RETEVET™
PORTABLE ERG

QUICK GUIDE

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CONTENT

1. NEEDED MATERIALS

Example

Figure 1: The material required and the individual components can be found in the following list

The following material is required to conduct an electroretinographic examination on a standing, sedated horse (Figure 1):

1. ERG RETevet™ (LKC Technologies, Gaithersburg, USA)
2. Electrodes
   a. Reference and grounding electrodes (needle electrodes), e.g. Natus, ultra subdermal, stainless steel, length 1,5 m, Natus Manufactum, Gort, Irland)
   b. Active electrode, e.g. ERG Jet™ Electrodes (Fabrinal, La Chaux-de-Fonds, Switzerland)
   c. Connection cable
3. Contact gel
4. Local anesthesia, e.g. Oxybuprocainhydrochlorid eye drops
5. Mydriatic, e. g. Tropicamid eye drops
6. Tape
7. Sedation
8. NaCl
9. Aqua destilled
10. Eyelid holder
11. Red light lamp
12. Fluorescein eye drops

2. GENERAL PRINCIPLES

Basically, it is important that every clinic creates its own standardized process, i.e. the following should always be the same:

- Premise
- Equipment
- Electrode positioning
- Protocols

→ This is the only way to keep disruptive factors to a minimum and make comparability of the data possible.

Room requirements:

- Darkenable
- Examination stand and headrest for the horse
- Keep as few electronic devices in the room operating or turn them off if possible

Each clinic should develop their own reference values [1–4]

Check the electrodes (before each use)

- Needle electrodes: rustproof, not bent
- ERG jet electrode: clean, gold ring must be intact
- No air bubbles in the contact gel on the active electrode

Strong illumination of the eye (e.g. indirect ophthalmoscopy, fluorescein angiography, fundus autofluorescence, photography, etc. imaging techniques) immediately before the ERG examination should be avoided [5,6]. A recovery phase in normal ambient light for at least ½ – 1 hour is recommended [1,5,6]

3. PROCESS OF THE ERG EXAMINATION

The following describes the process of an ERG examination using a dark and light adapted protocol (EVCO 5 steps, long).

General Preparation

1. General examination of the patient
2. Sedation (e.g. Detomidinhydrochlorid i. v.)
3. Lead the horse into a stand and place the horse's head on the cushion (Figure 2)

Figure 2: Horse in a stand

4. Attach needle electrodes subcutaneously. Various positions are described in the literature. A uniform approach is important, e.g.:
   a. Grounding electrode: median at the base of the head (Figure 3)

Figure 3: Position of the grounding electrode

   b. Reference electrode: 2.5 cm lateral to the temporal canthus (dimension with protective cover of the needle electrode) (Fig. 4). The protocol always begins with examining the right eye and then moves to the left eye. Therefore, the reference electrode on the right side is applied first.

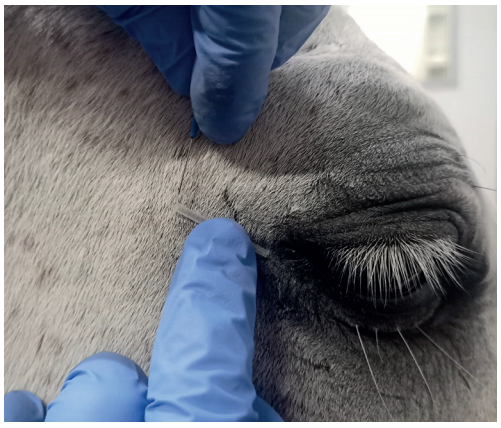

Figure 4: Position of the reference electrode, dimension of the distance with the protective cover

5. Attach the needle electrode cable to the halter (Figure 5)

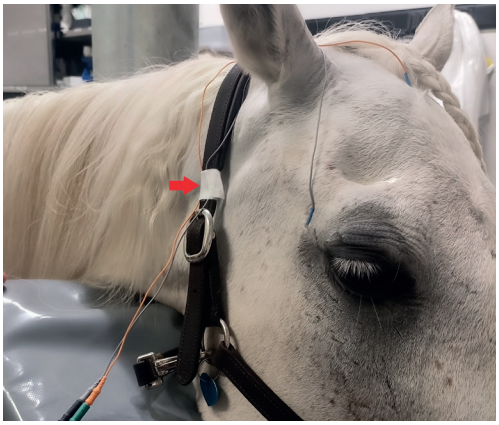

Figure 5: Attach the needle electrode cable to the halter (red arrow)

6. Start the RETevet device
   a. New test
   b. Insert patient name
   c. Insert birth date
   d. Choose protocol (e.g. ECVO 5 step long)
   e. Hold the device on the forehead and calibrate the device (Figure 6)

Figure 6: Calibration

   f. Switch on red light lamp, switch off room light
   g. Start timer for dark adaptation (for a horse at least 20 minutes recommended)[7]

Dark Adaptation Test

7. Apply topical mydriatic on both eyes
8. After approx. 15 minutes of dark adaptation: Apply local anesthetic to the cornea on both eyes, if needed apply more sedation
9. After approx. 18 minutes
   a. Apply local anesthetic again
   b. Adapt active electrode cable with connecting cable
   c. Apply bubble-free contact gel to the contact lens
   d. Open the upper eyelid with the eyelid holder (see Fig. 8)
   e. Apply the active electrode (see Fig. 8)
   f. Attach the cable to the upper jaw with tape (see Fig. 8)
   g. Connect the cable to the RETevet
10. After 20 minutes
   a. Begin test in dark adaptation
   b. Hold the device as close as possible to your right eye
      I. A green circle appears on the device screen. Place it over the dilated pupil
      II. Start testing
      III. Results appear on the screen
      → Continue in test protocol. If necessary, repeat the test or if there are significant disruptive factors, individual tests can be removed from the protocol
      IV. Follow instructions on the device
   c. Switch to the left eye
      I. Remove connection cable of the RETevet
      II. Remove active electrode and carefully flush with destilled water
      III. Flush right eye
      IV. Relocate reference electrode to the left eye
      V. Continue like described with the right eye (from point 10a)
11. Turn on the room light after conduction of dark adaptation tests

Right eye

Left eye

Light Adaptation Test

12. Place mini-Ganzfeld on the right eye and adapt the right eye to light for 10 minutes (Figure 7)

Figure 7: Light adaptation of the right eye, View from behind

13. After light adaptation proceed like described in 10a (Fig. 8 and 9)

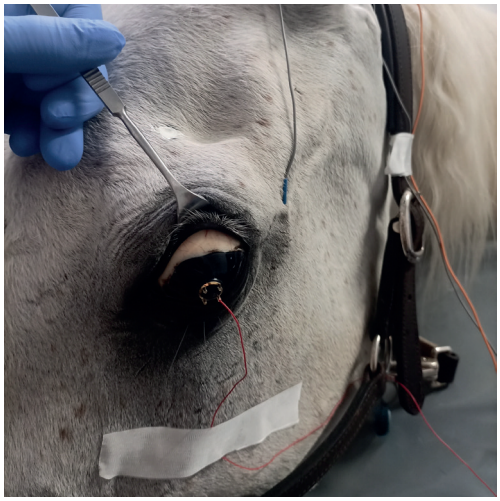

Figure 8: Placing the active electrode on the cornea

Figure 9: Conduction of light adaptation test

14. Switch sides like described in 11c

Right eye

Left eye

General

15. After completion of testing remove electrodes
16. Check both eyes for corneal erosions using fluorescein

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4. CLEANING AND CARE OF THE EQUIPMENT

- The electrodes are intended for single use
- Clean the black eye ring of the ERG device (Eye cub)

5. "FIRST-AID" IF PROBLEMS OCCUR

Various technical problems and/or artifacts may occur during the test run. For example, there is permanent monitoring of ambient noise. This is displayed if the threshold value of 55 µV is exceeded.
The following causes should be checked:

- All cables connected?
- Control of electrode placement
  - Are needle electrodes placed in correct position?
  - Is the active electrode placed correctly on the cornea with sufficient contact gel?
- Check electrode quality (see above) – maybe use new ones?
- Touching the electrode cables by examiner should be avoided
- Is the latest software (for the horse) installed? (Especially important for the dark-adapted tests)
- Sufficient sedation?
- Pay attention to the information in the manual
- To check the functionality of the electrodes, a so-called NaCl test can be carried out. To do this, place the needle electrodes and the active electrode in a vessel with NaCl without contact and start the test. Measuring should be possible.

6. LITERATURE REFERENCES

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NOTES

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