

Tool that predicts if chemotherapy will produce debilitating side effects in older adults

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Mina Sedrak, M.D., M.S., a medical oncologist at City of Hope, speaks to breast cancer patient Yuyuan Lin on Dec. 31, 2020. Credit: City of Hope

Researchers at City of Hope, a world-renowned independent research

and treatment center for cancer, diabetes and other life-threatening diseases, have developed a tool that could predict if older adults with early-stage breast cancer will develop a severe or deadly reaction to chemotherapy.

This first-of-its-kind risk assessment tool—called the Cancer and Aging Research Group-Breast Cancer (CARG-BC) Score—helps oncologists make personalized [treatment recommendations](#). Oncologists can discuss the score and its significance with early-stage breast [cancer](#) patients age 65 or older. Together, an informed decision about chemotherapy can be made as treatment benefit is weighed against quality of life concerns, said Mina Sedrak, M.D., M.S., co-first author of the new study and deputy director of clinical trials for the Center for Cancer and Aging Research at City of Hope.

"Despite remarkable advances in cancer treatment, tools to characterize the toxicity of cancer therapies have remained virtually unchanged for the past 20 years," Sedrak said. "This is a new precision medicine tool. Rather than basing treatment decisions and care on demographic data for a disease, we now can offer each elderly, early-stage breast cancer patient individualized toxicity information that could help align treatment with their goals for lifestyle, quality of life, longevity and other priorities."

More than [72% of older patients with cancer](#) reported that they would not choose cancer treatment that results in functional impairment even if it improves survival, Sedrak said.

If the risk of chemotherapy toxicity is known in advance, oncologists and patients could work together to decide whether chemotherapy is the right choice. Treatment modifications such as dose reductions and longer periods between chemotherapy delivery could be recommended. Older patients could also preemptively be referred for supportive care

interventions such as consults with [physical therapists](#), occupational therapists, social workers and pharmacists, who could evaluate potential drug interactions with existing medications for chronic ailments. Additionally, patients could have someone evaluate their home for safety or necessary modifications.

The [study](#), published on Jan. 14 in the *Journal of Clinical Oncology*, spanned 16 institutions across the nation, with City of Hope being the lead institution. It included 473 patients age 65 or older with Stage 1-3 breast cancer (283 in development cohort; 190 in validation cohort). They were all treated with chemotherapy either before or after surgery and were evaluated for geriatric and clinical symptoms predictive of severe (grade 3), debilitating (grade 4) or deadly (grade 5) side effects due to chemotherapy.

"Though chemotherapy is an effective way to treat early-stage breast cancer, it also carries a risk of side effects. There is a delicate balance between the benefits of chemotherapy and the harm of possible side effects," said [Canlan Sun, M.D., Ph.D.](#), senior author of the study and associate research professor in the Department of Supportive Care Medicine at City of Hope.

"The development of severe chemotherapy toxicity not only can harm the patient, but it can also compromise an older adult's ability to complete the full course of chemotherapy, possibly reducing the potential benefit of the [cancer treatment](#)," she added.

Sedrak noted that most women with early stage breast cancer have a potentially curable disease and some would benefit from chemotherapy after surgery. "Unfortunately, [older adults](#) aged 65 and over, who comprise about half of all breast cancer diagnoses, are significantly less likely to be offered chemotherapy compared to younger patients—sometimes because their doctors fear they won't be able to

tolerate it," he said. "Older adults are also underrepresented in cancer trials, and we know little about how best to treat this heterogeneous group."

The CARG-BC score is derived by combining eight disease and patient-reported predictors: use of an anthracycline chemotherapy, Stage 2 or 3 breast cancer, longer planned treatment duration, abnormal liver function, low hemoglobin, falls, limited walking ability and lack of social support.

This risk prediction model is an extension of prior work from the national Cancer and Aging Research Group led by scientists at City of Hope and elsewhere. As a National Cancer Institute-designated comprehensive cancer center, City of Hope offers integrated, multidisciplinary care that includes supportive care services addressing physical and emotional issues that can arise during and after treatment.

The newly developed CARG-BC score outperformed existing measures of patient performance status that are widely used in oncology such as the Karnofsky performance status or Eastern Cooperative Oncology Group performance status, both of which were developed and validated in younger patients.

"Those clinician-based 'eyeball tests' are imprecise and subjective," Sedrak said. "They do not detect important factors such as functional reserve or the ability to respond to stress, which vary greatly between [older patients](#) of the same chronological age and are valued by patients and caregivers."

As a next step, the researchers will look to improve the chemotherapy toxicity risk assessment tool with more biological markers. They will attempt to identify biomarkers that could predict severe or deadly side effects to chemotherapy. They are working to identify interventions to

support elderly breast cancer patients so that they derive the most benefit and the least toxicity from [chemotherapy](#).

The researchers will also [continue their efforts](#) to improve access to cancer clinical trials for all patients, leveraging new innovations in technology and widely used social media networks.

More information: Allison Magnuson et al, Development and Validation of a Risk Tool for Predicting Severe Toxicity in Older Adults Receiving Chemotherapy for Early-Stage Breast Cancer, *Journal of Clinical Oncology* (2021). [DOI: 10.1200/JCO.20.02063](https://doi.org/10.1200/JCO.20.02063)

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