



# Synapsys VHIT

video head impulse test



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**“Synapsys VHIT  
represents a unique way  
to perform Video Head  
Impulse Test (VHIT)”**



Testing all six semicircular canals at high frequency, with binocular recording and analysis of eye and head movements, has never been so **fast** and **simple**.

Synapsys VHIT is the ideal choice for ENT doctors, physiotherapists and balance professionals who are looking for reliable, accurate and state-of-the-art equipment.

The algorithms used by Synapsys VHIT are specifically developed to simultaneously measure the patient's gaze and head movements, supporting the analysis of the vestibulo-ocular reflex, VOR, in response to quick head impulses.

Capable of testing all six semicircular canals, including lateral and vertical planes, Synapsys VHIT provides valuable information on VOR gain, overt and covert saccades, and a complete results table including PR Score.

Synapsys VHIT can be combined with Synapsys VNG, which tests lateral canals at low and medium frequencies, to obtain a complete vestibular analysis.

When selecting Synapsys VHIT you can choose between two scalable software versions:

- **VHIT Basic** for testing lateral canals only
- **VHIT Plus** for a complete six canals analysis

**.Innovative  
Simple.  
.Unique**

Designed and developed with the help of the visionary and world-renowned otologist **Dr. Erik Ulmer**, Synapsys VHIT is a unique product in balance testing.

Thanks to a revolutionary **remote camera system**, Synapsys VHIT is the first and only video VHIT that does not require the use of goggles or any kind of head-mounted device to be placed on the patient's head.

This results in total prevention of mask slippage artifacts, greater patient comfort and complete freedom of movement for the practitioner.

Moreover, thanks to its remote camera, Synapsys VHIT is never in direct contact with the patient's skin or body, reducing the need for disposables and simplifying daily clinical workflow.

The camera is positioned directly in front of the patient and captures head and eye movements without any physical contact with the device. **No manual calibration is required:** the software automatically recognizes the patient's face and eye region, supporting faster setup and repeatable acquisition.

Synapsys VHIT enables **binocular recording** and **analysis of all six semicircular canals**, including the lateral canals and the vertical RALP and LARP planes. With acquisition up to 250 Hz, the system supports precise tracking of fast head and eye movements.

**The software guides the doctor during the examination** through display and sound information, helping perform the maneuvers correctly. By detecting the direction of the patient's head movements, it automatically recognizes the investigated plane, allowing the operator to complete the examination without ever leaving the patient.

Synapsys VHIT is designed to be **fast and simple to use**. A complete six-canal assessment can be performed in less than five minutes, providing VOR gain, overt and covert saccades, gain shift, PR Score and a complete results table.

No other system offers the same opportunity to test patients of all ages. Since tight-fitting goggles are not required, this remote camera system allows Video Head Impulse Testing in **infants as young as 3 months old**.

**INNOVATIVE** JUST LIKE YOUR CLINIC.

**UNIQUE** AS ALL YOUR PATIENTS.



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SYNAPSYS VHIT



## SYNAPSYS VHIT

Clinical evidence



### Normative Values of semicircular canal Vestibulo-Ocular reflex gain in infants and children

**Aim.** Assess normative values of semicircular canal VOR gain in infants and children using a Video Head Impulse system with a remote camera.

**Results.** Data show a non-linear and monotonous evolution: VOR gain increases rapidly up to the age of about 6 years old, with variation among canals, then progresses more slowly to reach adult values by the age of 16.

**Conclusions.** Remote video recordings and adapted protocols permit HIT in children as young as 3 months old in less than 10 min. The remote camera system allowed to determine the evolution curve of the VOR gain over time.

[Wiener-Vacher, Sylvette R., and Sidney I. Wiener. *Frontiers in Neurology* 8, 2017: 434].

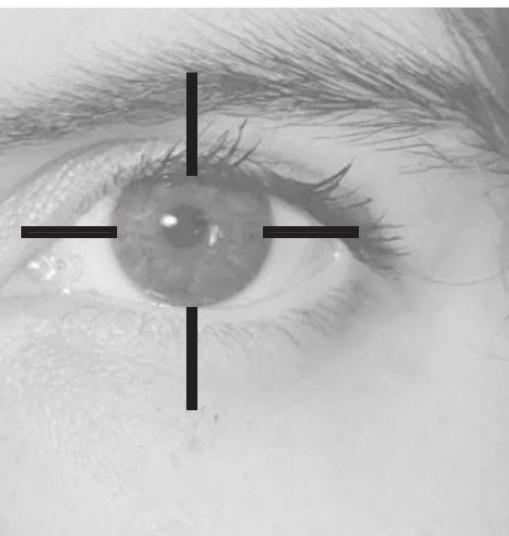
### Clinical Utility of Remote-Camera Video Head Impulse Testing in Children under 3 Years

**Aim.** Demonstrate the feasibility and clinical utility of remote-camera video head impulse testing, vHIT, for assessing semicircular canal function in very young children at risk for vestibular dysfunction.

**Results.** In five clinical cases (ages 6–31 months), remote-camera vHIT successfully provided reliable, ear-specific information about vestibular function. In some cases, it detected dysfunction missed by first-tier screening (cVEMP), while in others it confirmed or ruled out rotary chair findings—avoiding unnecessary repeat testing.

**Conclusions.** Remote-camera vHIT is a feasible, practical, and highly informative tool for evaluating vestibular function in infants and toddlers. It provides ear-specific results that enhance diagnosis and support timely referral to pediatric vestibular rehabilitation.

[Janky, K.L., Patterson, J., and Kelly, E.A. *The Laryngoscope* 134.12 (2024): 5201–5206].



## A WORD FROM THE EXPERTS

### Sylvette Wiener-Vacher

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The VHIT technique has revolutionized the vestibular system assessment by allowing the analysis of VOR gains at high speeds on each of the semicircular canals.

In my pediatric practice, 600 children per year, the Synapsys VHIT is an essential tool, absolutely not comparable to the others. Thanks to its remote camera, no devices are needed on the head of the child, giving you complete freedom while performing the exam. This is really important, because you can perform just 2-3 maneuvers and move on to the next plane preventing the child to get annoyed. At the end you can go back and complete the 5 required maneuvers per canal to get a complete result.

”

ENT doctor - Center for Evaluation of Balance Disorders in Children (EFEE), Robert Debré University Hospital, Paris, FR

### Olivier Dumas

“

I have been using Synapsys VHIT for 14 years now in the vestibular rehabilitation field, and this device has become essential to me. The speed and accuracy with which examinations are carried out are surprising, and the fact that there is no need for calibration is a considerable time saving.

The use of a remote camera greatly simplifies the exam practice learning, as I observe it daily during my teaching activities.

Moreover, the Synapsys VHIT allows to perform a precise analysis of early saccadic function, making this device an important rehabilitation tool.

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Vestibular Physiotherapist, Lyon, France - Professor in vestibular assessment, Lyon Sud University Hospital, Lyon, FR

### Vincenzo Marcelli

“

Early identification of vestibular dysfunction in children is essential to optimize motor and cognitive development.

With the advent of objective and non-invasive methods such as remote camera VHIT, accurate evaluation is now possible even in very young patients.

VHIT is a valuable, feasible, and reproducible tool that can detect dysfunction even in the absence of symptoms, and universal vestibular screening, beyond high-risk or symptomatic populations, should be considered to prevent diagnostic delays.

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Specialist and Consultant in Audiology and Vestibular Sciences at the University of Naples 'Federico II, Naples, IT

### Kristen Janky and Jessie Patterson

“

We have been performing pediatric vestibular testing at Boys Town National Research Hospital for more than 30 years and the addition of remote camera vHIT has proven to be an invaluable tool in our clinical practice.

It is quick, well-tolerated, and provides ear-specific results without the need for goggles or electrodes, which is especially important in infants, toddlers, and individuals with Down syndrome. In many cases, it is the only assessment children could complete successfully, and it provides complementary information to other tests of vestibular function.

Remote camera vHIT has become essential in our clinical and research protocols for accurately identifying vestibular dysfunction in difficult-to-test populations.

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Vestibular Audiologists  
Vestibular and Balance Research Laboratory  
Boys Town National Research Hospital, Omaha, NE



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KEY BENEFITS

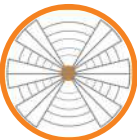
# Key benefits



- No goggles or head-mounted devices required.



- Ideal for pediatric assessment, including infants from 3 months old.



- Binocular recording and analysis of all six semicircular canals.



- Complete six-canal assessment in less than 5 minutes.



- High-speed acquisition up to 250 Hz.



- Automatic face and eye ROI detection, with no manual calibration required.



- Automatic detection of the canal under test.



- Complete results table including VOR gain, gain shift, PR Score and saccadic parameters.



- Video recording and playback for each maneuver.



- No disposables required.



- Fully integrated into Maestro software.



- Compatible with OTOAccess® Database.



Synapsys VHIT

Hardware specifications

Remote camera system  
Goggle-free and contact-free acquisition  
Motor-free design: no device movement required during testing  
Fixed remote camera setup at 90-100 cm from the patient  
Height adjustment through monopod  
USB footswitch for hands-free operation

Software specifications

Integrated into the Inventis Maestro software ecosystem  
Compatible with OTOAccess® Database  
Automatic face recognition and eye ROI detection  
No manual calibration required  
Binocular analysis of all six semicircular canals, including RALP and LARP planes  
Analysis of VOR, overt and covert saccades  
Complete results table including VOR gain, gain shift, PR Score and saccadic parameters  
Canalogram Ulmer  
Voice messages and guided acquisition  
Video recording and playback for each maneuver

Sensor specifications

Type: CMOS Mono  
Max resolution: 1456 x 1088 pixels  
Pixel size: 3.45 x 3.45 µm  
Sensor class: 1/3"  
Shutter type: Global

Timings

Camera acquisition rate: up to 250 Hz  
Exposure time: 2.4 ms  
Complete six-canal assessment: less than 5 minutes

Camera properties

Remote camera with fixed focus at 90-100 cm  
Focal length: 20 mm / 0.787 in.  
Field of vision: 7.3° horizontal, 3.9° vertical

Camera controls

Gain control: automatic  
Exposure control: manual fixed  
Automatic ROI detection for eye centering

Computer interface

Connection: through USB 3.0 port  
USB cable length: 3 m / 118.1 in.

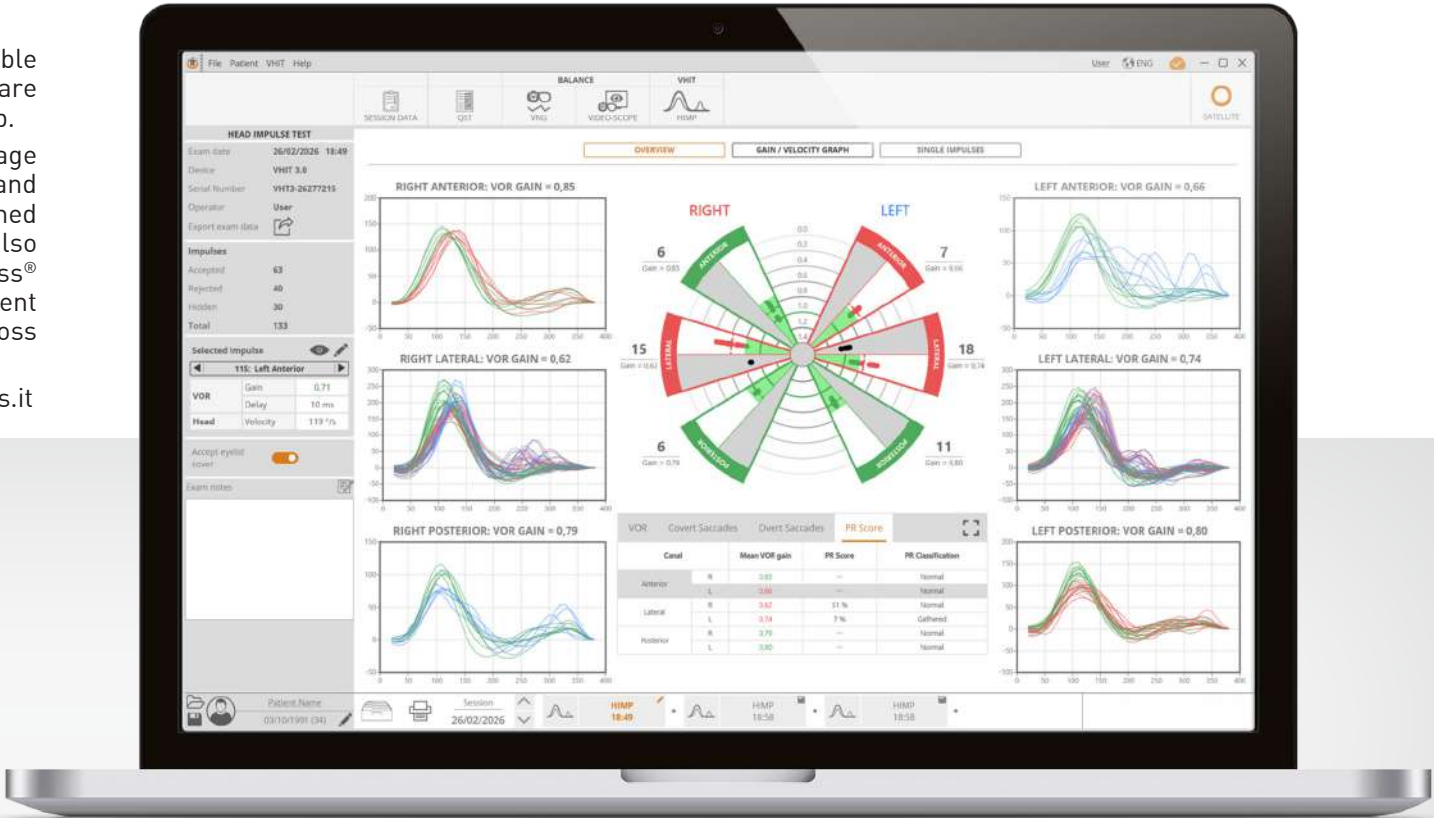
Models

10738 Synapsys VHIT Basic  
10739 Synapsys VHIT Plus

Synapsys VHIT is fully controllable through Maestro, the core software of the Inventis equipment set-up.

With Maestro, users can manage patient data, run, review and combine exams in a streamlined workflow. Synapsys VHIT is also compatible with OTOAccess® Database, supporting efficient patient data management across the clinical workflow.

Check out more on [www.inventis.it](http://www.inventis.it)



Check the video on [YouTube](#)



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TECHNICAL DATA

