Eye specialists use a few different methods for recording and interpreting eye activity and each methodology has a corresponding device dedicated to that use. Doctors examining for retinal health and scientists who do research on living organisms use these devices. The instruments track eye movement to find where an eye is positioned and what horizontal and vertical movements it makes when introduced to a stimuli -- usually a bright light.

Electrooculograph

An electrooculograph is used to measure the movement of the eyes, with both horizontal and vertical movements being recorded separately. The electroocuograph works by placing electrodes on the patient, which emit small voltages from the region surrounding the eye that are recorded by the machine. The machines rely on dark adaptation and changes in the metabolic state of the eye to deliver the readings. The University of Liverpool states, “There have been reports that the velocity of the eye as it moves may itself contribute an extra component” to the readings, and believes “it is not a reliable method for quantitative measurement, particularly of medium and large saccades. However, it is a cheap, easy and non-invasive method of recording large eye movements.”

Infra-Red Devices

Infra-red oculography devices use infra-red lights that can not be perceived by the human eye so the patient is not distracted by the light during the exam. These machines work on the principle that a stationary light directed at the patient's eye will cause eye movement to vary and that this variance can be seen when reflected back towards a detector in the machine. The natural lighting in the room (ambient lighting) does not affect the machine's reading because the detectors are only picking up the reflected infra-red light. This is particularly useful for capturing horizontal eye variance.

Image and Video Devices

Devices can also read where the eye is positioned from images and video of the patient's eye. Some of these create “Purkinje” images using a bright light to make a “reflection of the light source from various surfaces in the eye (the front and back surfaces of the cornea and lens),” according to the University of Liverpool. Several of these still Purkinje images are compared to track changes in the eye's movement. The same thing can be done using a combination computer software and video-imaging device to find the pupil and the center of the pupil and track vertical and horizontal movement. The University says, “image-based methods tend to have temporal resolutions lower that that achieved with IR techniques,” revering to infra-red devices, and adding that, “spatial resolution can also be limited.”

Search Coil Devices

Scleral search coil devices work by inserting an anulus -- a modified contact lens with small coils of wire inside -- into the patient's eye. To measure both horizontal and vertical movement, two anulus must be used. This device works on the principle that a coil of water moving inside a magnetic field will create a signal showing where the eye is positioned. The University of Liverpool website explains, “A wire from the coil leaves the eye at the temporal canthus. The field is generated by two field coils placed on either side of the head.” The reading is sent to the device, which interprets the data. This device is generally used only in clinical trials because of its invasive nature, but the method allows a wide variety of movement to be recorded.

Key Concepts

- devices measure eye
- measure eye activity
- device eye activity

References

- University of Liverpool: Methods of Measuring Eye Movement [http://www.liv.ac.uk/~pcknox/teaching/Eymovs/emeth.htm]