Neurological disorders

Bibliographic reference	**Ruggieri et al. (2008)**
Study type	Case control
Study quality	The Joanna Briggs Institute Prevalence Critical Appraisal Tool (http://ijhpm.com/article_2870_607.html) 1. Was the sample representative of the target population? YES 2. Were study participants recruited in an appropriate way? YES (consecutive sample recruited) 3. Was the sample size adequate? YES 4. Were the study subjects and the setting described in detail? YES 5. Was the data analysis conducted with sufficient coverage of the identified sample? YES

<table>
<tr><td></td><td>6. Were objective, standard criteria used for the measurement of the condition? YES
7. Was the condition measured reliably? YES
8. Was there appropriate statistical analysis? YES
9. Are all important confounding factors/subgroups/differences identified and accounted for? YES
10. Were subpopulations identified using objective criteria? NA
Overall risk of bias = LOW</td></tr>
<tr><td>Country</td><td>Italy</td></tr>
<tr><td>Number of patients</td><td>N=630 children with unknown neurological disorders
N=300 children with known neurological disorders
N=300 healthy controls</td></tr>
<tr><td>Study population</td><td>Inclusion (unknown neurological disorders): consecutive children fully evaluated and found to have neurologic disorders between 1998 and 2004 (90 per year)
- clinical features of patients with unknown neurological disorders: 270 with developmental delay, 180 with epilepsy, 100 with mental retardation, 50 with headache, 12 with chorea, 10 with ataxia and 8 with neuropathy

Inclusion (known neurological disorders): consecutive patients with specific neurological disorders
<table>
<tr><th>Neurological diagnosis</th><th>Number included</th></tr>
<tr><td>Neurofibromatosis type 1 (plus failure to thrive)</td><td>54</td></tr>
<tr><td>Neurofibromatosis type 2</td><td>24</td></tr>
<tr><td>Ruberous sclerosis complex</td><td>42</td></tr>
<tr><td>Complex malformation syndromes (ie. Marfan syndrome, Sotos syndrome, fragile X syndrome, etc)</td><td>23</td></tr>
<tr><td>Brain malformation dysplasia (ie. lissencephaly, cortical heterotopias, double cortex, etc)</td><td>22</td></tr>
<tr><td>Paraneoplastic neurologic syndromes (including leukemia, neuroblastoma, non-Hodgkins lymphoma)</td><td>21</td></tr>
<tr><td>Cerebellar degeneration (including carbohydrate-deficient glycosylation syndromes, episodic ataxia type 2)</td><td>20</td></tr>
<tr><td>Multiple sclerosis</td><td>18</td></tr>
<tr><td>Known leukodystrophies (ie. Krabbe disease, Canavan disease, etc)</td><td>18</td></tr>
<tr><td>Ataxia-telangiectasia</td><td>17</td></tr>
<tr><td>Congenital myasthenia syndromes</td><td>10</td></tr>
<tr><td>Congenital muscular dystrophies (including Fukuyama disease, muscle-eye-brain disease)</td><td>9</td></tr>
</table></td></tr>
<tr><td>Control</td><td>Children matched for age, sex and municipality of residence who attended the Department of Paediatrics for a normal developmental check-up had serological testing</td></tr>
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<tr><td></td><td>(1.33% [4] had single episodes of febrile seizures and 6% [18] had headache)</td></tr>
<tr><td>Follow-up</td><td>8.7 years (from 4 to 14) in study group with gluten sensitivity</td></tr>
<tr><td>Details of coeliac testing</td><td>IgA and IgG AGA, IgA-class EMA, IgA-class anti-tTG (ELISA method)
Biopsy for all with positive serology (diagnosed based on ESPGHAN criteria)</td></tr>
<tr><td>Results</td><td>Results from biopsy in all groups
<table>
<tr><td>Group</td><td>Positive gut biopsy</td></tr>
<tr><td>Gluten sensitivity (n=835)</td><td>100% (835/835)</td></tr>
<tr><td>Neurologic disorder with unknown cause (n=630)</td><td>1.1% (7)</td></tr>
<tr><td>Neurologic disorder with known cause (n=300)</td><td>0.3% (1)</td></tr>
<tr><td>Healthy controls (n=300)</td><td>0.7% (2)</td></tr>
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<tr><td>Source of funding</td><td>Not reported</td></tr>
<tr><td>Conflicts of interest</td><td>Not reported</td></tr>
<tr><td>Comments</td><td>Study also reports the rate of neurological disorders in a group of patients with gluten sensitivity but this was not presented here as it was not compared to the rate of neurolgoical disorders in a control group</td></tr>
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Definitions of abbreviations are given at the end of this document.