

# Cat Nictitating Membrane

### Resource Summary

An interactive, menu driven program which simulates experiments on the superior cervical ganglion-nictitating membrane preparation of the cat (in vivo) to teach the pharmacology of ganglionic transmission and sympathetically innervated smooth muscle.

### Review

#### Summary

This programme reinforces the learning of some pharmacological aspects of sympathetic ganglionic neurotransmission and it is a very useful smooth muscle preparation. It is suitable as a full complement to teach in undergraduate courses (Medicine, Veterinary Medicine, Pharmacy and Biology). The handling of the programme is easy, well arranged and combines some theoretical and practical aspects. Due to the in vivo preparation of cat nictitating membrane possible causing some moral objections by students, this programme can be a good alternative resource.

#### Comparison of the alternative resource with the real animal model in the laboratory

The cat nictitating membrane is an appropriate preparation to study sympathetic ganglionic pharmacology, but the laboratory animal necessary in this experiment is difficult to obtain and the methodology requires technical expertise. In addition, it would create moral objections among students. In fact, it is not very common to develop such experiments in normal pharmacology courses. From my point of view, in this case it is not essentially necessary to improve the theoretical concepts learned in tutorial classes using such types of experiments, especially when an alternative resource exists. In general, the programme attains different objectives:

1. to know the nictitating membrane characteristics by using easy and clear schemes
2. to establish the differences between ganglionic/cholinergic and postganglionic/noradrenergic nerve terminals
3. it allows one to analyse the effect of some cholinergic and noradrenergic drugs depending on their administration sites (superior cervical ganglion or nictitating membrane)

The methodology description is clear but not detailed enough to provide practice in laboratory skills. Students can observe the effect of drugs under 4 different conditions but they cannot change the drug dose and quantify the results obtained. Therefore, the programme only allows a qualitative analysis of drug effects. It is enough if the main goal is to better understand the mechanism of action of cholinergic and noradrenergic drugs at preganglionic and postganglionic neurons, learned in the lectures. But, in any case this resource will never be able to substitute laboratory skills if this is the objective. It would be interesting that the programme could include an explanation about the results obtained since some of them are not easy to interpret.

#### Using the alternative resource and visual appearance

The programme is easy to install and run. It has a short and clear Introduction in which the student can find the main characteristics of the nictitating membrane, its experimental usefulness and objectives. The resource is well organised with suitable links which make it easy to connect to the different programme sections (Tutorial, Method and Experiments). In the Tutorial section the characteristics of preganglionic and postganglionic neurons are given in an attractive and interactive way, allowing the student to better understand the different levels of drug interaction on preganglionic and postganglionic synapses. Pictures and computer animations have the appropriate quality, which facilitates the understanding of some theoretical aspects. Nevertheless, more detailed pictures in the Methods and Results section would give a more accurate idea about some technical and practical characteristics. The Results section has a complete list of cholinergic and adrenergic drugs and results are presented as a graph in a form similar to that obtained in the lab. Moreover, a suitable section of tasks and questions are included.

#### Contribution of the alternative resource to the 3R's

Due to nictitating membrane preparation not usually being introduced in a normal course of pharmacology, the resource gives the students the opportunity to know this in vivo preparation through a programme computer without using animals. Therefore, it can contribute to make students more aware of the 3R's. However, an

important aspect of laboratory experience is the discussion of the results to better understand the meaning of the results obtained taking into account the methodology used. In this case, the role of the tutor is fundamental to promote cooperative working among students and to help them to interpret the results accurately. In any case, I do not recommend to use the programme in an independent way.

**Applicability to the teaching situation**

As the description of the alternative resource suggests, this programme is suitable to undergraduate students of medicine (human and veterinary), biology and pharmacy schools. Additional guidance from a tutor is highly recommended to better understand the link between methodology and experimental results.

**Service provided by the supplier**

No technical problems have appeared during the trial, but in any case the service support is very effective in both technical and content aspects.

Reviewer

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