BÜHLMANN Anti-MAG & Anti-Ganglioside Autoantibody ELISAs

Most sensitive and efficient Screening and Monitoring of peripheral neuropathies
Benefits

1. The only test on the market which is based on human antigen.

2. Best sensitivity as published in comparative studies (Jaskowski T et al., 2007 / Kuijf M et al., 2009), yielding 72% of positives.

3. Reliable standardisation for quantitative testing appreciated by international experts (Willison H J et al., 2011).

4. Most frequently applied anti-MAG autoantibody assay in clinical studies (see Reference list).

Applications

Screening and Differentiation

- Clinically established cut-off value (1’500 BTU) as determined by Kuijf M et al., 2009, supports an efficient and sensitive screening (Joint Task Force of the EFNS and the PNS, 2006 and 2010).

- Excellent differentiation between healthy subjects and patients with a demyelinating neuropathy with immunoglobulin M (IgM) monoclonal gammopathy (IgM-PNP) with an area under the curve of 0.84 (Fig. 2, Kuijf M et al., 2009).

- BÜHLMANN anti-MAG ELISA is the only reliable quantitative tool to differentiate anti-MAG neuropathy into:
  1. typical anti-MAG neuropathy and high titres (>8’000 – 10’000 BTU) of anti-MAG antibodies and
  2. CIDP-like neuropathy, negative Immune fluorescence (IF) results and low BTU titres (< 8’000 BTU); Magy L et al., 2015.

Treatment Follow-up

Monitoring Rituximab treatment is an important tool for patient management. During successful treatment, the measurement of anti-MAG autoantibodies by the BÜHLMANN assay shows significant decrease allowing follow-up of patients in therapy (Fig. 3, Renaud S et al., 2003).
Benefits

1. **Combination** of MAG, GM1, GM2, GD1a, GD1b, GQ1b and high agreement with INCAT ELISA.
2. **Best** sensitivity available in the market (78%) as determined by Challah M et al. 2016 (Table 1).
3. **Less** false positive results as compared to other commercial assays.
4. **Less** misdiagnosis than competitors when using GanglioCombi (Table 1).

BÜHLMANN GanglioCombi™ MAG ELISA has the best overall performance studied with clinically validated samples.

Applications

**Targeted and Sensitive Screening**

The high sensitivity (Table 1) and the “unique” combination of relevant the BÜHLMANN GanglioCombi™ MAG ELISA is the ideal tool:

- for **screening** acute and chronic autoimmune peripheral neuropathies from one single patient sample (Fig. 4).
- To **confirm** most of the complex pathology patterns of autoimmune neuropathies (Table 2, next page).

**Differentiation**

- Combination of anti-MAG and relevant anti-Ganglioside antibodies onto the BÜHLMANN GanglioCombi™ MAG ELISA allows for differentiation of relevant antibodies in pathological samples:
  - Confirmation of high prevalence of anti-MAG autoantibodies among neural antibodies in autoimmune neuropathies. 15% of sera that are originally requested for anti-Ganglioside autoantibodies turn out positive for anti-MAG antibodies (Fig. 4).
  - Increase of sensitivity and determination by co-measurement of gangliosides with anti-MAG antibodies, in patients with demyelinating neuropathies and IgM monoclonal antibodies (IgM-PNP). A significant proportion of anti-MAG negative samples from this group show positivity for the relevant anti-ganglioside antibodies offered in the BÜHLMANN kit (Fig. 5).

BÜHLMANN GanglioCombi™ MAG ELISA

- Best antigen combination
- Most efficient patient differentiation

### Table 1: Method comparison with clinical samples. ELISA vs. Line Blots

<table>
<thead>
<tr>
<th></th>
<th>BÜHLMANN</th>
<th>Dotzen Line Blot</th>
<th>Generic Assays Line Blot</th>
<th>D-tek</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expected positivity</strong></td>
<td>14</td>
<td>12</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td><strong>Erroneous positivity</strong></td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td><strong>Confirmed diagnosis</strong></td>
<td>17</td>
<td>15</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td><strong>Misdiagnosis</strong></td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td><strong>Sensitivity</strong></td>
<td>78%</td>
<td>67%</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Figure 4: Prevalence of anti-neuronal antibodies

Figure 5: Frequency of MAG- and Ganglioside Antibodies in patients with IgM-PNP
### BÜHLMANN Anti-MAG & Anti-Ganglioside Autoantibody ELISAs

#### Interpretation of Autoimmune Neuropathies

<table>
<thead>
<tr>
<th>Profile</th>
<th>AMAN</th>
<th>AMSAN</th>
<th>MFS</th>
<th>CMV induced Neuropathy</th>
<th>MMN</th>
<th>CANOMAD</th>
<th>MAG Neuropathy</th>
<th>IgM PNP</th>
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</thead>
<tbody>
<tr>
<td>&quot;MAG&quot;</td>
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<td>✓</td>
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<tr>
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<tr>
<td>GM2</td>
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<td>✓</td>
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<tr>
<td>GD1a</td>
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<tr>
<td>GD1b</td>
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<td>✓</td>
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<tr>
<td>GQ1b</td>
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</table>

Table 2: Most prevalent pathologies and interpretation of autoimmune neuropathies

- ✓ primary immune response
- ✓ secondary immune response

### Over 40 References — BÜHLMANN neural antibody ELISAs in the Literature

**anti-MAG Autoantibodies ELISA**

- Stork ACJ et al., JNI, 2016 (290): 76-79
- Ferfoglia RI et al., JNPS, 2016 (21): 10-14
- Magy L et al., J Immunology Res, 2015, article ID450391 Camagnolo M et al., JNI, 2015 (281): 1 – 4
- Stork ACJ et al., JNPP, 2014 (85): 916-918
- Sala E et al., JNS, 2014 (345, 1-2): 224-227
- Stork ACJ et al., JNI, 2014 (268): 89-94
- Bridel C et al., JPNs, 2014 19(2): 180-182
- Hospital MA et al., Haematologica, 2013, 98:e156
- Picosquiro G et al., JPNs, 2013 (18): 185-188
- Stork ACJ et al., JPNs, 2013, (18): 189-191 P
- Maurer MA et al., JCI, 2012 (122): 1393-1402
- Mostafa GA et al., J Neuroinflammation, 2012, 8:71
- Larue S et al., EIN., 2011 (18): 899-905
- Matà S et al., JNI, 2011 (236): 99-105
- Juriczi S et al., Case Rep Neurol, 2011, 3(3): 294-300
- Théaudin M et al., Rev Neurol., 2011, 167(5): 897-904
- Delmont E et al., J Neurol., 2011, 258(9): 1717-9

**BÜHLMANN GanglioCombi™ ELISA/anti-GM1 Autoantibodies ELISA**

- Cao-Lormeau VM et al., supplementary appendix, 2016, 1-11
- Cao-Lormeau VM et al., Lancet, 2016 (29): 562-566
- Chalah M et al., Poster, 2016 (presented at International Congress on Autoimmunity, Leipzig)
- Kellere E et al., PLos one, 2015, 10(4)
- Uysalol M et al., BMJ, 2013 (30): 337-341
- Lez T et al., Vaccine, 2012, 30 (16): 2605-10
- Mani B et al., Poster, 2011 (presented at DSA, Dresden)
- Wurster U et al., Poster, 2011 (presented at DSA, Dresden)

**SGPG Autoantibodies ELISA**

- Bridel C et al., JNPS, 2014 19(2): 180-182
- Kuijf M et al., Neurology, 2009, 73(9): 688-95
- Jaskowsky TD et al., J Neuroimmunol., 2007, Jul, 187(1-2): 175-8
- Steck A et al., Curr Opin Neurol., 2006, 19(5): 458-63
- Renaud S et al., Curr Opin Neurol., 2006, 19(5): 458-63

**SGPG Autoantibodies ELISA**

- Delmont E et al., J Neurol., 2011, 258(9): 1717-9
- Théaudin M et al., Rev Neurol., 2011 (167): 897-904

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