

# Mom's Continuing Battle with Cancer

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*What follows is mostly about statistics, so read at your own risk. Mom has had colon cancer twice, each time having been operated upon successfully. Needless to say, when it appeared that it might have reoccurred, we were stressed.*

Many of the students in my statistics course can probably remember when I told them in January that it looked like Mom's colon cancer had returned. She recently completed her second set of followup tests and neither test showed any sign of cancer. That led me to investigate the statistics upon which Mom's oncologist had been so certain that cancer was back.

Before January, mom's CEA level (from blood tests) for the last two years was 3.3 . In January, it jumped to near 9 and subsequently as high as 9.4. Last week it was at 9.0.

A normal level is considered to be below 5. However, most of you know from a stats class that not only the mean but the variance matters in making predictions. Mom's doctor made a clear prediction—the cancer had returned. It was tested with both a colonoscopy and endoscopy. Neither found a problem.

As a typical academic, I went looking for publications that actually contained data and found a study from Brazil tracking 180+ colon cancer survivors for two years after surgery or until death (<http://www.scielo.br/pdf/spmj/v115n6/v115n6a05.pdf>). Digging through the article I found a table of recurrence data:

	CEA<5	CEA>5
Recurrence	16	16
Without recurrence	41	10

So what does this mean with respect to Mom, whose CEA was greater than 5? For the study participants, 38.5% of those with an elevated CEA value did NOT have a recurrence of colon cancer within two years. The correlation is weak, and correlation is not causation. Other causes for elevated CEA include diverticulitis, which runs in my family.

So why was Mom's doctor so definite, ready to go ahead with surgery immediately if he hadn't been contradicted by the surgeon who wanted the additional tests? I can only assume that his own limited experience was the basis for his beliefs, a prejudice we all fall into. I don't doubt that his intentions were good, but he scared Mom (and me) much more than if he hadn't jumped to conclusions.