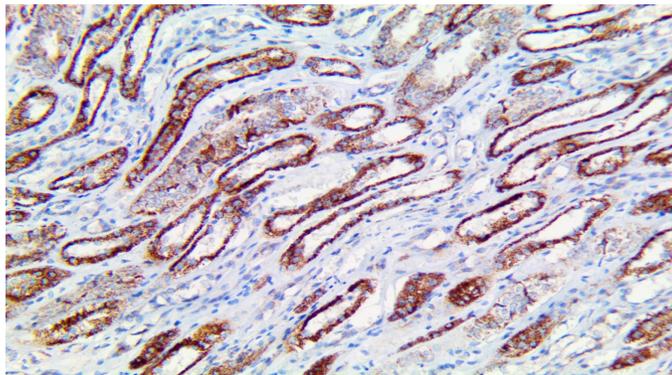


# Fumarate Hydratase/Fumarase

**Clone:** BSB-151  
Mouse Monoclonal



*Inset: IHC of Fumarate Hydratase/Fumarase on a FFPE Kidney Tissue*

## Intended Use

For In Vitro Diagnostic Use.

This antibody is intended for use in Immunohistochemical applications on formalin-fixed paraffin-embedded tissues (FFPE), frozen tissue sections, and cell preparations. Interpretation of results should be performed by a qualified medical professional.

## Immunogen

Synthetic peptide corresponding to the C-terminus of the human fumarate hydratase protein.

## Summary and Explanation

Fumarate hydratase (FH), or fumarase, is encoded by the *FH* gene, which is an enzymatic component of the tricarboxylic acid (TCA) cycle, or Krebs cycle, where it catalyzes the formation of L-malate from fumarate. Mutations in the *FH* gene can cause FH deficiency and lead to progressive encephalopathy. It was discovered that succinate dehydrogenase and FH are tumour suppressors and they are associated with metabolic dysfunction and tumorigenesis, providing biochemical evidence to explain enhanced glycolysis in tumours.

Hereditary Leiomyomatosis and Renal Cell Cancer (HLRCC) is an autosomal dominant heritable syndrome with predisposition to development of Renal Cell Carcinoma and Smooth Muscle Tumors of the skin and uterus. Cells of individuals with HLRCC had lower FH enzyme activity than cells from normal controls, making FH enzyme activity testing a useful method for diagnosis and screening. Loss-of-function mutations of *FH* predisposes individuals to the autosomal dominant syndrome of Multiple Cutaneous and Uterine Leiomyomatosis (MCUL). Biallelic inactivation/mutations of *FH* are seen in 85% of Hereditary Leiomyomatosis and Renal Cell Carcinoma cases, 100% of Renal Cell Carcinoma with germline *FH* mutations, 19% of Papillary Renal Cell Carcinoma (Type II) have FH deficiency and 90% of FH deficiency RCC have FH mutations, 1% of unselected Leiomyomas, 2.6% of Leiomyomas in patients < 40 years old and 37- 52% of Leiomyoma with bizarre nuclei.

|                      |  |                           |                   |
|----------------------|--|---------------------------|-------------------|
| <b>Antibody Type</b> | Mouse Monoclonal   | <b>Clone</b>              | BSB-151           |
| <b>Isotype</b>       | IgG1   | <b>Reactivity</b>         | Paraffin, Frozen  |
| <b>Localization</b>  | Cytoplasmic  | <b>Species Reactivity</b> | Human, Mouse, Rat |
| <b>Control</b>       | Placenta, Breast, Fallopian Tube, Colon, Kidney, Testis, Colon Adenocarcinoma, HER2 Negative Breast Cancer |                           |                   |
| <b>Application</b>   | Renal and Urothelial Cancer, Sarcoma & Soft Tissue Tumor   |                           |                   |

## Presentation

Anti-Fumarate Hydratase/Fumarase is a Mouse Monoclonal antibody derived from cell culture supernatant that is concentrated, dialyzed, filter sterilized and diluted in buffer pH 7.5, containing BSA and sodium azide as a preservative.

| <i>Catalog No.</i> | <i>Presentation</i> | <i>Dilution</i> | <i>Volume</i> |
|--------------------|---------------------|-----------------|---------------|
| BSB-3726-3         | Predilute           | Ready-to-Use    | 3.0 mL        |
| BSB-3726-7         | Predilute           | Ready-to-Use    | 7.0 mL        |
| BSB-3726-15        | Predilute           | Ready-to-Use    | 15.0 mL       |
| BSB-3726-01        | Concentrate         | 1:25-1:100      | 0.1 mL        |
| BSB-3726-05        | Concentrate         | 1:25-1:100      | 0.5 mL        |
| BSB-3726-1         | Concentrate         | 1:25-1:100      | 1.0 mL        |

## Control Slides Available

| <i>Catalog No.</i> | <i>Quantity</i> |
|--------------------|-----------------|
| BSB-3726-CS        | 5 slides        |

**Storage** Store at 2-8°C (Control Slides: Store at 20-25°C)

## Precautions

1. For professional users only. Results should be interpreted by a qualified medical professional.
2. This product contains <0.1% sodium azide (NaN<sub>3</sub>) as a preservative. Ensure proper handling procedures are used with this reagent.
3. Always wear personal protective equipment such as a laboratory coat, goggles, and gloves when handling reagents.
4. Dispose of unused solution with copious amounts of water.
5. Do not ingest reagent. If reagent is ingested, seek medical advice immediately.
6. Avoid contact with eyes. If contact occurs, flush with large quantities of water.
7. Follow safety precautions of the heating device used for epitope retrieval (TintoRetriever Pressure Cooker or similar).
8. For additional safety information refer to Safety Data Sheet for this product.
9. For complete recommendations for handling biological specimens, please refer to the CDC document, "Guidelines for Safe Work Practices in Human and Animal Medical Diagnostic Laboratories" (see References in this document).

## Stability

**This product is stable up to the expiration date on the product label.**

Do not use after expiration date listed on the package label. Temperature fluctuations should be avoided. Store appropriately when not in use, and avoid prolonged exposure to room temperature conditions.

## Specimen Preparation

**Paraffin sections:** The antibody can be used on formalin-fixed paraffin-embedded (FFPE) tissue sections. Ensure tissue undergoes appropriate fixation for best results. Pre-treatment of tissues with heat-induced epitope retrieval (HIER) is recommended using Bio SB ImmunoDNA Retriever with Citrate (BSB 0020-BSB 0023), ImmunoDNA Retriever with EDTA (BSB 0030-BSB 0033), or ImmunoDNA Digester (BSB 0108-0112). See reverse side for complete protocol. Tissue should remain hydrated via use of Bio SB Immuno/DNA Washer solutions (BSB 0029 & BSB 0042).

**Frozen sections and cell preparations:** The antibody can be used on acetone-fixed frozen sections and acetone-fixed cell preparations.

### IHC Protocol

1. Cut and mount 3-5 micron formalin-fixed paraffin-embedded tissues on positively charged slides such as Bio SB Hydrophilic Plus Slides (BSB 7028).
2. Air dry for 2 hours at 58° C.
3. Deparaffinize, dehydrate and rehydrate tissues.
4. Subject tissues to heat induced epitope retrieval (HIER) using a suitable retrieval solution such as ImmunoDNA Retriever with Citrate (BSB 0020-BSB 0023) or EDTA (BSB 0030-BSB 0033).
5. Any of three heating methods may be used:

#### a. TintoRetriever Pressure Cooker or Equivalent

Place tissues/slides in a staining dish or coplin jar containing the ImmunoDNA Retriever with Citrate or EDTA and place on trivet in the pressure cooker. Add 1-2 inches of distilled water to the pressure cooker and turn heat to high. Incubate for 15 minutes. Open and immediately transfer slides to room temperature.

#### b. TintoRetriever PT Module or Water Bath Method

Place tissues/slides in a pre-warmed staining dish or coplin jar containing the ImmunoDNA Retriever with Citrate or EDTA at 95°-99° C. Incubate for 30-60 minutes.

#### c. Conventional Steamer Method

Place tissues/slides in a pre-warmed staining dish or coplin jar containing the ImmunoDNA Retriever with Citrate or EDTA in a steamer, cover and steam for 30-60 minutes.

6. After heat treatment, transfer slides in ImmunoDNA Retriever with Citrate or EDTA to room temperature and let stand for 15-20 minutes.
7. For manual IHC, perform antibody incubation at ambient temperature. For automated IHC methods, perform antibody incubation according to instrument manufacturer's instructions.
8. Wash slides with ImmunoDNA washer or DI water.
9. Continue IHC protocol. Wash slides between each step with ImmunoDNA washer solution.

| Step                   | ImmunoDetector AP/HRP | PolyDetector AP/HRP | PolyDetector Plus HRP |
|------------------------|-----------------------|---------------------|-----------------------|
| Peroxidase/AP Blocker  | 5 min.                | 5 min.              | 5 min                 |
| Primary Antibody       | 30-60 min.            | 30-60 min.          | 30-60 min.            |
| 1st Step Detection     | 10 min.               | 30-45 min.          | 15 min.               |
| 2nd Step Detection     | 10 min.               | Not Applicable      | 15 min.               |
| Substrate- Chromogen   | 5-10 min.             | 5-10 min.           | 5-10 min.             |
| Counterstain/Coverslip | Varies                | Varies              | Varies                |

### Mounting Protocols

For detailed instructions using biodegradable permanent mounting media such as XyGreen PermaMounter (BSB 0169-0174) or organic solvent based resin such as PermaMounter (BSB 0094-0097), refer to PI0174 or PI0097.

### Product Limitations

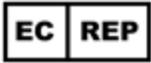
Due to inherent variability present in immunohistochemical procedures (including fixation time of tissues, dilution factor of antibody, retrieval method utilized, and incubation time), optimal performance should be established through the use of positive and negative controls. Results should be interpreted by a qualified medical professional.

### References

1. GeneCards. FH Gene (Protein Coding). <https://www.genecards.org/cgi-bin/carddisp.pl?gene=FH>
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3. Pithukpakorn M, Wei MH, Toure O, et al. Fumarate hydratase enzyme activity in lymphoblastoid cells and fibroblasts of individuals in families with hereditary leiomyomatosis and renal cell cancer. *J Med Genet.* 2006;43(9):755-762. doi:10.1136/jmg.2006.041087
4. Alam NA, Olpin S, Leigh IM. Fumarate hydratase mutations and predisposition to cutaneous leiomyomas, uterine leiomyomas and renal cancer. *Br J Dermatol.* 2005;153(1):11-17. doi:10.1111/j.1365-2133.2005.06678.x
5. Wei JJ. Fumarate Hydratase (FH), S-(2-succino) cysteine (2SC). <https://www.pathologyoutlines.com/topic/stainsFH2SC.html>
6. U.S. Department of Health and Human Services: Centers for Disease Control and Prevention. Guidelines for Safe WorkPractices in Human and Animal Medical Diagnostic Laboratories. Supplement/Vol. 61, January 6, 2012. <https://www.cdc.gov/mmwr/pdf/other/su6101.pdf>

### Abbreviated Immunohistochemical Protocol

#### Symbol Key/Légende des symboles/Erläuterung der Symbole

|   |  |   |  |   |
|---|--|---|--|---|
|  | EMERGO EUROPE<br>Prinsessegracht 20<br>2514 AP The Hague<br>The Netherlands                              |  Storage Temperature<br>Limites de température<br>Zulässiger Temperaturbereich                           |  Manufacturer<br>Fabricant<br>Hersteller             |  Catalog Number<br>Référence du catalogue<br>Bestellnummer |
|  | In Vitro Diagnostic Medical Device<br>Dispositif médical de diagnostic in vitro<br>In-Vitro-Diagnostikum |  Read Instructions for Use<br>Consulter les instructions<br>d'utilisation<br>Gebrauchsanweisung beachten |  Expiration Date<br>Utiliser jusque<br>Verwendbar bis |  Lot Number<br>Code du lot<br>Chargenbezeichnung           |