



VertiPACS®

integrated software platform for
all ZEHNIT vestibular products.



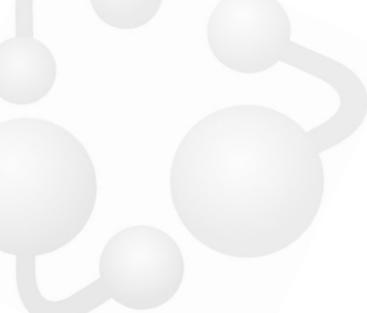
Developed by Dr. med. Martin Enke, an ENT specialist and otoneurologist, VertiPACS® is a unique product, especially in terms of user-friendliness and performance.

VertiPACS® is designed for use in the ENT or neurology practice as well as in the clinical or research setting.

Life needs balance!



ZEHNIT®



VertiPACS®-Features

VertiPACS® is the integrated software platform for all the entire ZEHNIT vestibular product range. It offers a complete arsenal of tests and procedures as well as a rich set of editing and documentation tools. Its basic features are:

Patient database

The easy-to-use database makes creating and retrieving patient files child's play.

Network capability

Examinations and assessments do not necessarily happen in the same room. VertiPACS® allows the same patient file to be accessed from different locations.

GDT Interface

Patient master data and examination results can be transmitted with this protocol. The latest GDT version (3.1) is supported.

Report generation

Reports and summaries can be created as printouts or PDF files. Your own logo can be integrated to enhance your corporate identity.

Editing and playback

Some test results require a closer look and sometimes even some editing to smooth out artefacts and make the result more clear-cut. Every test can be edited and played back with the corresponding video material.

Device control

VertiPACS® controls all ZEHNIT hardware devices, including VertiGoggles®, VertiPlatform®, VertiChair® and VertiSW®.

Interface to VertiApps

This interface is used to exchange patient master files, videos and raw data from measurements with the Verti-Mobile® app as well as completed questionnaires with the VertiQuest® app.



History

This function allows the systematic collection and recording of a patient's dizziness history. This step can thus be delegated.

Clinical findings

Here you can document and supplement findings from ear exams, vestibulospinal tests, vision exams, blood tests and other exams.

Image capture

Often, images are taken during the vertigo diagnosis process. Such images include photos of the eardrum taken during otoscopic examinations or images of the fundus of the eye taken with an ophthalmoscope, or X-ray films. These images and of course PDF files can be saved to the patient database and printed as part of the report.

Dizziness Handicap Inventory

When this well-known questionnaire is used with VertiPACS®, the program calculates the score and subscores and instantly generates a result. Using VertiQuest®, a patient can even do this test independently of a doctor.



Calibration

This test is used to calibrate the distance between the patient's eye and the beam splitter mirror of the video goggles.

Gaze

This test is performed to document gaze dependent spontaneous nystagmus, automatically calculating its direction and severity.

Position test

This test is designed to document position-dependent nystagmus, which frequently presents in patients suffering from atypical BPPV or central nervous system disorders.

Positioning test

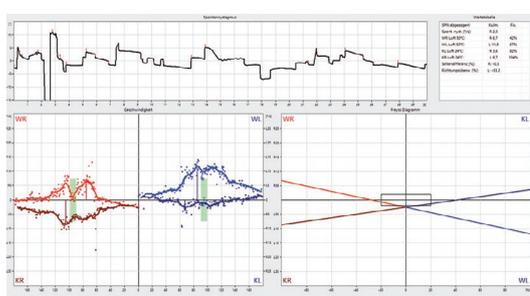
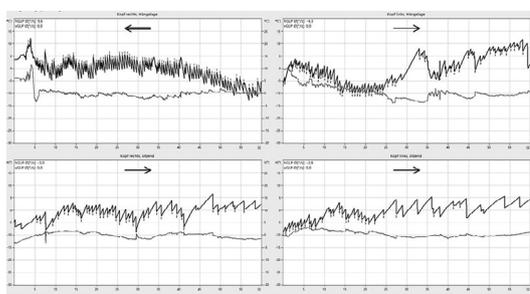
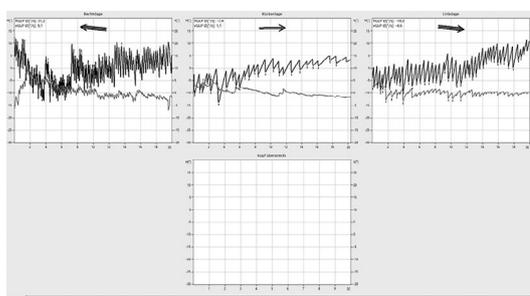
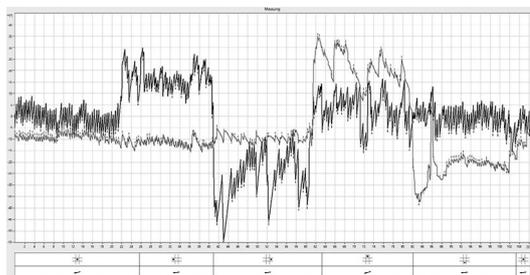
This test is designed for the diagnosis of BPPV. It can be used for dynamic positional testing of the semicircular canals and to document repositioning treatment of patients suffering from BPPV.

Caloric test

The classic test of the labyrinth. In addition to the analysis of spontaneous nystagmus, the results of the irrigations are displayed in the familiar culmination and Freyss diagrams, thus allowing diagnoses at a glance. The numeric values of Slow Phase Velocity (SPV), Vestibular paresis, Directional Preponderance and the Fixation Index are calculated and shown in a table.

Custom test

This feature allows users to freely configure their own VNG tests to be used separately or together with other tests as part of a test protocol.



Calibration

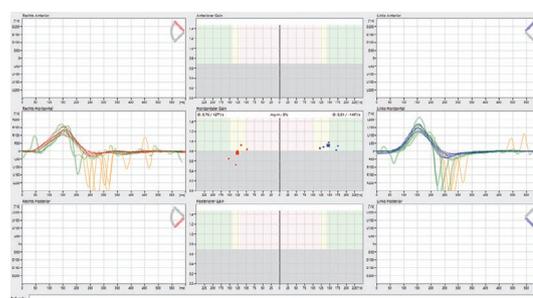
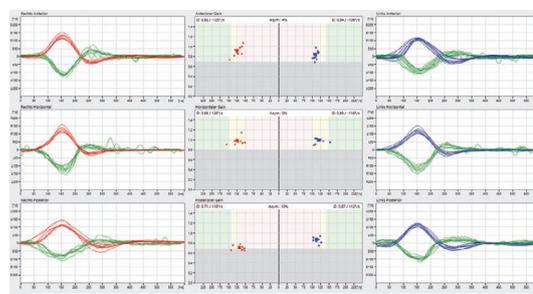
This test is used to calibrate the distance between the patient's eye and the beam splitter mirror of the video goggles.

HIMP

The Head Impulse test (HIMP) enables a sidedependent evaluation of all six semi-circular canals. In the test result the head trace can be superimposed on or mirrored with the eye trace. It is also possible to mirror the diagram for the left ear. The playback function allows simultaneous playback of the eye video and the head and eye traces in the position and velocity domain.

SHIMP

The SHIMP (Suppression Head Impulse test) is a new variant of the Head Impulse test. It lets you see whether and to what degree any residual function remains on the affected side. The patient's task is to stare at a built-in LED which is used as a fixation target during the test to prevent covert saccades ("saccade-killer"). The completely light-proof and magnetically held eye cover facilitates the test.

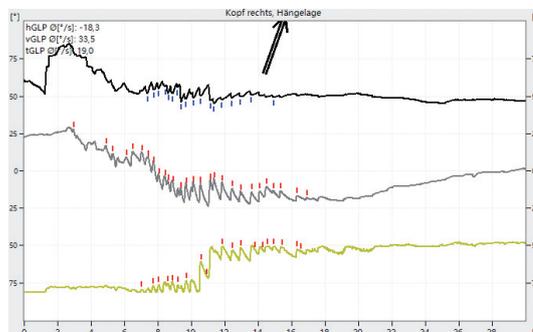


Torsion

The diagnosis of peripheral and central disorders requires a systematic examination of the different types of eye movements. For an analysis it is necessary to detect horizontal, vertical as well as torsional eye movements.

The detection of torsional eye movements is performed in the following tests:

- » Gaze Test
- » Position Test
- » Positioning Test
- » Custom Test



Export

For research and instructional purposes, measured values and videos can be stored as separate files on the local hard disk or on an external data storage device:

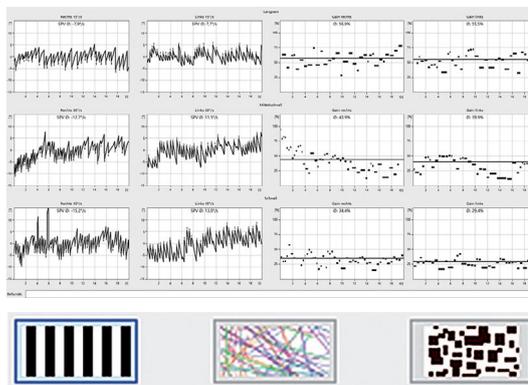
- » Goggles video – Eye video recorded in MP4 format during testing
- » Scene video – Room video recorded in MP4 format during testing
- » Data – ASCII test results formatted in a CSV file (comma separated values)

The videos are played back with standard media players. Exported measurement data can be used with programs such as Excel or MatLab.



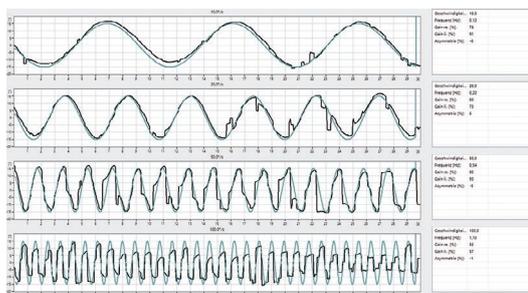
Optokinetic test

Dizziness caused by a malfunctioning of the optokinetic system is indicative of a central nervous system disorder. This test allows an examination of the optokinetic system using various stimuli in the horizontal and vertical planes.



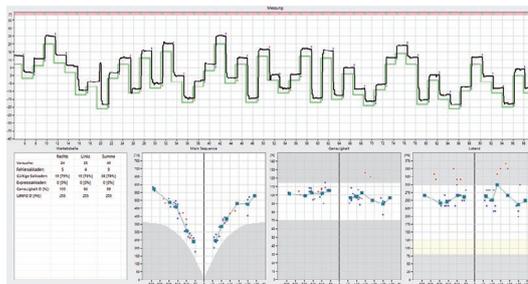
Smooth Pursuit

Disorders of the pursuit system can be detected with this test. It enables an examination of the pursuit system with horizontal and vertical stimuli at four velocities. The horizontal and vertical stimuli have a fixed amplitude of ±15° and ±10°, respectively.



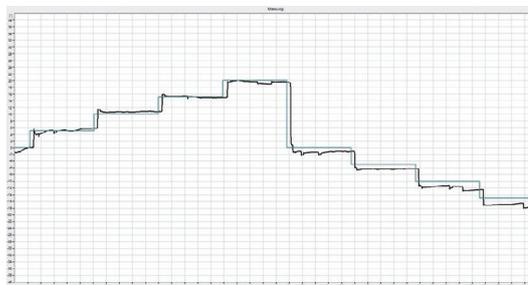
Conventional Saccades

The test allows the assessment of the saccade system via horizontal and vertical stimuli with an amplitude of between ±5° and ±30°. They alternate directions and are equal in number. Speed, precision and latency are assessed, along with the number of trials, error saccades, valid saccades and express saccades.



Gaze holding

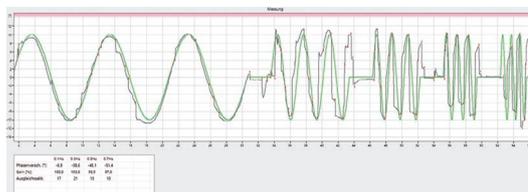
This test is performed to detect gaze dependent nystagmus. The duration of the measurement, the step duration and step amplitude horizontal and vertical can be set by the user.





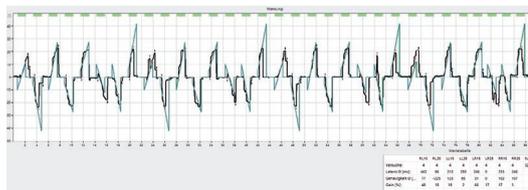
Predictive pursuit

The patient's eyes pursue a vertical, sinusoidal gaze target, which is continuously presented in a sequence of four frequencies. After each frequency there is a short pause and the gaze target briefly remains in the zero position. The viewer's anticipation directs the eye in the expected direction and then back again to the gaze target (zero position). The vertical, sinusoidal stimuli have an amplitude of $\pm 10^\circ$ and are presented in each test run at four velocities, 0.1Hz, 0.3Hz, 0.5Hz and 0.7Hz.



Step-Ramp-Test

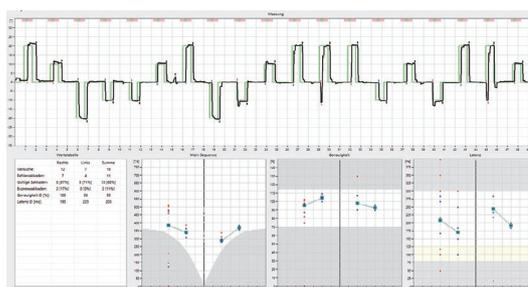
Variante des Smooth Pursuit Tests, in dem die initiale Sakkade durch einen kurzen Sprung des Fixationsziels unterdrückt wird. Um den Beginn des Smooth Pursuits zu beurteilen, werden unvorhersagbare Schritt-Ramp-Stimuli mit verschiedenen Sprüngen und Geschwindigkeiten verwendet. Die Amplituden der Sprünge variieren zwischen $\pm 5^\circ$ und $\pm 10^\circ$, die Geschwindigkeiten zwischen $15^\circ/s$ und $25^\circ/s$.



Advanced Saccades allow a detailed assessment of almost every part of the brain and so allow a kind of „brain mapping“ with a sensitivity that can, in certain cases, be higher than that of an MRI.

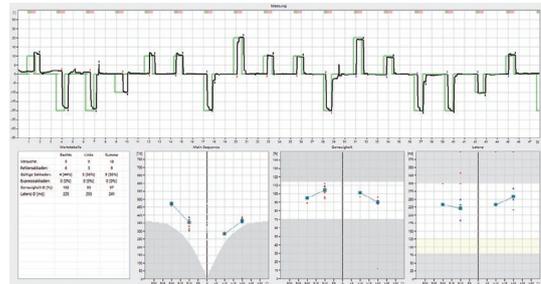
Gap Saccades

A fixation target at the zero position is switched off, after which a new target appears randomly with an amplitude of either $\pm 10^\circ$ or $\pm 20^\circ$ in the horizontal direction.



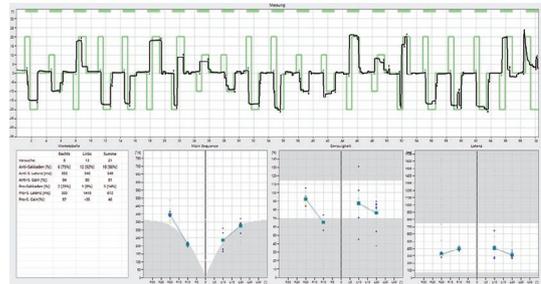
Overlap Saccades

During the presentation of the horizontal gaze target, the fixation target at zero position remains for a short time. The direction of the horizontal gaze target is random, with an amplitude of either $\pm 10^\circ$ or $\pm 20^\circ$.



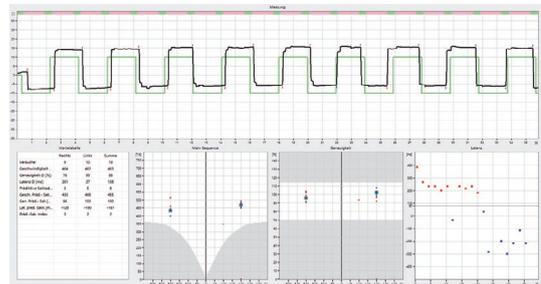
Anti-saccades

This test is used for the separate assessment of reflexive saccades (prosaccades) and voluntary saccades (antisaccades). When the visual stimulus is presented, the patient is asked to look at a point mirroring the position of the stimulus. The stimulus is horizontal with a random direction and amplitudes of $\pm 10^\circ$ and $\pm 20^\circ$.



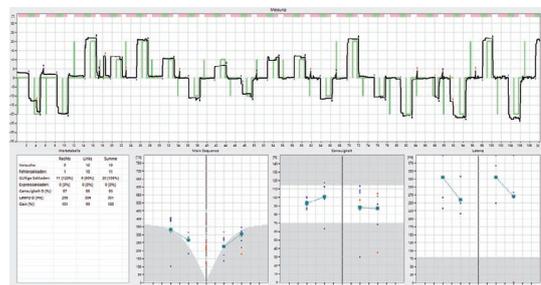
Predictive saccades

These are saccades generated in anticipation of the appearance of a target at a particular location. In this test, the amplitude of the visual target is always $\pm 20^\circ$, and the horizontal target jumps in a regular sequence. After a short period of getting used to the stimulus, the patient can perform the saccade even before the new visual target appears, due to the internal image of the saccade (efference copy).



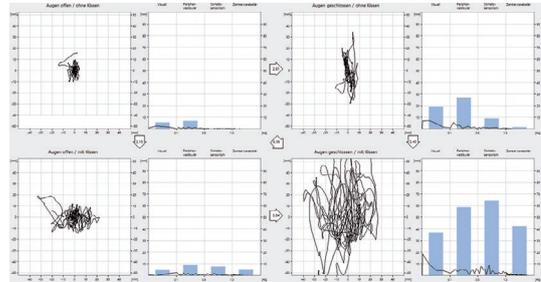
Memory saccades

This test assesses the patient's ability to generate a saccade to a location in which a target has been previously present. The direction and amplitude of the horizontal stimulus are random. The amplitudes are $\pm 10^\circ$ and $\pm 20^\circ$.



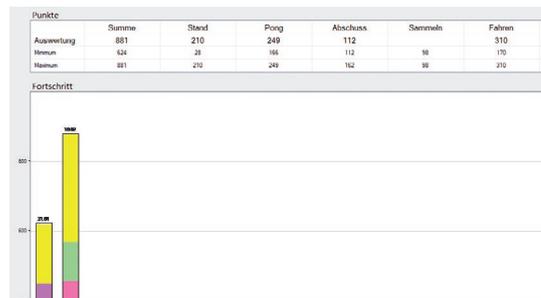
Romberg-Test

The VertiPlatform® allows a quantification of the Romberg test. VertiPlatform® is a force plate with pressure-sensitive sensors to determine the centre of pressure (COP), the oscillations of the body as well the loss of stability (LOS). The results are displayed in a 2D bar graph (stabilogram) and a sway frequency diagram (Fourier Analysis). Posturography is a means to assess dysfunctions of the vestibular system on the cerebellar, spinal and vestibular level.



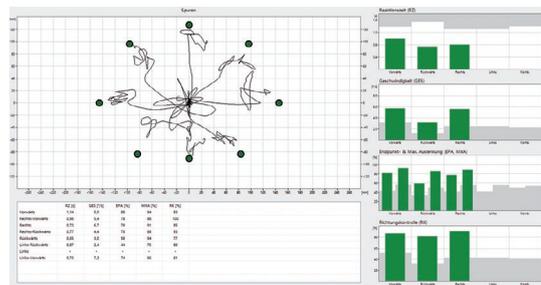
Balance training

The balance training consists of a Romberg test as basic test and 4 to 6 exercises which can be used for the therapy of any kind of balance disorder. Following instructions and guidance on a flat screen, the patient endeavours to control his centre of pressure. This feedback method increases the patient's motivation and accelerates the progress of compensation of vestibular deficits.



Limits of Stability

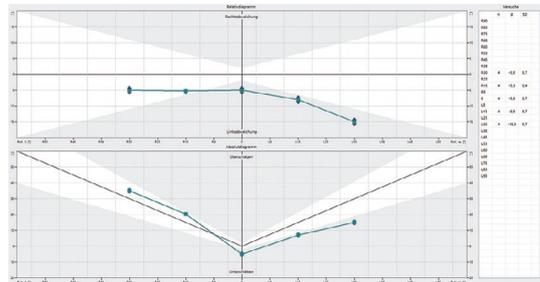
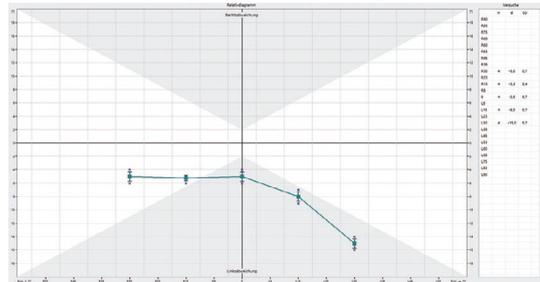
This test is used to define the extent to which the patient can move and control his centre of pressure without losing his balance. The patient's task is to shift his centre of gravity in a controlled manner in the direction of a target: forwards, forwards right, right, backwards right, backwards, backwards left, left, forwards left.



Subjective Visual Vertical

VertiSW® enables the determination of both the Subjective Visual Vertical and the Subjective Visual Horizontal. In addition to the classic protocol, which has the patient in a fully upright position, tests can be performed in up to 12 tilt positions per side to assess the functioning of the utricle and saccule at the same time. The test results are displayed as a graph and in a table with the mean value and standard deviation computed.

The test result can be displayed either in a relative diagram alone or as a combination of relative and absolute diagrams.





VertiPACS®-Module VertiChair

VertiChair® is a multi-purpose rotary chair system for the diagnosis and treatment of vestibular disorders. Its powerful step engines allow the subject to be turned in the pitch and yaw plane at the same time, providing a unique range of motion. Its motor-driven sled can even move the subject out of the yaw axis to enable eccentric rotations.

The chair is controlled by VertiPACS®, the integrated software for all ZEHNIT vestibular products.

The system can be position-driven and velocity-driven. It lets the user perform all major vestibular procedures and tests, including standard and user-defined procedures for the diagnosis and treatment of BPPV. The preset procedures are:

Classical Rotary Chair Tests

- » Impulse Acceleration Test
- » Constant Acceleration Test
- » Sinusoidal Acceleration Test
- » Sinusoidal Harmonic Acceleration Test
- » Velocity Step Test

Unilateral Centrifugation (VertiSVV®)

This test is performed to assess the function of each utricle separately. First, the seated patient is rotated on the vertical axis until the chair reaches its final velocity. Then the chair is moved a few centimetres to the side, just enough to bring one utricle into the centre of the rotation. Now the function of the other utricle can be assessed, either through a Subjective Visual Vertical (SVV) test or by means of 3D oculography. Acceleration, velocity, offset and number of repetitions can be set.



VertiPACS® Rotary Chair Test with VertiChair

Continuation

Unilateral Centrifugation (VertiGoggles®)

This test offers the same test parameters as the test described above. The eye movements are tracked via the VertiGoggles®.

BPPV Chair test

This is a rotary chair test for the diagnosis of BPPV. In addition to diagnostic uses, it allows the treatment of all kinds of BPPV. Predefined and user-defined procedures can be performed to determine and utilize the most effective treatments.

The multi-purpose rotary chair system VertiChair® is currently only available in countries that accept CFDA approval.



VertiPACS® is the integrated software platform for all ZEHNIT vestibular products.

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 ZEHNIT® General importer for Europe

Minimum computer requirements:
CPU 3.5 GHz processor, 8 GB RAM, 200 GB free disk space,
Windows 10 Home 64-bit, USB port 2.0/3.0, Bluetooth interface.