



**The Royal Australian and New Zealand
College of Ophthalmologists**

A.C.N. 000 644 404

94 – 98 Chalmers Street,
SURREY HILLS NSW 2010 AUSTRALIA
Telephone 61 2 9690 1001 Facsimile 61 2 9690 1321
E-mail: ranzco@ranzco.edu
<http://www.ranzco.edu>

**OPHTHALMIC BASIC SCIENCE EXAMINATIONS
PHYSIOLOGY
16 October 2007**

Duration of paper:	3 hours	Total Marks: 150
Total No. of questions:	15	

- ◆ **Candidates must attempt all questions**
 - ◆ **Write your answers in the answer pad using CLEAR and LEGIBLE writing, use diagrams and point form where appropriate**
 - ◆ **Start a new page for each question, do not write on the reverse of any answer page. Make sure to put your candidate number on each page**
 - ◆ **If you cross out an area of your own writing, it will not be considered by the examiners**
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Question 1

(20 Marks)

A patient presents with reduced vision and a normal visual field test. You then order an electroretinogram (ERG) and a visual evoked response (VER). Describe these two important electrophysiological tests and include in your answer the following:

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- Method of testing
- Typical normal traces
- Cells of origin of the test response
- Effects of possible pathology

Question 2

(20 Marks)

Vitamin A is essential in the detection of light, and the retina is very efficient in recycling this vitamin. Explain how this is achieved.

Question 3

(20 Marks)

Describe the physiological principles involved in the formation, circulation, and drainage of aqueous humour in the eye.

Question 4

(10 Marks)

To maintain corneal clarity the corneal epithelium acts a barrier with controlled flow of ions. Draw a schematic diagram of the corneal epithelium outlining the proteins involved in ion transport and the direction of flux of common ions.

Question 5

(10 Marks)

Clinical and pharmacologic testing of a Horner's syndrome requires an intimate understanding of the autonomic nervous system.

- a) Draw the anatomy of the relevant sympathetic innervation to the eye and face. Include the chemical mediator released at each synapse and receptor type.
- b) Describe the pharmacologic diagnosis and localisation of Horner's syndrome.

Question 6

(10 Marks)

Death of retinal ganglion cells is the final common pathway underlying virtually all diseases of the optic nerve. Explain the response of the optic nerve to retinal ganglion cell axonal injury.

Question 7

(10 Marks)

Explain the concept of "suppression" as it relates to binocular vision and briefly describe the stimuli that may evoke its mechanisms.

Question 8

(10 Marks)

The discovery of the extraocular muscle pulley systems has led to a reconsideration of the actions of human extraocular muscles and how surgical interventions might influence them. Briefly describe these muscle pulleys and explain how their presence affects oculomotor control.

Question 9

(10 Marks)

Describe the differences in the physiological basis for testing visual fields using standard automated perimetry and frequency doubling technology perimetry.

Question 10

(5 Marks)

A fundus photograph is taken of a patient's posterior pole. List the structural and physiological mechanisms that protect the retina from such an intensive light stimulus.

Question 11

(5 Marks)

Human contrast sensitivity is generally significantly better than that derived from the optical properties of the eye. Explain non-optical brain mechanisms that enhance the retinal image.

Question 12

(5 Marks)

Describe the neurophysiologic substrate of touch sensation.

Question 13

(5 Marks)

Briefly describe the tear film. State the origins of each layer.

Question 14

(5 Marks)

Describe the features of spontaneous blinking of the human eye. Also briefly describe the variables that may affect it.

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Question 15

(5 Marks)

Identify differences in the visual acuity between an infant aged 6 months and an adult aged 75 years.

END OF PAPER