Can a technology aimed at preventing cancer deaths become so efficient that it causes other problems? The counterintuitive answer is yes. Studies suggest that 20 to 40 percent of breast tumors found by mammography are overdiagnosed, meaning that the detected tumors would not have become clinically noticeable or dangerous during the patients’ lifetimes.

Donald Lannin, MD, Professor of Surgery, and Shi-Yi Wang, MD, PhD, Associate Professor of Epidemiology, have added to this growing body of research by investigating the mechanisms behind overdiagnosis using mammography. Dr. Lannin, whose specialty is breast surgery, noticed that studies showed a dramatic increase in the incidence of small breast cancers due to mammography screening, but no corresponding dramatic drop in breast cancer fatalities.

They published their findings in *The New England Journal of Medicine* under the intriguing title, “Are Small Breast Cancers Good Because They Are Small Or Small Because They Are Good?” A key factor in their analysis is “lead time,” the period between when a mammogram can detect a breast tumor and when the tumor would become clinically apparent without screening.

“In general we thought that the lead time before breast cancer diagnosis was three or four years,” said Dr. Wang. “But based on our simulation modeling—and we are the first paper to say this—we found that the lead time differs by tumor characteristics. For aggressive, unfavorable breast cancers, the lead time could be as short as two years. But for small tumors with favorable characteristics, the lead time could be as long as 15 or 20 years.”

“If you’ve given us a better picture of who is being overdiagnosed based on the biology of the tumor and the age of the patient,” added Dr. Lannin, “That’s quite a conceptual advance in understanding overdiagnosis.”

Dr. Lannin and Wang also found that mammography is great at finding small tumors, which tend to have excellent prognosis—not because the tumors are found early, but because they are biologically unaggressive and grow so slowly. Mammography is less successful at early detection of the aggressive breast cancers that really endanger a woman’s life. These cancers grow so quickly that by the time the woman gets her next screening, they have spread.

Drs. Lannin and Wang note that mammography carries critical, especially for women of high-risk for breast cancer. Screenings have cut breast cancer mortality by about 19 percent, notes Dr. Lannin, then he added, “But on the other hand, that’s not the 75 percent to 90 percent that we once expected and that many people still assume. Our data is very consistent with big trials on screening mammography that show a small benefit. Now, I think we understand a little bit better why it’s fairly small.”

“We need to rethink this issue,” said Dr. Wang, “It’s such a good prognosis that I can reassure them that if we hadn’t diagnosed it on the mammogram, they wouldn’t have known about it for 10 or 15 years. This is very important that we understand that, they feel better. In general, we still remove the tumor because very few patients want to leave it alone, but we don’t plan any additional treatment.”

They point out that this idea isn’t new or radical. When the screening test with prostate-specific antigen (PSA) was new, it created a spike in diagnoses of prostate cancer, leading to overtreatment. Oncologists now understand that many prostate cancers are slow-growing and nonthreatening, so the current treatment strategy is monitoring. Something similar—monitoring after a lumpectomy, say Drs. Lannin and Wang, is appropriate for many breast cancers.

Rethinking Mammography