

Overview

Useful For

Diagnostic assessment of kidney tumors

Reflex Tests

Test Id	Reporting Name	Available Separately	Always Performed
IHTOI	IHC Initial, Tech Only	No	No
IHTOA	IHC Additional, Tech Only	No	No

Testing Algorithm

For the initial technical component only immunohistochemical (IHC) stain performed, the appropriate bill-only test ID will be reflexed and charged (IHTOI). For each additional technical component only IHC stain performed, an additional bill-only test ID will be reflexed and charged (IHTOA).

Method Name

Immunohistochemistry (IHC)

NY State Available

Yes

Specimen

Specimen Type

TECHONLY

Ordering Guidance

[This test includes only technical performance of the stain; no pathologist interpretation is provided.](#)

Technical component only stains **should not** be ordered with PATHC / Pathology Consultation. If ordered with PATHC, the technical component stains **will be canceled**. Any immunohistochemistry (IHC)/in situ hybridization (ISH) stain performed as a part of the PATHC will be performed at the reviewing pathologist's discretion at an additional charge.

Shipping Instructions

Attach the green "Attention Pathology" address label (T498) and the pink Immunostain Technical Only label included in the kit to the outside of the transport container.

Specimen Required

Specimen Type: Tissue

Supplies: Immunostain Technical Only Envelope (T693)

Container/Tube: Immunostain Technical Only Envelope

Submit:

Formalin-fixed, paraffin-embedded tissue block

OR

2 Unstained, positively charged glass slides (25- x 75- x 1-mm) per test ordered; sections 4-microns thick

Digital Image Access

1. Information on accessing digital images of immunohistochemical (IHC) stains and the manual requisition form can be accessed through this website: <https://news.mayocliniclabs.com/pathology/digital-imaging/>
2. Clients ordering stains using a manual requisition form will not have access to digital images.
3. Clients wishing to access digital images must place the order for IHC stains electronically. Information regarding digital imaging can be accessed through this website: <https://news.mayocliniclabs.com/pathology/digital-imaging/#section3>

Reject Due To

Wet/frozen tissue	Reject
Cytology smears	Reject
Nonformalin fixed tissue	Reject
Nonparaffin embedded tissue	Reject
Noncharged slides	Reject
ProbeOn slides	Reject
Snowcoat slides	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
TECHONLY	Ambient (preferred)		
	Refrigerated		

Clinical & Interpretive

Clinical Information

SRY-box transcription factor (SOX9) is a transcription factor that plays a key role in chondrocyte differentiation and skeletal development. Recent studies have shown that *FLCN*-mutated kidney tumors (FMT) in patients with Birt-Hogg-Dube syndrome (historically referred to as "hybrid tumors") frequently express SOX9. SOX9 can therefore be

used with other immunohistochemistry -based markers, like glycoprotein non-metastatic melanoma protein, to screen for FMT.

Interpretation

This test does not include pathologist interpretation, only technical performance of the stain. If interpretation is required, order PATHC / Pathology Consultation for a full diagnostic evaluation or second opinion of the case.

The positive and negative controls are verified as showing appropriate immunoreactivity.

Interpretation of this test should be performed in the context of the patient's clinical history and other diagnostic tests by a qualified pathologist.

Cautions

Age of a cut paraffin section can affect immunoreactivity. Stability thresholds vary widely among published literature and are antigen dependent. Best practice is for paraffin sections to be cut within 6 weeks.

The charge of glass slides can be affected by environmental factors and subsequently may alter slide staining. Sending unsuitable glass slides can result in inconsistent staining due to poor slide surface chemistry.

Best practices for storage of positively charged slides:

- Minimize time slides are stored after being unpackaged
- Limit exposure to high humidity and heat
- Minimize exposure to plastic

Clinical Reference

1. Gupta S, Dasari S, Shen W, et. al. Morphologic and immunophenotypic characterization of conventional FLCN-mutated tumors (FMT) compared to a series of 8 non-conventional FMT. *Hum Pathol.*2025;160:105813
2. Gupta S, Dasari S, Warren RR, et. al. Renal neoplasia in Birt-Hogg-Dube syndrome: Integrated histopathologic, bulk, and single-cell transcriptomic analysis. *Eur Urol.* 2025;88(3):263-273. doi:10.1016/j.eururo.2025.03.012
3. Lan KC, Chen YT, Chang C, et al. Up-regulation of SOX9 in Sertoli cells from testiculopathic patients accounts for increasing anti-mullerian hormone expression via impaired androgen receptor signaling. *PLoS One.* 2013;8(10):e76303. doi:10.1371/journal.pone.0076303
4. Cai C, Wang H, He HH, et al. ERG induces androgen receptor-mediated regulation of SOX9 in prostate cancer. *J Clin Invest.* 2013;123(3):1109-1122. doi:10.1172/JCI66666
5. Wang H, McKnight NC, Zhang T, Lu ML, Balk SP, Yuan X. SOX9 is expressed in normal prostate basal cells and regulates androgen receptor expression in prostate cancer cells. *Cancer Res.* 2007;67(2):528-536. doi:10.1158/0008-5472.CAN-06-1672

Performance**Method Description**

Immunohistochemistry on sections of paraffin-embedded tissue.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

1 to 3 days

Specimen Retention Time

Until staining is completed

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Main Campus

Fees & Codes**Fees**

- Authorized users can sign in to [Test Prices](#) for detailed fee information.
- Clients without access to Test Prices can contact [Customer Service](#) 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact [Customer Service](#).

Test Classification

This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information

88342-TC, Primary

88341-TC, If additional IHC

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
SOX9	SOX9 IHC, Tech Only	Order only;no result

Result ID	Test Result Name	Result LOINC® Value
623383	SOX9 IHC, Tech Only	Bill only; no result