

# New Study Finds Celiac Disease Can Be Diagnosed Up to Four Years Earlier with AI

TEL AVIV, ISRAEL, January 29, 2025 /EINPresswire.com/ -- Celiac disease affects an estimated 1 percent of adults and children worldwide. Yet, many individuals endure years of symptoms before receiving a diagnosis. Studies suggest it can take more than a decade for some to be diagnosed.

A [groundbreaking study](#) by Maccabi [KSM Research and Innovation Center](#) and [Predicta Med](#) highlights the potential of machine learning models to identify patients at risk for undiagnosed Celiac disease using electronic medical records (EMRs). The findings, published in Nature Portfolio, Scientific Reports Journal, found that these models could identify patients with Celiac disease up to four years before the first documented evidence of the disease. The study received ethical approval from the Helsinki Committee.

Currently, Celiac disease is diagnosed through serologic tests and intestinal biopsies but knowing who to send for testing is a challenge, especially among adults who may have a variety of symptoms or be asymptomatic. In this study, a team of researchers analyzed anonymized EMR data from Maccabi Healthcare Services, a leading Israeli HMO, which include data from over 2.9 million patients. The study population included cases of patients with highly elevated levels of the antibody for tissue transglutaminase (tTG-IgA), a highly predictive marker for Celiac disease, and control patients with no documented indication of Celiac disease.

The researchers trained machine learning models on one set of cases and controls using only commonly performed lab tests and basic demographic information (sex and age) and evaluated the models' ability to distinguish between patients of both types on a test set composed of previously unseen cases and controls. Area under the curve (AUC) was the metric used to assess how well a model can distinguish between the case and control patients. The AUC score ranges



from 0 to 1, with higher values indicating better performance. The models were tested at various time intervals between one and four years before the initial Celiac disease positive serologic test, which led to the patient being diagnosed.

Five algorithms were trained and tested: logistic regression, decision tree, random forest, XGBoost and multilayer perceptron. Among them, XGBoost performed best, achieving an AUC of 0.86 one year before diagnosis and maintaining strong accuracy (AUC > 0.8) even at longer intervals of up to four years. Key predictors of unidentified Celiac disease autoimmunity included low hemoglobin, low ferritin, low HDL (High-density lipoprotein cholesterol), and elevated liver function tests.

This study offers a promising framework for using machine learning to detect patients at risk for Celiac disease, demonstrating the feasibility of leveraging routine clinical data for early detection. This approach could potentially be integrated into healthcare practices where comprehensive EMR systems are in place.

"Early identification of celiac disease can significantly improve patient outcomes, as those diagnosed earlier often experience better intestinal healing and reduced symptoms, whereas delayed diagnosis is linked to persistent health issues despite adhering to a gluten-free diet," said Dr. Amir Ben-Tov, Pediatric Gastroenterologist and Senior Clinical researcher at KSM Research and Innovation Center.

The developed tool could potentially evolve in the future to a pre-screening method to flag patients for further evaluation, including serologic tests and biopsies. Predicta Med is conducting pilots with leading US based hospitals, to prove the tool's effectiveness in prospective settings. An on-going study with a major hospital in California shows high agreement between the AI's indications and the clinician's disease risk assessments in a prospective real-world environment.

To read the full study click [here](#).

Dvir Assouline  
PRO PR LTD  
[email us here](#)

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