

## Association of Neurophysiology Scientists of Australia Inc.

(also known as ANSA, formerly ANTA)

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### Competency statements- Visual Evoked Potentials (VEP)

These competency statements assume a University education including a bachelor of biomedical science or similar including major components of human anatomy and physiology.

### Underpinning Knowledge

The following areas of knowledge are topics that relate to the competency statements required to perform a VEP. These areas of knowledge are not included in the statements as topics that require competence in performance but would assist in a better understanding of the competencies required.

- Anatomical structures and function of the central nervous system
- Maturation and development of the central nervous system
- Electrophysiology of the peripheral nervous system
- The neurological examination
- Neuro-imaging techniques
- Diseases of the nervous system including but not limited to
  - Multiple Sclerosis
  - optic neuritis
  - pituitary tumour
- Medications used for treatment of diseases of the nervous system
- Verbal and written communication skills
- Health and ethical principles

## **To perform VEP**

1. Core Knowledge
2. Preparation
3. Patient Care
4. Equipment
5. Electrode application
6. Recording
7. Interpreting the data
8. Completing the test
9. Presenting the data for reporting
10. Managing the recorded data

Appendix

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## 1. Core knowledge

The Neurophysiology Health Worker must be able to demonstrate an understanding of specialised knowledge in the following areas:

- Define the anatomical structures and function of the
  - visual nerve pathways
  - visual cortex
  - eye
- Describe the effects of the diseases of the nervous system on the VEP including but not limited to
  - Multiple sclerosis
  - optic neuritis
  - pituitary tumour
- Correlate the VEP waveforms to the appropriate anatomical signal generators
- Describe analogue to digital conversion recording techniques
- Identify bandwidth and frequency response characteristics
- Identify and explain the implication and use of frequency filters
- Explain the function and purpose of differential amplifiers
- Define common mode rejection ratio and understand its function and purpose
- Identify the recording parameters and how they differ from display parameters including sensitivity and filters
- Identify advantages and disadvantages of different types of electrodes
- Discuss sterilising procedures including high risk infectious diseases according to current Workplace Health and Safety (WH&S) and Infection Control (IC) regulations
- Identify the need to chloride and re-chloride silver electrodes
- Discuss the chemical and electrolytic process to chloride and de-chloride silver electrodes
- Explain the measurement of impedance
- Identify the importance of equal and low impedances in electrode application
- Explain the importance of normative data

## 2. Preparation

The Neurophysiology Health Worker must be competent in the following areas of VEP preparation:

- Identify the process for patients to attend and leave the clinic
- Prepare consumables appropriately
- Perform routine maintenance of equipment.
- Prepare and check equipment is set up according to manufacturer's specifications
- Identify and correct minor equipment faults
- Identify the process for arranging repair of more complex faults
- Prepare the environment according to WH&S regulations
- Identify and remove equipment likely to cause electrical interference
- Register correct data for patient
- Identify sufficient recording space for the recording
- Identify ethical issues that may occur during the recording
- Obtain appropriate patient consent

## 3. Patient Care

The Neurophysiology Health Worker must be competent in the following areas of VEP patient care:

- Introduce self and others present
- Identify correct patient, correct procedure
- Evaluate clinical and patient information on the request form noting
  - age of the patient
  - special care requirements
  - obtain relevant clinical history including
    - personal medical history
    - description of symptoms
    - medications
    - family history
    - visual impairment
  - indication for the test
  - contraindications for the test or part there of
  - identify the stimulation method to best suit the patient (pattern reversal, flash)
  - determine the need for full, half and or central field stimulation
- Demonstrate appropriate patient interaction
  - according to age, cultural differences and clinical state
  - provide sufficient pre-test information
    - appropriate eye wear (glasses/contact lenses)
    - appropriate level of alertness prior to and during the VEP
  - gain sufficient pre-test information
    - measure visual acuity
  - explain the procedure and answer questions
- Identify the need to adapt the VEP procedure according to the information provided
- Position the patient for adequate accessibility, and patient comfort
- Recognise and respond when assistance is required
- Demonstrate patient confidentiality

#### 4. Equipment

The Neurophysiology Health Worker must be competent in the following areas of VEP equipment:

- Electrodes
  - identify advantages and disadvantage of different types of electrodes
  - prepare and clean electrodes for use according to WH&S and IC regulations
  - store electrodes appropriately
- Amplifiers
  - identify and explain the implication and use of frequency filters on the VEP
  - identify the routine acquisition recording parameters for the VEP
  - identify appropriate sample rates for the VEP
- Stimulator
  - demonstrate the connection of the stimulator to recording equipment
  - differentiate between different types of stimulation application
    - checkerboard
    - flash stimulation
  - identify the parameters of the checkerboard stimulation
    - check width
    - field size
    - visual arc (distance from the patient)
    - reversal rate
  - demonstrate the measurement of appropriate visual arc
  - identify parameters of the flash stimulation
    - rate
    - intensity
    - distance from the patient
  - identify other parameters related to the visual stimulus
    - room luminance

#### 5. Electrode Application

The Neurophysiology Health Worker must be competent in the following areas of VEP electrode application:

- Accurately place electrodes according to the 10/20 electrode placement system and/or Queen Square electrode placement system
  - prepare skin for application of recording electrodes adhering to WH&S and IC regulations
  - explain the importance of good electrode application
  - identify advantages and disadvantages of different types of application – surface electrodes with paste, surface electrodes with Collodion, sub-dermal needle electrodes, other
  - demonstrate appropriate stability of electrode application for the length of recording
  - identify and implement infection control procedures
  - observe and apply standard precautions for contact, droplet and airborne infection risks when applying, removing and cleaning electrodes

## 6. Record the VEP

The Neurophysiology Health Worker must be competent in the following areas of VEP recording:

- Connect electrodes to pre-amplifier
  - connect electrodes to the pre-amplifier according to electrode placement
  - arrange leads and pre-amplifiers to minimise environmental artefacts
- Identify the appropriate electrode impedance for VEP
  - define the required impedance level for recording
  - read impedance measurement
  - adjust impedance where appropriate
- Define the machine settings used for VEP
  - define the machine settings including sensitivity, filters, sweep duration, number of averaged sweeps, automatic rejection
  - explain the relevance of machine settings to the recording
  - use machine settings according to departmental protocols
  - identify stimulator controls including intensity, contrast, flash or pattern reversal rates
  - alter machine and stimulator settings when appropriate
- Identify the appropriate montage for VEP
  - identify the montage used for VEP
  - discuss advantages and disadvantages of the number of recording channels for the VEP
  - discuss the usefulness of recording an Electro-retinogram (ERG) in conjunction with the VEP
- Recognise artefacts
  - identify artefacts and their source
    - instrumental and or environmental artefacts
    - physiological artefacts
  - eliminate or minimise source of artefact
- Recording the VEP
  - discuss advantages and disadvantages of monocular over binocular stimulation
  - apply eye patch appropriately to non stimulated eye
  - demonstrate different stimulation presentations appropriate for the individual
  - identify appropriate number of sweeps for best signal to noise ratio for VEP recording
  - demonstrate reproducibility of recorded waveforms
  - follow departmental protocol
  - adjust recording and or stimulation procedure where appropriate
  - identify inadequate fixation/attention and its effects on the VEP
- Annotation of the recording
  - annotate recorded traces to identify appropriate waveform latencies and amplitudes
- Annotate stimulation method used

## 7. Interpreting the data

The Neurophysiology Health Worker must be competent in the following areas of VEP data interpretation:

- Identify the VEP waveforms
  - identify normal waveforms including latencies and amplitude of the expected VEP appropriate for age and normative data
  - identify abnormal waveforms including latencies, amplitudes, and side to side differences according to age and normative data
- Correlate the VEP waveforms to the appropriate anatomical signal generators
- Identify the electroretinogram (ERG) latencies expected

## 8. Completing the VEP

The Neurophysiology Health Worker must be competent in the following areas of completing the VEP:

- Check electrode integrity
- Validate recording on completion
- Remove electrodes according to different applications, WH&S and IC regulations and patient comfort.
- Remove electrolyte from patient
- Assist patient as required
- Inform patient of the process for obtaining results
- Dispose of materials according to waste management, WH&S and IC regulations
- Clean recording electrodes in accordance with WH&S and IC regulations

## 9. Presenting VEP for reporting

The Neurophysiology Health Worker must be competent in the following areas of presenting the VEP for reporting:

- Present recorded traces for interpretation
- Present tabulated data (latencies and amplitudes) for interpretation

## 10. Managing the recorded data

- Archive recording
- Maintain database of recording

## Appendix – Stakeholders

### Stakeholders

- ANTA Inc. Members
- Document Development Committee
- Document Development Committee Advisory Group
- Other interested parties

### Document Development Committee (2014-2015)

Joanne Wex, Angela Borbelj, Anna Exley, Holly Campbell, Mary Lynch, , Santhi Chigurupati, Malcolm Corkhill, Amy Lofts, Vicky Grant, Samantha Soe.

### Advisory Committee

The document development committee identified a group of key stakeholders to view the draft documents for feedback. The advisory group was made up of technologists, scientists and neurologists working in the neurophysiology industry around Australia. The comments from this group were considered, compared against the reference material and included where appropriate.

### Members Feedback

On completion of the final draft the document was put out to all members of ANTA Inc. for feedback. The comments from members were considered, compared against the reference material and included where appropriate.

### Amendment

2023 July Rebranded to ANSA Inc



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