

- Human antigen: High analytical specificity
- ELISA Methodology: High analytical sensitivity
- Semi-quantitative results (expressed in BÜHLMANN Titer Units)
- Standardized & reproducible performance
- included in guidelines by PNS/ EAN (CIDP paraproteinimic neuropathies)

CE marked under **IVDR**

NEUROimmunology (Autoimmune Neurology)

anti-MAG* Antibodies ELISA

Reference Method for anti-MAG Antibody Detection

BÜHLMANN

Built on Trust. Driven by Science. Focused on You.

Supplied by

alpha laboratories
supplying quality to science

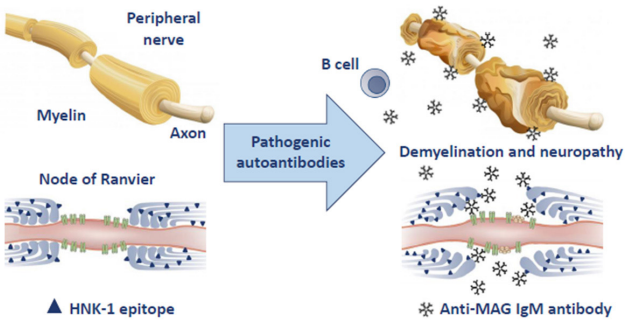
* Myelin-Associated Glycoprotein

Indication: MAG Neuropathies

anti-MAG neuropathy is a rare autoimmune disorder affecting the **peripheral nerves**. Myelin-associated glycoprotein (MAG) is a component of the myelin sheath, the protective covering of nerves *(Figure 1)*. In anti-MAG neuropathy, the immune system mistakenly attacks MAG, damaging the myelin sheath and impairing nerve function.

The main clinical feature is progressive sensory loss, particularly in the distal limbs (feet and hands). Patients may experience numbness, tingling, and weakness, which can significantly affect mobility and quality of life.

In some cases, imbalance, gait difficulties, and muscle wasting may occur.

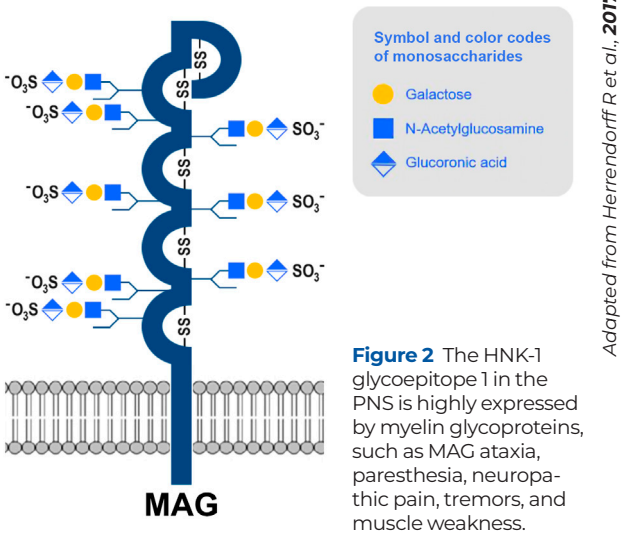


Adapted from Herrendorff R et al., 2015

Figure 1 Pathophysiology of anti-MAG neuropathy
Pathogenic anti-MAG IgM autoantibodies bind to MAG in the peripheral nervous system, thus causing demyelination and neuropathy. Patients suffer from sensorimotor deficits, sensory ataxia, paresthesia, neuropathic pain, tremors, and muscle weakness.

Detection of anti-MAG Antibodies

Using **human MAG** in ELISA for detecting MAG antibodies ensures accurate, clinically relevant results, enhancing diagnostic utility in identifying MAG-associated neuropathies and related conditions. MAG, a transmembrane glycoprotein found in Schwann cell and oligodendrocyte membranes, contains the specific epitope HNK-1, shared with other peripheral nerve myelin glycoproteins and glycolipids *(Figure 2)*.



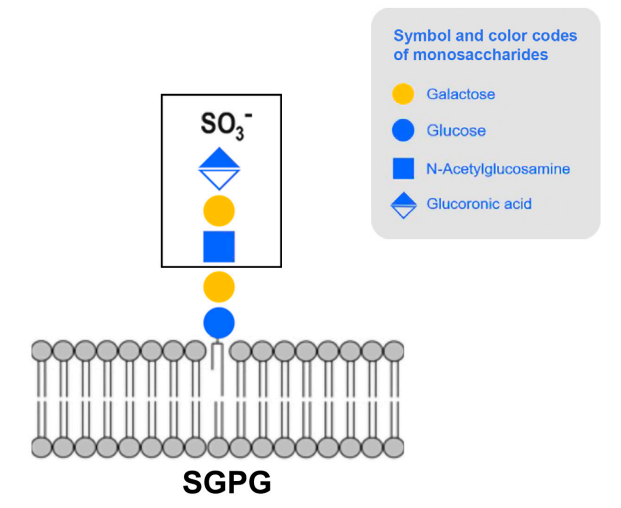
Adapted from Herrendorff R et al., 2017

Figure 2 The HNK-1 glycoepitope 1 in the PNS is highly expressed by myelin glycoproteins, such as MAG ataxia, paresthesia, neuropathic pain, tremors, and muscle weakness.

Diagnostic Work-up of MAG Neuropathies

Diagnosing anti-MAG neuropathy is challenging because its symptoms often resemble those of other neurological disorders. Therefore, **thorough clinical evaluation and specialized testing are essential for accurate diagnosis**. Early detection is critical, enabling timely treatment to relieve symptoms and slow disease progression *(Figure 3)*.

Detection of **MAG antibodies in serum** provides valuable insight, particularly for identifying anti-MAG neuropathy. As a **key serological marker**, these antibodies help confirm the diagnosis, support treatment decisions, enable early intervention, and ultimately improve patient outcomes.



Adapted from Herrendorff R et al., 2017

Figure 3 The HNK-1 glycoepitope 1 in the PNS is also highly expressed by glycolipids, such as SGPG and SG(L)PG

Semi-quantitative Results

The anti-MAG technology, using human MAG as an antigen. The wells of the microtiter plates are coated with purified, human MAG. Antibodies against MAG are detected using anti-IgM antibodies.

The test results are interpreted semi-quantitatively. This takes account of the wide range of concentrations of anti-MAG antibodies in affected patients as well as of the clinical significance of different concentration ranges (Vallat J.-M. et al., 2020; Magy L. et al., 2015)[5].

Robust Sensitivity & Specificity

The **anti-MAG Antibodies ELISA**, using **human-purified MAG**, demonstrates high sensitivity and specificity for detecting anti-MAG neuropathy. Although no universal cut-off has been established to balance sensitivity and specificity, studies indicates that including a **grey zone** helps account for variability in antibodies levels. The assays **consistently shows high diagnostic accuracy**. Notably, the **low correlation between Western Blot and ELISA results** highlights the ELISA's distinct and reliable diagnostic performance *(Figure 4)*.

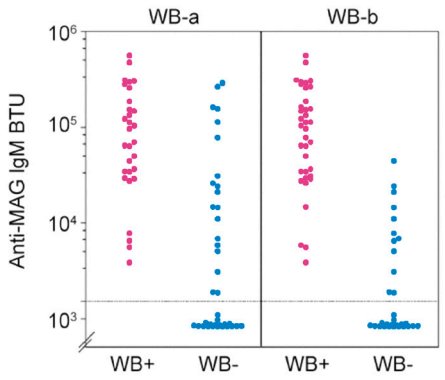
Cut-Off [BTU]	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	Accuracy
1.000	100	90,99	80	100	93,38
1.500	100	95,5	88,89	100	96,69
3.000	98	98,2	95	98,2	97,35
6.000	92,5	98,55	98,67	97,36	97,88
7.000	92,5	100	100	97,37	98,01
10.000	87,5	100	100	95,69	96,69

Adapted from Liberatore G. et al., **2020**

Figure 4 Sensitivity, specficity, positive and negative predictive value as well as accuracy at different thresholds, expressed as BÜHLMANN Titer Units (BTU), anti-MAG patients vs controls, i.e. samples of differential diagnostic relevance (Chronic Inflammatory Demyelinating Polyneuropathy, CIPD)

MAG antigen ELISA and Comparison with Western Blot

The antibodies present in serum bind to MAG. Thus the nature of the antigen plays a vital role in the recognition of anti-MAG Antibodies enabling precise diagnosis of autoimmune conditions. Notably, the anti-MAG Antibodies ELISA stands out as the sole IVD test employing human MAG as an antigen. In a comparative study with Western Blot (Kuijf M et al., Neurology, 2009)[2]. The anti-MAG Antibodies ELISA demonstrated a 25% higher detection rate of positive samples across N= 68 serum samples, highlighting its superior sensitivity and diagnostic potential *(Figure 5)*.



Adapted from Kuijf M et al., **2009**

Figure 5

Key Benefits of anti-MAG Antibodies ELISA

1. **High Sensitivity and Specificity:** Ensures accurate detection of MAG antibodies
2. **Human purified MAG Antigen:** Uses human MAG for precise diagnosis
3. **Early Detection:** Facilitates timely initiation of appropriate treatment
4. **Improved Diagnostic Utility:** Enhances identification of MAG-associated neuropathies
5. **Superior Detection Rate:** Outperforms other testing techniques in detecting positives

Diagnostic Workflow

The anti-MAG Antibodies ELISA is designed to support clinical decision-making with a structured, stepwise and economic approach *(Figure 6)*.

1. Clinical suspicion in neurology initiates a comprehensive screening panel for ganglioside and MAG antibodies.
2. Positive screening results guide reflex testing for differentiation (IgG/IgM ganglioside antibodies) or confirmation of IgM anti-MAG antibodies, as clinically indicated.
3. Follow-up testing may support monitoring in chronic conditions.

For in vitro diagnostic use. Results should be interpreted in conjunction with clinical findings and other laboratory data.

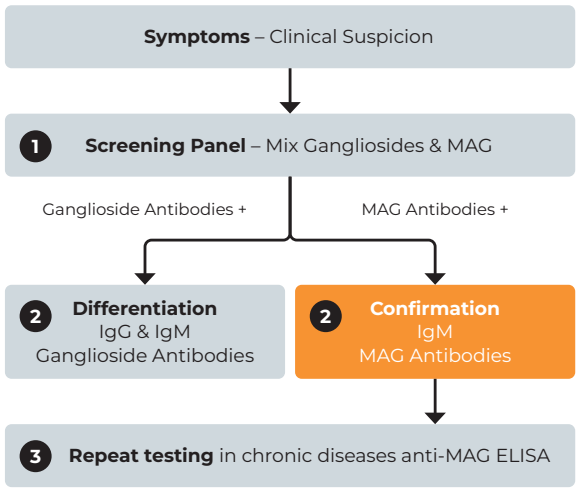


Figure 6 **Streamlined Ganglioside- and MAG-Antibody Testing**

Portfolio of NEUROimmunology CE-Marked IVD ELISA Tests under IVDR

Antigens	Product Designation	Ordering code
MAG Antibodies (single test IgM)	anti-MAG Antibodies ELISA	EK-MAG
GM1 Antibodies (single test IgG, IgM)	anti-GM1 Antibodies ELISA	EK-GM1-GM
SGPG Antibodies (single test IgM)	anti-SGPG Antibodies ELISA (RUO)	EK-SGPG-U
MAG, GM1, GD1a, GD1b, GT1a, GQ1b (multiparametric IgG/IgM mix, IgG, IgM)	BÜHLMANN GanglioCombi® MAG ELISA	EK-GCM
GM1, GD1b, GQ1b (multiparametric IgG/IgM mix, IgG, IgM)	BÜHLMANN GanglioCombi® *Light* ELISA	EK-GCL-S

BÜHLMANN

Supplied by alpha laboratories supplying quality to science

Alpha Laboratories Ltd
40 Parham Drive
Hampshire SO50 4NU UK

Tel: +44 (0)23 8048 3000
Email: sales@alphalabs.co.uk
Web: www.alphalabs.co.uk

Key Literature

1. Jaskowski et al.; Journal of Neuroimmunology, 187 (2007) 175-178
2. Kuijf, M.L. et al.; Neurology, 73(9), pp. 688–695 (2009).
3. Steck, A.J.; Journal of Neuroimmunology, 361, p. 577725 (2021). doi:10.1016/j.jneuroim.2021.577725.
4. Liberatore, G. et al.; Journal of Neuroimmunology, 345, p. 577288 (2020).
5. Vallat, J.-M. et al.; Neurology, 96(5), pp. 214–225 (2021).
6. Latov, N.; Current Opinion in Neurology, 34(5), pp. 625–630 (2021).

anti-MAG Antibodies ELISA is a registered trade mark of BÜHLMANN in many countries. Please contact your local BÜHLMANN representative to find out if a product is available in your country.

CE 0123 marked products

This document and its content are copyright of BÜHLMANN Laboratories AG [2026]. All rights reserved. All information contained is believed to be accurate. Neither BÜHLMANN nor its employees, agents, or directors however are liable for misprints or errors contained within. Handout version 04/2026