apparatus

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ABSTRACT

Objectives: A reproductive biology laboratory requires to provide reliable instruments for regular use of research workers. To understand an organ and perform scientific study and reach on a conclusion good instruments and techniques are essential. Such a suitable one is not available in case of testicular study. The present study is aimed to clear this lacuna.

Materials and Methods: A new testicular perfusion apparatus for rabbit and rat is designed and fabricated with glass. The glass blowing instrument available is used. The perfusion fluid preferred is Krebs Ringer bicarbonate buffer (pH 7.4). Quartz wool provided in stem tube filters emboli present in it. Perfusate temperature is maintained to that of testis. A 26-gauge needle is introduced into the spermatic artery to allow entry of perfusate into testis. Method for the collection of perfusate leaving testis is available. This permits to measure the level of an injected substance before its entry through perfusion fluid into the testis, which shall be compared in the fluid after completion of perfusion.

Results: Initially few animal testes were used and found the instrument to be functioning well.

Conclusion: A new simple perfusion apparatus for testes of rabbit and rat is designed. The apparatus made out of glass could be prepared with the help of glass blowing facility and used regularly in any laboratory.

Keywords: Testis, Perfusion, New design, Simple technique, Rabbit, Rat

Introduction

Understanding Physiology became easier after the introduction of isolated organ perfusion studies. It also enriched the knowledge of pharmacology. "To produce its characteristic effects a drug must be present in appropriate concentrations at its site of action. Concentration attained depends on extent and rate of absorption, distribution localisation, biotransformation and excretion" (1). Similar studies on testes were limited. The probable reason was the lack of a simple apparatus for testis perfusion. We present here a suitable and simple glass apparatus to overcome this lacuna, which is convenient for regular use in laboratories. This method is useful for the study of testis of rabbit and rat.

Perfusion apparatus

The glass apparatus consists of four parts (Fig. 1):

1. A 2 lt. aspiration bottle for filling perfusate, to which an oxygen supply is connected. The bottle is kept at a suitable height to permit fluid to flow down easily. Pressure of fluid is measured with the help of an attached manometer. One arm of the manometer is filled with sterile glucose-free Locke solution. The fluid pressure may be adjusted with the help of the stopcock present.
2. The perfusate passes through a tube (20 mm OD) containing quartz wool, which filters the emboli, if present.
3. The perfusate circulate through a coil condenser made of Pyrex glass (30 mm OD). Between the coil and outer jacket, warm water is allowed to flow to maintain the perfusate temperature equivalent to that of the animal's testicular temperature.
4. The organ chamber is made by removing the bottom of a 1 lt. conical flask. As and when required this is closed, with thin loosely placed rubber sheath tying around the bottom rim of the flask (Fig. 1).

The covering prevents the drying of the tissue. A slanting glass strip (stand) is fixed inside the chamber, to place the organ. This permits the fluid coming out from the organ to flow easily through the outlet tube. Alternatively, the tissue is placed in a petri dish and kept on glass stand.

The above four parts are connected with each-other by tight conical joints to prevent leakage of perfusate from the whole system (Fig. 1). The size of the joints between the aspiration bottle and quartz wool tube, coil condenser with quartz wool tube and coil condenser and organ chamber is of the size $\overline{\$}$ 10/19. The size of the joint between aspiration bottle and stop cock connecting to manometer is $\overline{\$}$ 24/29.

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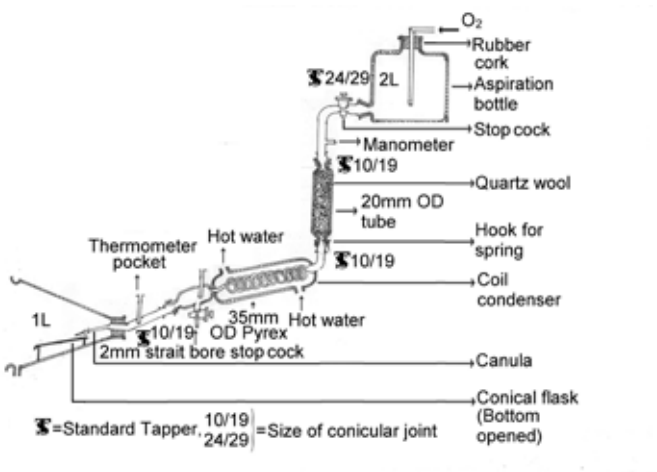

Fig. 1 - Schematic diagram of "Testicular perfusion apparatus".

The perfusate preferred in this set-up is Krebs Ringer bicarbonate buffer, where pH is kept at 7.4; to this, bovine albumin powder (3% wt/vol) and 1000 U crystalline sodium penicillin per mL are added (2, 3). Some authors preferred blood as perfusion fluid in experiment (4).

There are two thermometers to measure temperature: one close to the condenser and the other nearer to organ chamber.

The perfusate enters the spermatic artery through a needle (gauze 26). Extreme care is to be taken to prevent the breakage of the thin spermatic artery. The outlet of perfusate is near the bottom of the flask. The perfusate may be collected for further study.

Advantages in using this apparatus are discussed here. Considering the simplicity in preparing the apparatus, this may be easily employed in any laboratory.

1. The apparatus has two thermometers, which are helpful in understanding and regulating the temperature of perfusate before it enters the testis. The testicular temperature of rat is 33°C (5). The first thermometer measures the temperature of the fluid that comes out of the condenser. If the temperature is more than the level desired, the stopcock below is opened to release the perfusate. This excludes the entry of the fluid into the testis till the temperature is regulated. The second thermometer permits to precisely measure the temperature of fluid before perfusing the organ. Maintaining the temperature in the testis is essential. The decreased temperature in the testis is important for intra- and extra-seminiferous tubular functions. A rise in temperature can damage the tissue and its functions (6).
2. The fluid flow fluid and pressure are adjusted as per the need of the experiment.
3. In this apparatus the organ is placed easily in an organ chamber where enough space is present to handle it.
4. The slanting organ stand is useful for the easy flow of exudate, which may be easily collected from the outlet whenever it is essential. In many experiments, the exudate from the testis is useful to understand the utilisation of a substance or the secretion of another substance by the testis (2-4).

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Disclosures

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