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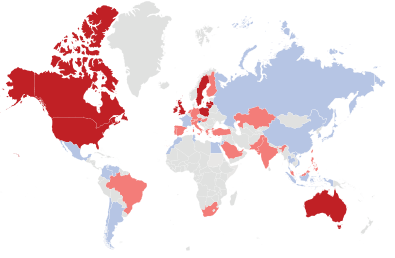
Diabetes Care®

In This Issue of *Diabetes Care*

By Max Bingham, PhD

Two-Thirds of Individuals Surveyed Were Unaware of Cardiovascular Risk Associated With Diabetes

A globally administered survey, reported by Chaudhary et al. (**p. 379**), suggests that about two-thirds of individuals in 50 high- and middle-income countries are unaware of diabetes being a major risk factor for cardiovascular disease. Given the predicted increases in the global burden of diabetes over the next 25 years (a 50% increase), the authors urge that concerted actions are needed now to raise awareness of the risks involved. They do note, however, that addressing the knowledge gap will require a complex multifaceted strategy tailored to different audiences, and that it will likely need the active engagement of multiple stakeholders and significant levels of investment. The findings come from an online YouGov survey that was conducted by the American Heart Association in 2021 and asked questions broadly related to heart disease. In this secondary analysis, the authors focused on one question that aimed to identify the level of awareness of risk factors for cardiovascular disease, one of which was diabetes. They also examined variation according to demographics, geography, and economic development. There were just under 49,000 respondents, with ~16,000, or one-third, identifying diabetes as a major risk factor for cardiovascular disease. Awareness levels were similar among men and women but did increase with age. Awareness levels were also higher in high-income countries compared with those classed as middle income. Meanwhile, the spread of awareness is notable, ranging from 7.4% in Slovenia to 47.3% in Lithuania. No low-income countries were included in the survey because of the limited capacity of the survey vendor to provide nationally representative samples via its online design at the time of the survey. "The knowledge gap identified in our study has important public health consequences," said author Dhruv S. Kazi. "People with this knowledge may also be more likely to get screened and treated for diabetes and may be more likely to make the lifestyle changes necessary for preventing cardiovascular disease."

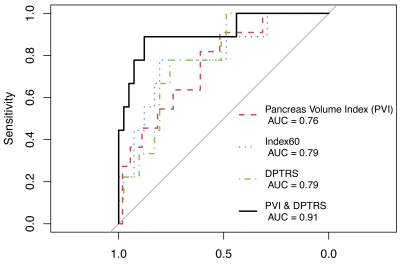


Awareness levels of diabetes as a risk factor for cardiovascular disease in 50 middle- to high-income countries (red, 40–50%; light blue, 20–30%).

Chaudhary et al. Low awareness of diabetes as a major risk factor for cardiovascular disease in middle- and high-income countries. Diabetes Care 2024;47:379–383

MRI-Determined Pancreas Volume Adds Predictive Power for Progression to Stage 3 Type 1 Diabetes

Pancreas size, assessed via MRI, appears to be an early marker of type 1 diabetes progression, according to Virostko et al. (**p. 393**). Specifically, small pancreas size predicted faster progression to stage 3 type 1 diabetes (i.e., symptomatic disease) and appears to provide different information from that derived from traditional metabolic testing. The findings come from 65 individuals who were positive for multiple autoantibodies and underwent MRI targeting the pancreas using a standardized multisite protocol. Prediction of progression to stage 3 type 1 diabetes was then assessed via the MRI-derived pancreas volume index (PVI), the oral glucose tolerance test–derived Index60 score, and the Diabetes Prevention Trial–Type 1 Risk Score (DPTRS). Eleven of the 65 individuals progressed to stage 3 type 1 diabetes over the course of the study, and at study entry, PVI and metabolic scores all were significantly different from those of individuals who did not progress. Notably, PVI did not correlate with the metabolic scores, indicating the measure was likely reflecting different components of risk for progression. In terms of predicting progression to stage 3 type 1 diabetes, PVI had an area under the receiver operating curve of 0.76, and both metabolic scores were 0.79. A combination of PVI and DPTRS had a predictive power of 0.91, which was significantly higher than either of the metabolic scores alone. The authors note that use of MRI is likely to improve predictive accuracy, which would be a clear benefit for trials of preventative therapies. However, its wider application is currently limited due to the costs involved. "The pancreas is not currently assessed in type 1 diabetes staging, but pancreas imaging yields early predictors not captured by blood tests," said author John Virostko. "As artificial intelligence increasingly automates MRI acquisition and analysis, the speed, cost, and ease of pancreas analysis may become comparable with (or surpass) that of current assays."



Receiver operating curve (black) indicating predictive power of a combination of MRI-determined pancreas volume and traditional metabolic testing. AUC, area under the curve.

Virostko et al. Longitudinal assessment of pancreas volume by MRI predicts progression to stage 3 type 1 diabetes. Diabetes Care 2024;47:393–400

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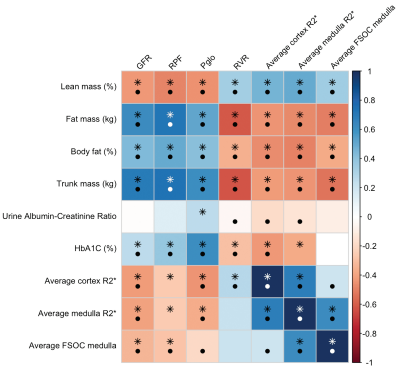
Youth-Onset Type 2 Diabetes Is Linked to Early Signs of Kidney Injury

Young individuals with type 2 diabetes appear to have severe β-cell dysfunction that is associated with a series of measures that indicate early kidney injury according to Bjornstad et al. (**p. 409**). Specifically, they identify intraglomerular hypertension and perturbed energetics as common features in youth with type 2 diabetes. While further work is needed to understand the relationships and future clinical risk, the study appears to set the basis for the development of early therapeutic interventions to prevent kidney-related complications later in adulthood. Traditional risk factors do not fully explain the severity and progression of type 2 diabetes in youth, and current treatments only partially restore kidney function when given early enough. The findings come from an observational study that compared 50 young (mean ~16 years) individuals with type 2 diabetes with 21 similarly aged individuals without diabetes but with obesity as well as with 20 individuals with normal weight. All participants underwent assessments for glomerular filtration rate, renal plasma flow, and kidney perfusion and oxygenation. Individuals with diabetes and those without diabetes but with obesity also had a variety of measures relating to insulin secretion and sensitivity assessed via hyperglycemic clamp. The authors found that youth with type 2 diabetes had a lower disposition index (an indicator of insulin secretion relative to insulin sensitivity) and higher urine albumin-to-creatinine ratio and intraglomerular pressure compared with youth without diabetes but with obesity. Taking these findings together, the authors conclude that there is likely a substantial level of kidney issues in young individuals with type 2 diabetes and, to a lesser extent, in those with obesity but no diabetes, and this should prompt a search for therapies to limit the damage as early as possible. "Our study underscores a critical aspect of early-onset type 2 diabetes: the pronounced β-cell dysfunction and associated kidney injury in youth," said author Petter Bjornstad. "We anticipate that these findings will inform future research aimed at early intervention strategies, which could improve the management of diabetic kidney disease in this high-risk population."

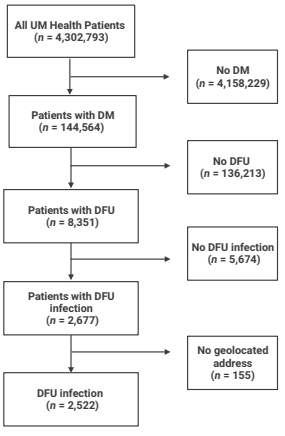


Correlation heat map indicating relationships between various measures of kidney function and participant characteristics. GFR, glomerular filtration rate; FSOC, furosemide-suppressible oxygen consumption; Pglo, glomerular pressure; RPF, renal plasma flow; RVR, renal vascular resistance.

Bjornstad et al. Insulin secretion, sensitivity, and kidney function in young individuals with type 2 diabetes. Diabetes Care 2024;47:409–417

Diabetic Foot Ulcer Infections Are Linked to Neighborhood-Level Social Determinants of Health

An association appears to exist between neighborhood-level social determinants of health and the development of diabetic foot ulcer infections, according to Schmidt et al. (**p. 508**). Specifically, neighborhood characteristics such as poverty, ethnicity, immigration, rates of nonmarriage, and lower rates of access to health care appear to drive higher risk for ulcer infections compared with individuals with diabetes who did not have these neighborhood characteristics. The findings come from a retrospective case-control analysis in which individuals diagnosed with a diabetic foot ulcer infection were identified and matched to the neighborhood characteristics of their address. The authors then used various regression models to look at associations in comparison with those of the general population with diabetes. The overall number of individuals with diabetes identified during the 2013–2017 study period was just under 145,000. Of those, 8,351 developed a diabetic foot ulcer, and in 2,252 of those individuals the ulcers were complicated by an infection. Those with infections tended to be nonmarried individuals, especially men, and were more likely to come from neighborhoods with higher levels of poverty and higher numbers of Hispanic residents or residents who were born outside the U.S. Index scores describing neighborhoods in broader terms showed that individuals with infections tended to come from neighborhoods with more disadvantage and lower education levels as well as lower levels of affluence. In multivariable analysis, the only index that was predictive of diabetic foot ulcer infection was the neighborhood ethnic immigration concentration. While noting some study strengths, they point out that the study is based on the records of a single large tertiary medical center, which may limit generalizability. Nevertheless, the authors conclude that social determinants of health at the neighborhood level may help identify individuals with particularly high risk for infection. "Having compelling data to link neighborhood-level social determinants of health with outcomes is powerful," said author Brian M. Schmidt. "We must not only identify disparity but also use these data about disparities to begin to break them down and do better for all people."



Study population flowchart identifying cases of diabetic foot ulcer (DFU) infections among 4.3 million patients. DM, diabetes mellitus; UM, University of Michigan.

Schmidt et al. Residential address amplifies health disparities and risk of infection in individuals with diabetic foot ulcers. Diabetes Care 2024;47:508–515

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