

Metformin Associated with Decreased Risk of Chronic Disease Beyond Diabetes in Type 2 Diabetic Patients

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Key Findings:

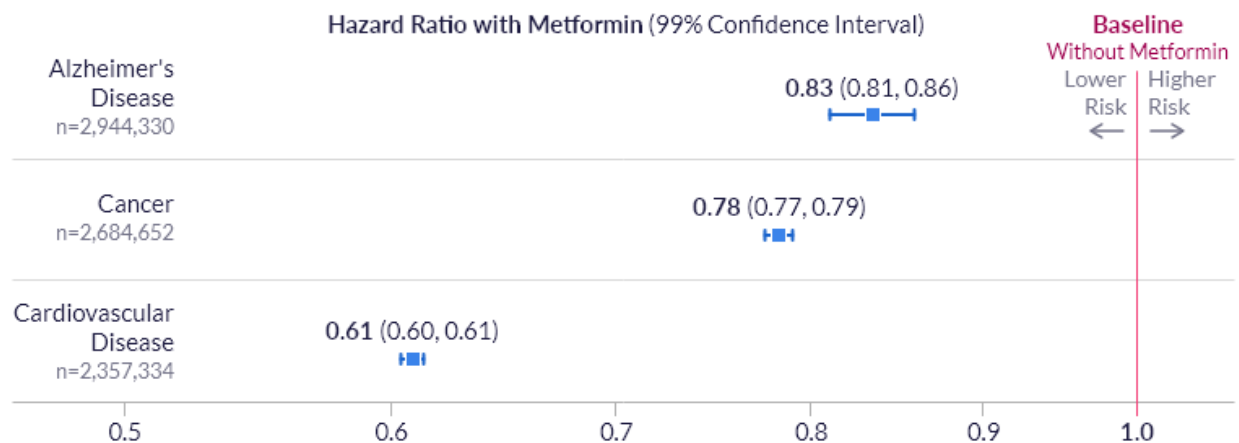
- Type 2 diabetics prescribed metformin are less likely to be diagnosed with cancer, cardiovascular disease, and Alzheimer's than type 2 diabetics not taking metformin.

Metformin is a medication often prescribed to type 2 diabetic patients to help with blood glucose levels.¹ Some studies have suggested that metformin might have additional health benefits beyond managing type 2 diabetes, such as a reduced risk for cardiovascular disease or cancer.²

To better understand whether there might be a correlation between metformin use and the incidence of aging-related disease, we studied 3,082,664 patients diagnosed with type 2 diabetes at age 40 or older between January 1, 2017, and June 30, 2023. We compared the relative risk of cancer, cardiovascular disease, and Alzheimer's disease between patients prescribed metformin compared to patients not prescribed metformin. We excluded patients who had the condition of interest previously diagnosed from the analysis for that diagnosis. We adjusted for patient age, sex, race, ethnicity, body-mass index, initial hemoglobin A1c at diagnosis, and smoking status.

We found that type 2 diabetic patients prescribed metformin were less likely to be diagnosed with all three conditions assessed compared to those not prescribed metformin. Patients on metformin were 17% less likely to be diagnosed with Alzheimer's, 22% less likely to be diagnosed with cancer, and 39% less likely to be diagnosed with cardiovascular disease, as shown in Figure 1.

Alzheimer's Disease, Cancer, and Cardiovascular Disease Hazard Ratios for Metformin-Treated Type 2 Diabetics



"Alzheimer's Disease, Cancer, and Cardiovascular Disease Hazard Ratios for Metformin-Treated Type 2 Diabetics," 2023. EpicResearch.org

Figure 1. Cox proportional hazard ratios for Alzheimer's disease, cancer, and cardiovascular disease for type 2 diabetic patients prescribed metformin compared to type 2 diabetics not prescribed metformin. A hazard ratio of 1 means that a patient

prescribed metformin has the same likelihood of being diagnosed as a patient not prescribed metformin. A hazard ratio of 0.5 means a patient prescribed metformin is half as likely to be diagnosed as a patient not prescribed metformin.

This study did not investigate other outcomes, side effects, or contraindications of metformin. There are other considerations for prescribing antidiabetic medications that are not included in this analysis.

These data come from Cosmos, a HIPAA-defined Limited Data Set of more than 213 million patients from 218 Epic organizations including 1,235 hospitals and more than 26,800 clinics, serving patients in all 50 states and Lebanon. This study was completed by two teams that worked independently, each composed of a clinician and research scientists. The two teams came to similar conclusions. Graphics by Brian Olson.

References

1. AHFS Patient Medication Information [Internet]. Bethesda (MD): American Society of Health-System Pharmacists, Inc.; c2019. Metformin. Updated March 15, 2020. Accessed September 7, 2023. <https://medlineplus.gov/druginfo/meds/a696005.html>
2. Soukas AA, Hao H, Wu L. Metformin as Anti-Aging Therapy: Is It for Everyone? *Trends Endocrinol Metab.* 2019;30(10):745-755. doi:10.1016/j.tem.2019.07.015

Data Definitions

Term	Definition
Study period	1/1/2017 to 6/30/2023
Study population	• Patients first diagnosed with type 2 diabetes during the study period at age 40 or older • Must have all of the following: ○ BMI recorded within 60 days of diagnosis ○ A1C within 30 days of diagnosis ○ Smoking status documented • Face-to-face visit after the diagnosis • For each outcome, exclude any patients with a history of the outcome prior to their first diagnosis
Exposures	• Treatment with metformin • Treatment with other anti-diabetic medications (ADM)
Outcomes	• Diagnosis of cancer • Diagnosis of cardiovascular disease (CVD) • Diagnosis of Alzheimer's
Confounders Included	• Age • Race/ethnicity • Sex • Relative health of patient besides having type 2 diabetes • BMI • A1C (initial) Smoking status
Model Specifications	Cox's time-varying Proportional Hazards Model • Time-varying factors: First treatment with metformin, first treatment with non-metformin ADM
Cancer	A diagnosis with SNOMED concept grouper #363346000
Cardiovascular disease	A diagnosis with one of the following ICD-10 codes: I20-I25
Alzheimer's	A diagnosis with ICD-10 code G30