VHLA Suggested Active Surveillance Guidelines

Until a cure is found, surveillance is a patient's strongest defense to prevent severe VHL complications.
[Revised 4/24/2020]

Surveillance is the testing of individuals at risk for von Hippel-Lindau disease (VHL) who do not yet have symptoms, or who are known to have VHL but do not yet have symptoms in a particular area. The unaffected organs should still be screened.

Modifications of surveillance schedules may sometimes be done by physicians familiar with individual patients and with their family history. Once a person has a known manifestation of VHL, or develops a symptom, the follow-up plan should be determined with the medical team. More frequent testing may be needed to track the growth of known lesions.

People who have had a DNA test and do not carry the altered VHL gene may be excused from testing.

In order to monitor the most critical areas of the brain and spinal cord in the most efficient and cost-effective manner, CNS MRIs should include the brain, cervical, thoracic, and lumbar spine. Scans should be ordered as no less than a 1.5T MRI with and without contrast, with thin cuts through the posterior fossa, and attention to inner ear/petrous temporal bone to rule out both ELST and hemangioblastomas of the neuraxis.

Surveillance Modality (Tumors being screened)	**AGE[1]**						**Pregnancy[11]**
	<5 years	**Beginning at age 5y**	**Beginning at age 11y**	**Beginning at age 15y**	**Beginning at age 30y**	**Beginning at age 65y[1]**	
History and Physical Examination[2]	Yearly from age 1 year	Yearly	Yearly	Yearly	Yearly	Yearly	Prior to conception[11]
Blood Pressure and Pulse (Pheochromocytomas/paragangliomas)	Yearly from age 2 years	Yearly	Yearly	Yearly	Yearly	Yearly	Prior to conceptionr[11]
Dilated Eye Examination[3] (Retinal Hemangioblastomas)	Every 6-12 months, beginning before age 1 year	Every 6-12 months	Every 6-12 months	Every 6-12 months	Yearly	Yearly	Prior to conception, then Every 6-12 months[11]
Metanephrines[4] (Pheochromocytomas/paragangliomas)	——	Yearly	Yearly	Yearly	Yearly	Stop routine[1]	Prior to conception[11]
MRI Brain and Spine w/wo Contrast[5,6,7] (CNS Hemangioblastomas)	——	——	Every 2 years[8]	Every 2 years[8]	Every 2 years[8]	Stop routine[1]	Prior to conception[11]
Audiogram (Endolymphatic sac tumors)	——	——	Every 2 years	Every 2 years	Every 2 years	Stop routine[1]	——
MRI Abdomen w/wo Contrast[5,6,7] (Renal cell carcinomas, Pheochromocytomas/paragangliomas, Pancreatic neuroendocrine tumors/cysts)	——	——	——	Every 2 years[9]	Every 2 years[9]	Stop routine[1]	Prior to conception[11]
MRI Internal Auditory Canal[10] (Endolymphatic sac tumors)	——	——	——	Once	——	——	No specific changes

Notes:
Your clinician may suggest more frequent surveillance based on existing lesions. In such a circumstance, it is important to be seen by a VHL specialist.

1. Beginning at age 65, routine laboratory and radiologic screening for patients who have never had specific VHL manifestations may cease. With the exception of routine physical examination and ophthalmologic assessment, this applies to all other routine screening/surveillance tests in asymptomatic patients. However, patients presenting with signs/symptoms should be evaluated with appropriate testing/imaging regardless of age.

2. Age-appropriate history and physical examination to include: Neurologic examination, auditory and vestibuloneural questions and testing, visual symptoms, catecholamine excess symptom assessment (headaches, palpitations, diaphoresis, hyperactivity, anxiety, polyuria, abdominal pain).

3. Dilated, in-person eye examination including ophthalmoscopy to occur every 6-12 months based on quality of examination obtained (especially in a child) and perceived adherence to follow-up. Consider examination under anesthesia in young children in whom a detailed eye examination cannot be adequately obtained in the clinic. Consider including ultrawidefield photography and ultrawidefield fluorescein angiography, but these should not replace a dilated eye examination with a specialist with experience in retinal manifestations of VHL.

4. Plasma free metanephrines (preferred, due to its higher sensitivity) or fractionated 24-hour urinary free metanephrines.

5. Use macrocyclic/class II gadolinium-based contrast agents. MRI of the neuroaxis may be obtained at the same time as MRI abdomen, and may be performed under a single long anesthesia event, especially in children. However, both the neuroaxis protocol and the abdominal protocols should be obtained consecutively. It is NOT recommended to evaluate the spine solely using an abdominal protocol MRI, nor is it recommended to evaluate the abdominal organs solely using a neuroaxis protocol. See footnote #6 and #7 for how to combine these protocols.

6. Based on contraindications (metallic implants, renal failure, etc.), the following order of imaging priority applies: MRI (with and without contrast) > MRI (without contrast) > CT (with contrast) > CT (without contrast) > US (kidneys, adrenals and pancreas only) > Endoscopic US (pancreas only). See also footnote #5 and #7.

7. Timing of contrast administration when imaging multiple organ systems together should be as follows: Obtain non-contrasted images of CNS and abdomen first, then give contrast using a power injector and perform multi-phase contrast-enhanced imaging of the abdomen including pancreas and kidneys during the late arterial phase and delayed venous phases. Then late post-contrast imaging of neuroaxis. See also footnote #5 and #6.

8. If no CNS hemangioblastomas, continue routine surveillance every 2 years. If hemangioblastomas are present and there is an increase in hemangioblastoma size, or if the patient has associated symptoms, scans should be yearly (or more frequently), as appropriate (or referred to neurosurgery).

9. If no renal lesions present on initial scan, continue routine surveillance every 2years. If small tumors (< 3 cm) found, reimage initially with MRI every 3-6 months to determine stability. Once stability has been determined over 3 consecutive scans, consider extending to every 2 years. If renal mass is > 3 cm, consider a referral to a urologist (preferably familiar with the care of VHL).

10. High-resolution (1mm slice thickness) magnetic resonance imaging of the internal auditory canal. This baseline MRI of the internal auditory canal should be obtained after age 15 years (once the temporal bones have matured), and it should be added onto the MRI of the neuroaxis conducted between ages 15-20 years.

11. “Prior” indicates that this surveillance testing should ideally be performed prior to any planned conception, if possible. MRIs performed during pregnancy should be
without contrast.