

## 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is out of date.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 A recent article in *The Wall Street Journal* said Levitt thinks “the way math is taught in schools is outdated and impractical in preparing students for today’s data-driven world.”

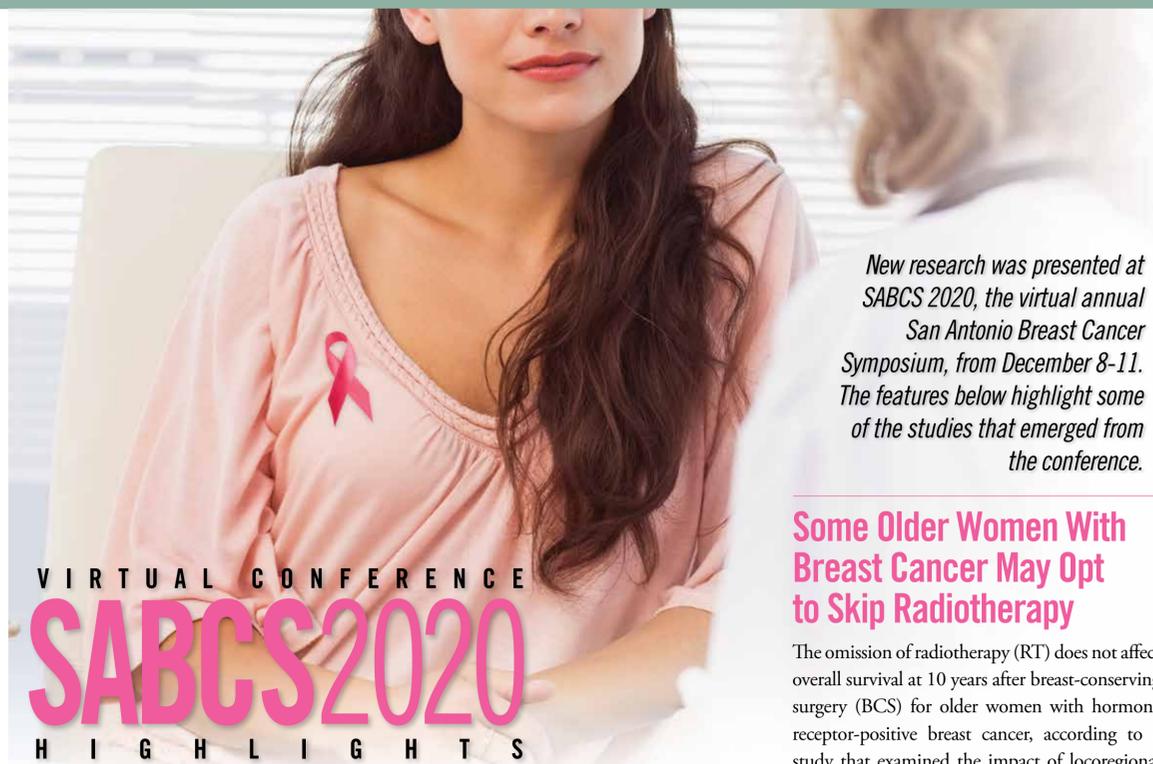
Substitute the word “medicine” for “math,” and you will echo what many medical educators think is true. Levitt and Stanford math-education professor, Jo Boaler, are trying to modernize math. Instead of the current Algebra II as a third-year of high school math, they suggest allowing high school students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



## VIRTUAL CONFERENCE SABCS2020 HIGHLIGHTS

### Pregnancy Less Likely After Breast Cancer Diagnosis

Pregnancy is less likely after prior breast cancer (BC) diagnosis, according to a systematic literature review that examined pregnancy after BC, fetal and obstetrical outcomes, disease-free survival (DFS), and overall survival (OS). Data were included from 39 studies with 57,739 women with cancers other than BC and 114,573 women with BC. The researchers found that 7,505 patients with BC had a pregnancy after their diagnosis. Patients with BC had lower chances of having a pregnancy following anti-cancer treatment completion compared with women from the general population (relative risk,

0.40). BC survivors had significantly increased risks of low birth weight, small for gestational age, preterm delivery, and cesarean section compared with the general population (odds ratios, 1.50, 1.16, 1.45, and 1.14, respectively). However, no negative impacts were observed on patient outcomes in association with pregnancy after BC. Better OS and DFS were seen for patients with BC with subsequent pregnancy versus those without (hazard ratios [HRs], 0.56 and 0.73, respectively). The results were similar after adjustment for the “healthy mother effect” (HRs for OS and DFS, 0.52 and 0.74, respectively). ■

### Improved Outcomes With Neratinib-Based Regimens in CNS Metastases from HER2+ BC

A subgroup of patients participating in the randomized phase III NALA study of neratinib plus capecitabine (N+C) versus lapatinib plus capecitabine (L+C) in patients with third-line HER2+ metastatic breast cancer demonstrated improved central nervous system (CNS) outcomes with neratinib-based regimens in the treatment and prevention of CNS metastases from HER2+ breast cancer. The phase III NALA trial enrolled 621 patients who were randomized (1:1) to receive either N+C or L+C. The co-primary endpoints of the trial were independently adjudicated progression-free survival (PFS)

and overall survival (OS). The NALA study met its primary endpoint, with the neratinib arm having significantly improved PFS versus the lapatinib arm (hazard ratio [HR], 0.76; mean PFS, 8.8 months vs. 6.6 months). The data showed no statistical difference in OS between treatment arms (HR 0.88). Time to intervention for symptomatic CNS disease was a pre-defined secondary endpoint of the trial. In the intent to treat population, significantly fewer interventions for CNS disease occurred with N+C versus L+C (cumulative incidence, 22.8% vs. 29.2%). ■

### Clinical & Genomic Data Combine for Improved Prognosis & Adjuvant Chemotherapy Guidance

An online tool (RSCLin) incorporating clinical-pathologic data and results of the 21-gene recurrent score (RS) successfully estimated distant recurrence (DR) risk and adjuvant chemotherapy benefit in women with hormone receptor-positive, HER2-, and node-negative breast cancer according to a study for which researchers developed and tested the tool in 10,004 women who received endocrine therapy alone in the B-14 and TAILORx trials or also chemotherapy in TAILORx. RSCLin integrates RS with tumor grade, tumor size, and age. In the study, RSCLin

provided more prognostic information (likelihood ratio  $\chi^2$ ) for DR than RS or clinical-pathologic factors alone (both  $P < 0.001$ , likelihood ratio test). In external validation, the RSCLin risk estimate was prognostic for DR risk in the Clalit registry ( $P < 0.001$ ), with the estimated risk significantly correlated with risk of DR (hazard ratio, 1.73; 95% CI, 1.40-2.15;  $P < 0.001$ ). The study authors noted with RSCLin use in a 55-year-old woman with a 1.5-cm intermediate-grade tumor, the absolute chemotherapy benefit estimate ranges from 0% to 15% as the RS ranges from 11 to 50. ■

New research was presented at SABCS 2020, the virtual annual San Antonio Breast Cancer Symposium, from December 8-11. The features below highlight some of the studies that emerged from the conference.

### Some Older Women With Breast Cancer May Opt to Skip Radiotherapy

The omission of radiotherapy (RT) does not affect overall survival at 10 years after breast-conserving surgery (BCS) for older women with hormone receptor-positive breast cancer, according to a study that examined the impact of locoregional RT after BCS on long-term outcomes in older patients receiving appropriate systemic therapy. A total of 1,326 patients aged 65 and older with axillary node-negative, hormone receptor-positive breast cancer were randomly assigned to either receive or not receive (658 and 668, respectively) whole breast RT and followed for a median of 7.3 years. At 10 years, ipsilateral breast tumor recurrence rates were 9.8% and 0.9% in the no RT and RT arms, respectively, with a hazard ratio of 0.12 for those receiving RT. Regional recurrence differed significantly (2.3% vs 0.5% with no RT and with RT, respectively), but no differences were seen in contralateral breast cancer or distant metastases. Breast cancer-free survival rates were 12.7% and 6.6% for the no RT and RT arms, respectively. At 10-years, overall survival rates were 80.4% and 81.0% without and with RT, respectively. ■

### Radiation Side-Effects Often Underrecognized in Patients With Breast Cancer

Acute side effects of radiation therapy (RT) are often underrecognized by the physicians of patients with breast cancer, according to the results of a patient-reported outcomes questionnaire completed by 9,941 patients with breast cancer who received RT following a lumpectomy at 29 practices from 2012-2020. Physician observations underrecognized patients’ frequent discomfort from swelling in 51.4% of cases, frequent discomfort from itching in 36.7%, moderate or severe pain in 30.9%, and severe fatigue in 18.8%. More than half (53.2%) of those who reported at least one substantial symptom among these categories had their symptom underrecognized by their physician. Demographic factors independently associated with symptom underrecognition included age younger than 50 versus age 60-69 (odds ratio [OR], 1.35), age 50-59 versus age 60-69 (OR, 1.21), black versus white race (OR, 1.92), and other versus white race (OR, 1.82). Also associated with differences in symptom reporting between patients and their physicians were conventional fractionation (OR, 1.15), supraclavicular field use (OR, 0.80), and treatment at an academic center (OR, 1.13). ■

MEDPAGE TODAY'S

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### A Physician's Guide to Surviving COVID Winter

By Rada Jones, MD

How can you survive this winter holding on to your temper, family, and job? Look out for #1. That's you. To care for others, you must care for yourself first. That's not selfish. That's smart. To protect those who need you, you must stay healthy and sane. How? These are my tips.

**1 | Set rules for others and for yourself** | Your sleep should be sacred. So should whatever time off you can schedule.

**2 | Enlist help** | So many grateful folks want to help healthcare workers. Your neighbors may be glad to walk your dog, run some errands, or grab a gallon of milk.

**3 | Prioritize yourself** | Pay someone to plow, buy groceries online, hire a housekeeper to save time for the things that really matter.

**4 | Schedule time for yourself** to exercise, meditate, pray, journal—whatever helps fill your well.

**5 | Shut off the TV** | Whether you're Democrat or Republican, you won't enjoy the news. Watch Hallmark, the Nature Channel, or the Food Channel. Watching food is fun, and it won't make you fat.

**6 | Go outdoors** | There's magic in nature and sunlight, whatever's left of it. Hike, snowshoe, and allow your lungs to breathe real air instead of the reconditioned germs they allow you in the hospital.

**7 | Say no** | That's a survival technique. Say no to parties, hugging strangers, doing things you shouldn't, and protecting others' feelings. Let them take care of their feelings. You take care of yourself.

**8 | Cut yourself some slack** | You aren't perfect. Nobody is. You'll make mistakes, gain a few pounds, step on some toes, maybe even lose it at times. So what? Just do the best you can.

**9 | Read a book** | Remember those things made of paper? You turn a page and land in a new world?

**10 | Be careful with alcohol and substance use** | They may feel good at the moment, but you'll be worse off in the long run.

**11 | Watch old movies** that make you laugh.

**12 | Take a break from social media** | Picking fights with random strangers won't help your mental health. Cut off those who hurt you.

**13 | Get a cat** | They have nine lives; that's why they are masters of survival. They ignore all unpleasantness, and they'll show you how. And they're the best nap helpers.

**14 | Communicate** | Ask your coworkers how they handle the stress. They may teach you something, and if they don't, sharing the burden will help you both.

**15 | Seek help before you lose it** | Check out the CDC's resources on stress and coping.

**16 | Pat yourself on the back** | You're a darn hero! In recycled PPE, instead of shining armor, you saved fair maidens of all genders, ages, and persuasions. With a vaccine in sight, there's a light at the end of the tunnel.

Wishing you all health, joy, and happiness. See you all on the other side.

Rada Jones is an emergency physician and can be reached at her self-titled site, [RadaJonesMD.com](http://RadaJonesMD.com), and on Twitter @jonesrada. She is the author of *Overdose*.

### In Case You Missed It New Mammogram-Based Risk Measures for Breast Cancer

New mammogram-based risk measures based on brightness (*Cirrocumulus*) and texture (*Cirrus*) improve breast cancer risk prediction beyond an established measure of mammographic density (*Cumulus*), according to a study published in the *International Journal of Cancer*. Researchers examined risk prediction with *Cirrocumulus* and *Cirrus* fitted together and with *Cumulus* using data from three studies consisting of 168 interval cases and 498 matched controls; 422 screen-detected cases and 1,197 matched controls; and 354 younger-diagnosis cases and 944 controls frequency-matched for age at mammogram. Measure-specific risk gradients were estimated as the change in odds per standard deviation of controls after adjustment for age and body mass index (OPERA); the area under the receiver operating characteristic curve (AUC) was also calculated. For interval, screen-detected, and younger-diagnosis cancer risks, the best-fitting models involved *Cumulus* and *Cirrus* (OPERAs, 1.81 and 1.72, respectively), *Cirrus* and *Cirrocumulus* (OPERAs, 1.49 and 1.16, respectively), and *Cirrus* and *Cirrocumulus* (OPERAs, 1.70 and 1.46, respectively), with corresponding AUCs of 0.73, 0.63, and 0.72. “Our new measures appear to be more strongly correlated with such causal factors than conventional mammographic density,” the study authors write.

### Triple Treatment Combo Beneficial in BRAF-Mutant CRC

Irinotecan and cetuximab combined with vemurafenib improve progression-free survival in *BRAF*<sup>V600E</sup>-mutated colorectal cancer (CRC), according to a study published in the *Journal of Clinical Oncology*. Investigators randomly assigned 106 patients with *BRAF*<sup>V600E</sup>-mutated metastatic CRC previously treated with one or two regimens to receive irinotecan and cetuximab with or without vemurafenib. They observed improvement in the primary end point of progression-free survival with the addition of vemurafenib (hazard ratio, 0.50). Significant improvements were also seen in the response rate (17% vs 4%) and disease control rate (65% vs 21%). In 87% versus 0% of patients, a decrease in circulating tumor DNA *BRAF*<sup>V600E</sup> variant allele frequency was observed, with a low incidence of acquired RAS alterations at the time of progression. Based on RNA profiling, treatment benefit was not dependent on previously established *BRAF* subgroups or the consensus molecular subtype. “The addition of vemurafenib to cetuximab and irinotecan represents an active combination that improves progression-free survival,” the study authors write. ■

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