

## Question: What Do Math & Medicine Have in Common?

Answer:  
The way they are taught  
is out of date.



Written by  
**Skeptical Scalpel**

A guy named Steven Levitt is tired of helping his teenagers with their quadratic equations and imaginary zeros. Because they will never use these skills again, he thinks teaching these calculations is futile. Who is Steven Levitt? He is the University of Chicago economist who wrote the book "Freakonomics." A recent article in *The Wall Street Journal* said Levitt thinks "the way math is taught in schools is outdated and impractical in preparing students for today's data-driven world."

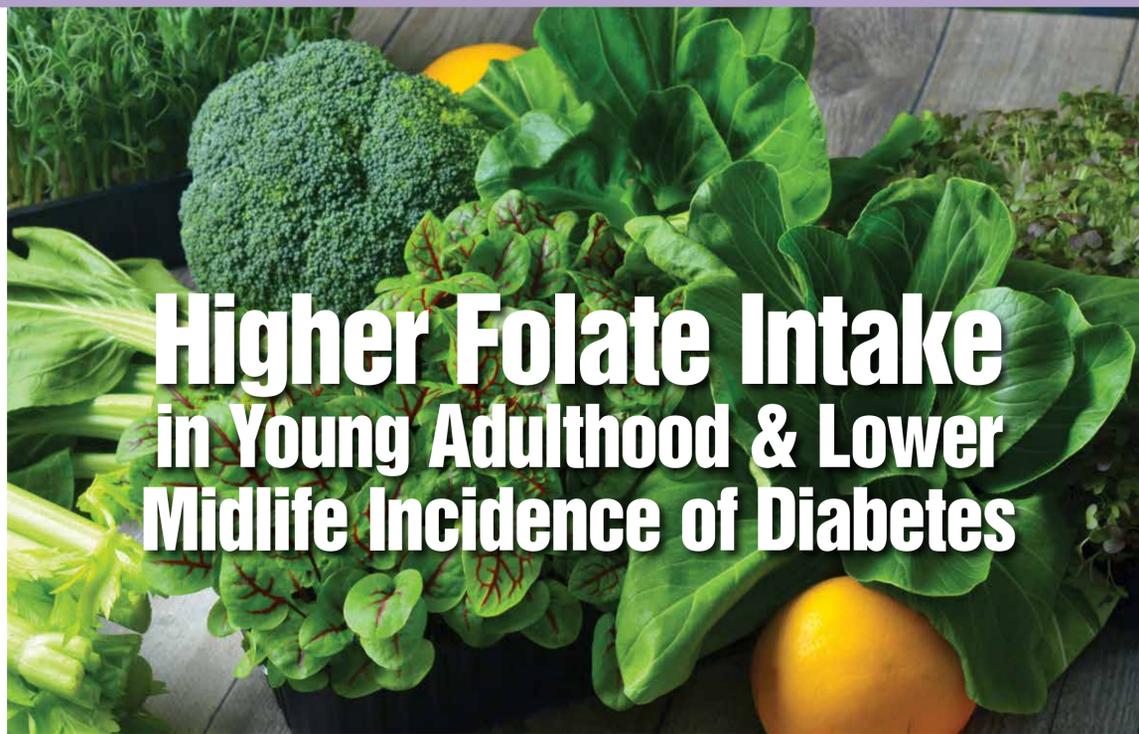
Substitute the word "medicine" for "math," and you will echo what many medical educators think is true. Levitt and Stanford math education professor Jo Boaler are trying to modernize math. Instead of the current Algebra II as a third-year of high school math, they suggest allowing high school students to study data science.

British technologist and math education reformer Conrad Wolfram thinks we no longer need to teach hand calculations and that "the fundamental problem with today's math curriculum is that it doesn't acknowledge that computers exist." He said students should know when to use quadratic equations but let the computer do the calculating. The savings in time could be used to teach data literacy. Likewise, Boaler said, "What we don't need is to make them memorize the times tables."

The Journal piece said, "Math curriculum has remained largely unchanged since the 1950s." The same is true of medicine. In 2012, I blogged, "Now that a resident can carry a computer in her pocket and access everything there is to know instantly, why should she have to memorize formulas, chemical reactions, and other minutia? With the exception of the rules limiting work hours, medical school and resident curricula have changed very little since I was a student and resident some 40 years ago."

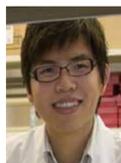
Educators in the state of Washington are restructuring Algebra II to include only what colleges and industries feel is necessary for students to prepare for higher education. They want to emphasize things like "mathematical modeling, data science, quantitative reasoning, and statistics."

We in medicine have the same problem as the mathematicians. There is a lot of talk, but no one does anything about it. Maybe when Levitt, Boaler, and others are done restructuring math education, they can help us bring medical education into the 21st century. ■



## Higher Folate Intake in Young Adulthood & Lower Midlife Incidence of Diabetes

Written by



**Jie Zhu, MD, PhD**  
Assistant Professor  
Nutrition and Foods Program  
School of Family and  
Consumer Sciences  
Texas State University



**Cheng Chen, PhD**  
Department of Obstetrics  
and Gynecology  
Vagelos College of  
Physicians and Surgeons  
Department of Epidemiology  
Mailman School of  
Public Health  
Columbia University Irving  
Medical Center

It has been recognized that homocysteine (Hcy) degradation needs B vitamins to serve as a prerequisite substrate donor (folate) or essential coenzymes (vitamin B<sub>6</sub> and B<sub>12</sub>), and increase of Hcy has emerged as a risk factor for type 2 diabetes due to its association with insulin resistance. Although studies from some other countries reported that dietary folate intake was inversely related to self-reported incident diabetes, none have examined the association of dietary folate and other B vitamin intake with diabetes risk among the US general population.

### Addressing an Unmet Need

For a study published in *Diabetes Care*, we and our colleagues sought to prospectively investigate intakes of folate and vitamins B<sub>6</sub> and B<sub>12</sub> in relation to diabetes risk in a large US cohort of African-American and Caucasian young adults with 30 years of follow-up, using data from the Coronary Artery Risk Development in Young Adults (CARDIA) study. The study included 4,704 CARDIA apparently healthy adults aged 18-30 at baseline (1985-86) who were followed until 2015-2016. Diabetes incidence was ascertained by clinical examinations and anti-diabetic medication records. The cumulative average intakes of folate, vitamin B<sub>6</sub>, and vitamin B<sub>12</sub> were used, based on multiple dietary assessments conducted during the follow-up.

Results from this large longitudinal cohort study demonstrated that consumption of folate (including both dietary and supplemental resources; Table), but not vitamins B<sub>6</sub> and B<sub>12</sub>, in young adulthood was inversely associated with incident diabetes in midlife. Notably, the null associations of vitamin B<sub>6</sub> and B<sub>12</sub> intake with diabetes risk might be explained by most of the participants having had adequate intakes of vitamin B<sub>6</sub> and B<sub>12</sub>, unlike their intake of folate. Therefore,

further intakes of these two B vitamins may not result in additional benefit with respect to diabetes development. Consistently, we found that higher folate intake was significantly related to lower blood levels of Hcy, insulin, and C-reactive protein, suggesting that the observed inverse association between folate intake and diabetes risk may be, at least in part, explained by mechanisms related to Hcy level, insulin sensitivity, and systemic inflammation.

### Examining the Implications

The novel findings from this longitudinal study suggest that adequate intake of folate in young adulthood reduces the likelihood of developing diabetes later in life among the general US adult population. When clinicians see patients who are at high risk of diabetes (eg, family history of diabetes or increased Hcy and/or glucose levels), they should ensure that B vitamin status is opti-

mal and encourage these patients to add foods rich in B vitamins to their diet as needed.

Although the possible effects of other lifestyle risk factors and diet quality were controlled in the study, any potentially residual confounders cannot be ruled out. Additionally, the B vitamin intakes in the study included both dietary and supplemental resources, and high B vitamin consumption may indicate a marker of a healthy dietary pattern, suggesting that other nutrients in B vitamin-rich foods may also contribute to the observed association. Moreover, the results were based on the healthy cohort of African-American and Caucasian young adults in the US. Thus, the generalizability to the population with or at increased risk for chronic diseases or in other races was limited. Further research is warranted to establish the cause-and-effect relationship between folate intake and diabetes. ■

**Table Multivariable-Adjusted Hazard Ratios\* Between Folate Intake Levels & Diabetes Incidence\*\***

	Folate intake Mean ± SD	Tertiles of folate intake levels			P trend
		Tertile 1	Tertile 2	Tertile 3	
Range (µg/day)	N/A	<354.8	354.8-563.0	≥563.0	N/A
Median (µg/day)	N/A	260.7	450.0	744.2	N/A
<b>Age</b>					
<Median 26 years	515.1 ± 483.9	0 [Ref.]	0.79 (0.58, 1.08)	0.93 (0.64, 1.35)	0.18
≥Median 26 years	546.6 ± 506.4	0 [Ref.]	1.10 (0.83, 1.45)	0.73 (0.52, 1.02)	0.04
P for interaction	N/A		0.79		
<b>Sex</b>					
Female	508.3 ± 590.5	0 [Ref.]	0.98 (0.74, 1.29)	0.87 (0.63, 1.22)	0.04
Male	554.1 ± 361.6	0 [Ref.]	0.92 (0.67, 1.26)	0.74 (0.51, 1.06)	0.27
P for interaction	N/A		0.27		
<b>Race</b>					
African American	470.7 ± 315.9	0 [Ref.]	0.95 (0.74, 1.21)	0.97 (0.72, 1.30)	0.37
Caucasian	592.8 ± 624.8	0 [Ref.]	0.77 (0.53, 1.10)	0.54 (0.35, 0.83)	0.011
P for interaction	N/A		0.38		
<b>Baseline glucose</b>					
<0.0555 mmol/L (n = 4,603)	530.8 ± 496.8	0 [Ref.]	0.91 (0.74, 1.12)	0.83 (0.64, 1.06)	0.03
≥0.055 mmol/L (n = 101)	503.8 ± 403.2	0 [Ref.]	1.87 (0.42, 8.24)	1.52 (0.24, 9.66)	0.67
P for interaction	N/A		0.35		

\*95% confidence intervals.

\*\* All models were constructed using Cox proportional hazard regression mode with adjustment for covariates. P trend was examined by using the continuous folate intake variable that excluded the values >99th percentile.

Source: Adapted from: Zhu J, et al. *Diabetes Care*. 2020;43(10):2426-2434.



## Dealing With Non-Compliant Patients: Using Facts in Your Defense

The following is a continuation of the MedLaw column in the January issue.

If, despite your best efforts, your patient suffers a poor outcome and you are being sued for malpractice, you would ideally like to stop the process before it reaches the courtroom. To that end, your attorney would file a Motion for Summary Judgment, asking the judge to dismiss the case as a matter of law because the plaintiff cannot meet their burden of proof. The plaintiff would be required to "lay bare their proof" that it was actually your conduct that was the proximate cause of the harm.

The judge may decide the Motion on papers alone or may hold a hearing at which the attorneys can offer argument but there will not be any witnesses called. Your "witness" will, therefore, be the medical record. Courts generally loathe to deny a plaintiff their day in court, and so the record must be very clear as to the patient's resistance to your efforts to work with them and your informing them of the serious consequences of their non-compliance and of the likelihood that it would cause the very harm that they then suffered.

If this Motion fails and the matter proceeds to trial, you still have strong defenses to raise based on the patient's non-compliance:

- ▶ Contributory negligence is an archaic defense that is still retained in few jurisdictions. It holds that a plaintiff who has any fault at all in their injuries may not recover damages for those injuries. If you are in one of those jurisdictions, your ability to demonstrate that patient non-compliance contributed at all to the claimed harm will bar any recovery against you.
- ▶ Comparative negligence does exactly what its name implies: it compares the level of fault for each side. In some jurisdictions, no amount of plaintiff fault bars recovery, and in others, there is a cut-off beyond which the plaintiff is barred. If a case goes through, any recovery will be offset by the proportion of the plaintiff's fault. In any comparative negligence jurisdiction, patient non-compliance will be a critical issue, because even if the case is not barred and the patient wins, damages will be reduced.

The plaintiff's duty of mitigation applies to the conduct of the patient after a harm has been recognized. Plaintiffs must show that they did what they reasonably could to minimize the effect that the negligence for which they are suing had on them. Even if you do have actionable liability for an error of your own, a patient non-compliant with well-advised recommendations for correction comes into evidence and acts as a damages offset.

When dealing with a persistently non-compliant patient, think ahead to how you would counter a malpractice claim when you create the record. A clear contemporaneous record of the patient's ongoing non-compliant conduct despite your efforts to have them act in a medically responsible way is the key to a solid defense.

This article was written by Dr. Medlaw, a physician and medical malpractice attorney.

## In Case You Missed It Glycemic Control in Type 1 Diabetes Improved During Lockdown

On average, glycemic control improved during lockdown among people living with type 1 diabetes, according to a study published in *Diabetes Care*. Researchers conducted an observational assessment from a self-reported questionnaire on behavioral changes and glycemic information from flash glucose monitoring (FGM) during lockdown in 1,378 individuals living with type 1 diabetes. Change in the mean glucose level two months before and one month after the lockdown was the main outcome. The researchers observed improvement in mean glucose from 9.1 ± 1.7 mmol/L to 8.7 ± 1.7 mmol/L. Decreased alcohol consumption, an increase in the frequency of FGM scans and in the number of hypoglycemic events, and an easier diabetes control perception were factors associated with better glycemic control (odds ratios, 1.75, 1.48, 1.67, and 1.71, respectively). "Our study suggests that while the lockdown was a source of anxiety for many people with type 1 diabetes, it was also an opportunity to make positive behavioral changes," the authors write. "Their persistence after easing of lockdown should be studied."

## Intensive Glycemic Control CV Autonomic Neuropathy

Cardiovascular autonomic neuropathy (CAN) risk may be reduced among type 2 diabetes patients undergoing intensive glycemic therapy, according to a study. Investigators examined the effect of intensively treating traditional risk factors for CAN (hyperglycemia, hypertension, and dyslipidemia) among 7,275 individuals with type 2 diabetes and high cardiovascular risk participating in the Action to Control Cardiovascular Risk in Diabetes trial. Compared with standard intervention, intensive glucose treatment reduced CAN risk (odds ratio [OR], 0.84; 95% confidence interval [CI], 0.75 to 0.94; P = 0.003), an effect driven by individuals without cardiovascular disease (CVD) at baseline (OR, 0.73; 95% CI, 0.63 to 0.85; P < 0.0001) rather than those with CVD (OR, 1.10, 95% CI, 0.91 to 1.34, P = 0.34). CAN risk was decreased by intensive blood pressure (BP) intervention (OR, 0.75; 95% CI, 0.63 to 0.89; P = 0.001), particularly in patients aged 65 and older (OR, 0.66; 95% CI, 0.49 to 0.88; P = 0.005). There was no significant effect observed between fenofibrate and CAN (OR, 0.91; 95% CI, 0.78 to 1.07; P = 0.26). "The finding of possible heterogeneity in the effectiveness of intensive glycemic control based on CVD history, and of BP control based on age, may allow personalization of this treatment to maximize its cost-effectiveness," the authors write. ■

PHYSICIAN'S WEEKLY  
**PW**  
PODCAST  
LISTEN NOW  
www.spreaker.com/show/physicians-weekly