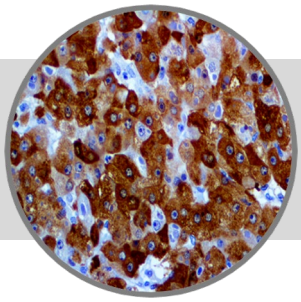
Glutamine Synthetase

Clone: GS-6

Mouse Monoclonal



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Inset: IHC of Glutamine Synthetase on a FFPE Hepatocellular Carcinoma Tissue

Intended Use

For Research Use Only.

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

Human Glutamine Synthetase aa. 1-373.

Summary and Explanation

Glutamine synthetase (GS) is an enzyme that plays an essential role in the metabolism of nitrogen by catalyzing the condensation of glutamate and ammonia to form glutamine. GS is present predominantly in the brain, kidneys, and liver. GS in the brain participates in the metabolic regulation of glutamate, the detoxification of brain ammonia, the assimilation of ammonia, recyclization of neurotransmitters, and termination of neurotransmitter signals. In normal liver, GS expression is seen in pericentral hepatocytes, but not in mid-zonal or periportal hepatocytes.

GS positive tumor cells are believed to be derived from GS positive hepatocytes. GS immunoreactivity has been seen in a majority of hepatocellular carcinoma (HCC), including cases of early HCC (70%) and for low grade HCC (59%).In nonmalignant nodules, GS overexpression is only seen in high grade dysplastic nodules (HGDN, 13.6%). In these cases, GS overexpression was restricted to 11.5%-50% of hepatocytes, whereas in HCC the majority of cases (53%), including early HCC (60%), showed diffuse immunostaining (>50% tumor cells). A panel composed of antibodies against HSP70, GPC3, and GS has been proposed to be very useful in distinguishing between dysplastic and early malignant hepatocellular nodules arising in cirrhosis. Staining of hepatocellular lesions with anti-GS antibody have been useful in the differential diagnosis of focal nodular hyperplasia (FNH), hepatic adenoma (HCA), and dysplastic nodules, and low grade hepatocellular carcinoma. In the case of FNH, GS stains in a characteristic "map-like" pattern, thus differentiating it from HCA, in which GS staining is usually absent, but may occasionally be present at the border of the lesion or around the veins inside the tumor.

Antibody Type	Mouse Monoclonal	**Clone**	GS-6
Isotype	IgG2a	**Reactivity**	Paraffin, Frozen
Localization	Cytoplasmic	**Control**	Liver, Tonsil, Testis, Prostate, Hepatocellular Carcinoma, Bladder TCC
	Species Reactivity	Human, Predicted: Mouse, Rat	

Presentation

Glutamine Synthetase 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.

Catalog No.	*Antibody Type*	*Dilution*	*Volume/Qty*
BSB 2929	Tinto Prediluted	Ready-to-Use	3.0 mL
BSB 2930	Tinto Prediluted	Ready-to-Use	7.0 mL
BSB 2931	Tinto Prediluted	Ready-to-Use	15.0 mL
BSB 2932	Concentrated	1: 50 - 1: 200	0.1 mL
BSB 2933	Concentrated	1: 50 - 1: 200	0.5 mL
BSB 2934	Concentrated	1: 50 - 1: 200	1.0 mL

Control Slides Available

Catalog No.	*Quantity*
BSB 2935	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_3) as a preservative. Ensure proper handling procedures are used with this reagent.
3. Always wear personal protective equipment such as laboratory coat, goggles and gloves when handling reagents.
4. Dispose of unused solution with copious amount 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 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 Digestor (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 for labeling acetone-fixed frozen sections and acetone-fixed cell preparations.

Staining Procedure

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 staining, perform antibody incubation at ambient temperature. For automated staining methods, perform antibody incubation according to instrument manufacturer's instructions.
8. Wash slides with ImmunoDNA washer or DI water.
9. Continue IHC staining protocol. Wash slides between each step with ImmunoDNA washer solution.

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.

Abbreviated Immunohistochemical Protocol

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

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. Eisenberg D, et al. Some evolutionary relationships of the primary biological catalysts glutamine synthetase and RuBisCO. Cold Spring Harb. Symp. Quant. Biol. 1987; 52: 483–90.
2. Liaw SH, Kuo I, Eisenberg D. Discovery of the ammonium substrate site on glutamine synthetase, a third cation bindingsite. Protein Sci. 1995; 4 (11): 2358–65.
3. Di Tommaso L, et al. Diagnostic value of HSP70, glypican 3, and glutamine synthetase in hepatocellular nodules in cirrhosis. Hepatology. 2007; 45:725-734.
4. Bioulac-Sage P et al. Over-expression of glutamine synthetase in focal nodular hyperplasia: a novel easy diagnostic tool in surgical pathology. Liver International. 2009; 3:459-465.
5. Shafizideh N, Kakar S. Diagnosis of well-differentiated hepatocellular lesions: role of immunohistochemistry and other ancillary techniques. Adv Anat Pathol. 2011; 18: 438-445.
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7. Lagana S, et al. Utility of an immunohistochemical panel consisting of glypican-3, heat-shock protein-70, and glutamine synthetase in the distinction of low-grade hepatocellular carcinoma from hepatocellular adenoma. Appl Immunohistochem Mol Morphol. 2013; 21:170-76.
8. U.S. Department of Health and Human Services: Centers for Disease Control and Prevention. Guidelines for Safe Work Practices in Human and Animal Medical Diagnostic Laboratories. Supplement / Vol. 61, January 6, 2012.

Symbol Key / Légende des symboles/Erläuterung der Symbole

Storage Temperature Limites de température Zulässiger Temperaturbereich	Manufacturer Fabricant Hersteller	REF Catalog Number Référence du catalogue Bestellnummer
Read Instructions for Use Consulter les instructions d'utilisation Gebrauchsanweisung beachten	Expiration Date Utiliser jusque Verwendbar bis	LOT Lot Number Code du lot Chargenbezeichnung

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