

# Neurocognitive Effects of Gluten Exposure: Results of a Nationwide Survey

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**BACKGROUND:** While neurocognitive effects after gluten exposure (e.g. “celiac fog” or “brain fog”) are commonly described by patients with celiac disease (CD) and non-celiac gluten sensitivity (NCGS), there are little data regarding the prevalence and symptoms associated with these experiences.

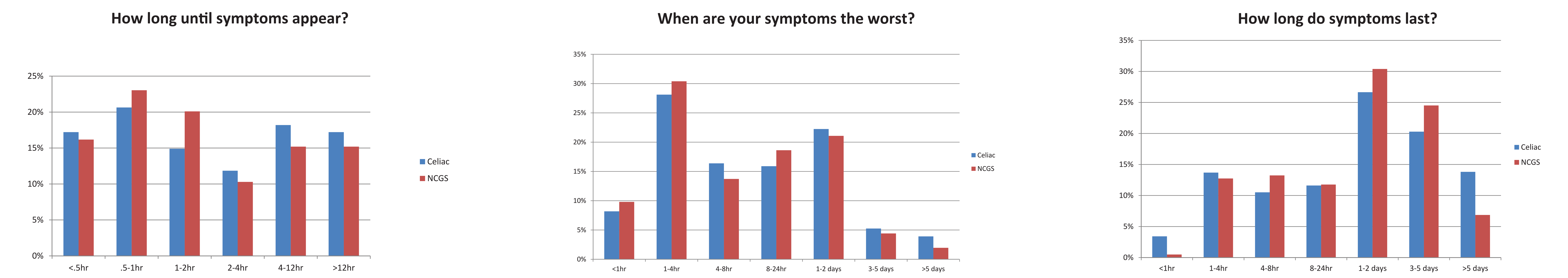
**OBJECTIVE:** This study aimed to understand the neurocognitive symptoms associated with gluten exposure in CD and NCGS patients.

**METHODS:** A nine question online survey was completed by 1,396 persons (1,143 with CD; 253 with NCGS). Of those with CD, 53% were diagnosed via small intestine biopsy and serology, 27% by serology alone and 20% by biopsy alone. Of those with NCGS, 51% were diagnosed by a physician and 49% were self-diagnosed. Participants were asked to describe the celiac fog symptoms experienced after gluten ingestion and to provide the times to onset and resolution of symptoms through forced choice and free-response questions.

**RESULTS:** The majority of survey participants (89% of CD and 95% of NCGS) reported having experienced neurocognitive effects after gluten exposure. When asked to characterize the following neurocognitive symptoms associated with gluten exposure, CD and NCGS participants responded similarly: “Difficulty Concentrating” - 72.4% of CD and 75.5% of NCGS; “Forgetfulness” – 60.3% of CD and 64.9% of NCGS; “Grogginess” - 58.2% of CD and 69.2% of NCGS; “Detachment” – 47.3% of CD and 54% of NCGS; and “Mental Confusion” - 45.3% of CD and 57.4% of NCGS. These symptoms are most consistent with attention/processing and short-term memory impairment. The most commonly reported time period until symptoms appear was “30 minutes to 1 hour” as described by 21% of CD and 23% of NCGS participants. Timing of most severe symptoms were similar between CD and NCGS participants, with 28% of CD and 30% of NCGS participants reporting “1-4 hours” post gluten exposure and 22% of CD and 21% of NCGS participants reporting “1-2 days” post gluten exposure. When asked the duration of time that celiac fog symptoms typically last, 27% of CD and 30% of NCGS participants reported “1-2 days” and 20% of CD and 25% of NCGS participants reported “3-5 days.”

**CONCLUSIONS:** This pilot survey suggests that neurocognitive effects of gluten exposure are common and may be severe in both CD and NCGS patients. A continued analysis of this study’s forced choice and free-response questions using qualitative data analysis software to identify categories and trends is ongoing. However, further research, including the development of a patient reported outcome targeting neurocognitive effects of gluten exposure, is warranted.

CD = celiac disease, NCGS = non-celiac gluten sensitivity



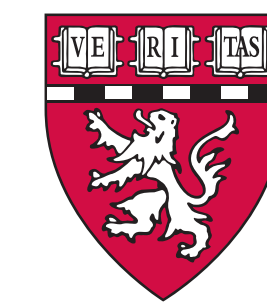
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Through empowerment, education, advocacy and advancing research, the National Foundation for Celiac Awareness drives diagnoses of celiac disease and other gluten-related disorders and improves the quality of life for those on a life-long gluten-free diet.