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Self-Perceptions of Age among 292 Chemotherapy-Treated Cancer Patients: Exploring Associations with Symptoms and Survival

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Abstract

Background—A growing literature suggests that older individuals who report feeling younger than their actual chronological age enjoy better health and survival. The purpose of this study was to explore similar associations in patients with cancer.

Methods—Chemotherapy-treated cancer patients completed a previously-validated questionnaire item on their self-perception of age. Concurrent patient-reported number of symptoms and pain severity were recorded. In addition, baseline and longitudinal data captured demographics and vital status, respectively.

Results—Among 292 patients, 185 (63%) reported that they perceived themselves as younger than their actual age, 45 as older (15%), 56 (19%) as the same age (unable to be determined in 6). The mean actual chronological age (standard deviation) among those who perceived themselves as younger, older, or the same age were 63 years (11), 54 (12), and 60 (10); ($p < 0.0001$). An inverse relationship was observed between self-perceived age and actual age (odds ratio 1.05 with 95% confidence interval of 1.02, 1.07; $p = 0.0001$) but, otherwise, no statistically significant relationships were observed with gender, cancer curability potential, number of symptoms, or pain severity. Improved survival was associated with fewer symptoms and the potential for curing the cancer but not with patients' age perceptions. Qualitative themes such as positive thinking, staying engaged with life, the importance of family, and maintaining a sense of humor emerged among those who felt younger.

Conclusion—A substantial percentage of patients with cancer -- particularly older ones -- report feeling younger than their actual age; this perception appears to have no relevance to symptoms or survival.

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Keywords

cancer; age; perception; younger; symptoms; prognosis

Does an individual's self-perception of age influence or define any aspect of that person's health? A growing body of literature suggests it does. Older individuals who perceive themselves as younger than their actual chronological age represent a minority within any given cohort, but these "younger" individuals tend to be overall healthier [1,2]. Indeed, patients who view themselves as younger manifest a sharper memory, a swifter gait, a lower rate of hospitalizations, and a lesser chance of suffering a debilitating fall [1,2]. Moser and others studied a cohort of 1,422 elderly individuals aged 65–70 years and observed that a negative self-perception of aging was associated with debility in the following three years, even after adjustment for chronic medical conditions, depression, living arrangements, and socioeconomic status. Some studies have even observed that such individuals live longer. Levy and others observed that, among 660 individuals who were 50 years of age and older and living in a community-based dwelling, those with a favorable self-perception of age lived an average of seven years longer, even after adjustment for age, gender, socioeconomic status, loneliness, and functional status [3]. Admittedly, these studies and others were not consistent in how they assessed perception of age; nonetheless, these observations suggest that further study of patients' own perceptions might provide insight into health outcomes.

Despite trends in national demographics that point to a steadily growing population of elderly patients with cancer and despite the provocative nature of the above observations that were gathered in a non-cancer setting, to our knowledge, few, if any, studies have examined the implications of self-perception of age among patients with malignant disease [4]. Do patients with cancer, who are receiving chemotherapy with all its attendant adverse events, view themselves as older or younger than their actual age? How do these patients rationalize their age perceptions? Are such perceptions associated with increased or decreased symptomatology? Are such perceptions in any way prognostic? The purpose of this exploratory study was to examine the above questions within a single-institution setting. The primary goals were 1) to assess chemotherapy-treated cancer patients' reported self-perceptions of their own age relative to their actual chronological age; 2) to capture qualitatively patients' reasons for their age self-perceptions; 3) to assess whether patients' reported symptomatology and severity of pain was associated with their self-perception of age; and 4) to determine whether such age self-perceptions appear to impact survival. Such information might have clinical and research applicability that would enhance healthcare providers' understanding of the potential impact of cancer patients' age self-perceptions, especially with respect to patients' cancer symptomatology and prognosis.

METHODS

Overview

The Mayo Clinic Institutional Review Board approved this study. Patients were required to provide written consent before participating.

All consecutive adult patients with cancer, who were receiving treatment within the Chemotherapy Unit at the Mayo Clinic in Rochester, Minnesota during the months of August and September of 2010, were eligible to participate regardless of their age. The study team asked the nursing staff to ask all patients to complete a brief questionnaire on their perceptions of their own age. As in the case of most study recruitment for patients with cancer, the nursing staff was allowed some discretion in approaching patients. This was a

pen-and-paper questionnaire, and patients were to sign the consent form, complete the questionnaire, and return both the same day in person.

Questionnaire Content

By design, the questionnaire was brief and derived from a previously-published instrument [5]. The questionnaire included an introduction that read, “These questions assess how you feel about your age. There are no right or wrong answers, just tell us how you feel.” The instrument then went on to ask patients to respond to the following, “Many people feel older or younger than they actually are. What age (in years) do you feel most of the time?” The other item in the instrument read, “Please explain why you answered the above question as you did,” and provided space for write-in comments.

Medical Record Review

Thereafter, members of the research team reviewed the medical records of each patient. This review was performed as a 2-stage process, first to capture relevant baseline demographic and symptom-related data and then, no less than 15 months from questionnaire completion, to capture vital status. Demographics included an assessment of cancer curability, which was defined as a 10% or less chance of patient being alive and cancer free at 5 years and which was determined by the goals outlined by the treating oncologist, as outlined in the medical record, and/or by the clinical judgment of the clinicians on the study team.

Symptom-related data relied on counting the total number of symptoms that patients marked from a 67-item checklist used within our institution’s clinical practice. This checklist included a large list of symptoms, including fevers, unusual bruising, unusual thirst, hoarseness, double vision, coughing, wheezing, hearing loss, light-headedness, loss of appetite, chest pain, diarrhea, blood in stool, blood in urine, sleep difficulty, feeling “sad most of the time,” as well as several others. Furthermore, because of its recognition as the “fifth vital sign,” pain was assessed by means of a patient-reported 0–10 point scale, where 10 denoted especially severe pain. Symptom assessment occurred at the same time of patient-reported perception of age.

Two investigators reviewed all the medical records (ML and ES) with spot check record confirmation by another (AJ).

Statistical Considerations

The primary and secondary goals of this study are outlined above. Although sample size was determined *a priori* to enable the study team to report on the percentage of patients who reported their perceptions of age with a 95% confidence interval of 10%, a sample size of 290 patients also allowed the study team to detect a hazard ratio of 1.4 between patient groups with greater than 80% power and a one-sided 5% significance level. This calculation assumed a median survival of 4 months in the less favorable group, with the latter interval based on prior outcomes in a non-first-line setting from a common cancer type [6].

For quantitative analyses, the statistical package JMP, version 9.0.1 (Cary, North Carolina, USA) was used. Wilcoxon rank sum tests and logistic regression analyses with reported odds ratios were used to examine relationships in the data set. Specifically, a logistic regression model was used to examine the variables of gender, cancer curability, actual patient age, number of patient-reported symptoms, and pain scores to predict associations with patients’ feeling younger than their actual age. Survival data were censored as appropriate, and Kaplan Meier curves were constructed accordingly. A Cox proportional hazards model was used to further assess survival with respect to other relevant variables, which consisted of gender, cancer curability, actual age, number of patient-reported

symptoms, and pain scores. A p-value of < 0.05 was deemed statistically significant in all analyses.

Qualitative data were reviewed by two investigators independently and themes were identified (ES and AJ). These investigators met and discussed discrepancies in theme identification until a consensus was reached; use of an adjudicator was never necessary. Direct quotes from patients are provided to illustrate themes.

RESULTS

Baseline Demographics

A total of 292 patients participated. Baseline demographics appear in Table 1. For the cohort as a whole, the median age was 63 years (range: 85, 26). Cancer types represented within the cohort consisted of hematologic malignancies (n=81), gastrointestinal malignancies (60), breast cancer (52), genitourinary malignancies (49), thoracic cancer (16), and other (34).

One hundred eighty-five (63%) reported that they perceived themselves as younger than their actual chronological age, 45 as older (15%), and 56 (19%) as the same age. In 6 patients, this determination could not be made based on these patients' responses. The mean actual age (standard deviation) among those who perceived themselves as younger, older, or the same age were 63 years (11), 54 (12), and 60 (10); ($p < 0.0001$).

Age Self-Perception and Other Clinical Characteristics

The relationship between self-perception of age (collapsed into younger versus other because of small patient numbers) and gender, cancer curability, actual age, number of symptoms, and pain severity revealed similar conclusions in both univariate and multivariate analyses. Multivariate analyses demonstrated an inverse relationship between self-perceived age and actual age (odds ratio 1.05 with 95% confidence interval of 1.02, 1.07; $p=0.0001$) but no statistically significant associations with gender, cancer curability, number of symptoms, or pain severity (Table 2).

Of note, we had also considered adding depression to our model. However, because only 5 patients (1.7%) reported that they "felt sad most of the time," we did not include this variable in any analyses.

Survival

At the time of this report, 52 deaths had occurred in patients who perceived themselves as younger and 22 in patients who perceived themselves as older or the same as their actual age. The median survival within the groups had not yet been reached (Figure 1).

The only variables directly associated with a better survival were fewer symptoms and the possibility that the cancer was curable. Otherwise, patients' perceptions of age had no prognostic effect (Table 3).

Qualitative Data

Themes that emerged among patients who described feeling younger than their actual age included focusing on positive thinking and staying engaged with life. A second theme that emerged centered on the importance of family. Finally, the theme of maintaining a sense of humor was also noted. Relevant quotes are as follows:

"The old phrase, 'you're not getting older, you're getting better...' when you've been diagnosed with cancer, you must keep telling yourself just that," 76 year-old women with incurable lung cancer, conveying the theme of positive thinking.

"I keep busy all day long," 80 year-old woman with incurable genitourinary cancer, conveying the theme of staying engaged with life.

"I still love to do the things I did when I was 20 -- ride my Harley, drive my Firebird, go boating, fishing, hunting. I love to grill food," 51 year-old man with incurable colorectal cancer, conveying the theme of staying engaged with life.

"We camp in the summer and cross country ski in the winter," 77 year-old woman with incurable breast cancer, conveying the theme of staying engaged with life.

"Have kids and grandkids that I will be here for -- they keep me feeling young," 66 year old woman with incurable genitourinary cancer, conveying the importance of family.

"Because this is the age I stopped having birthdays. I'm 29 every year," 55 year-old woman with an uncategorized incurable malignancy, conveying a sense of humor.

Patients, who perceived themselves as the same age/older, voiced more concern about the precarious nature of cancer and mentioned cancer side effects frequently. Relevant quotes are as follows:

"It's like you have one foot on a banana peel and one foot on edge of cliff, and you're waiting to see which foot does what," 68 year-old woman with an incurable hematologic malignancy, conveying the precarious nature of cancer.

"Without hair, I feel older," 53 year-old woman with a curable breast cancer, mentioning cancer side effects.

"The tired feeling that comes with low blood counts tends to make me feel older," 57 year-old woman with incurable breast cancer, mentioning cancer side effects.

DISCUSSION

This study explored cancer patients' self-perception of age. This study differed from previously published reports in that it focused exclusively on chemotherapy-treated patients with cancer and included younger patients. Interestingly and in contrast to earlier studies that focused on non-cancer patients and that focused exclusively on older individuals, the majority of patients with cancer in this study reported that they perceived themselves as younger than their actual age. In fact, the older the patient, the more likely it was that that person would perceive himself/herself as younger. Such perceptions were associated with qualitative comments that underscored positive thinking and staying engaged in life. However, in searching for objective validation of cancer patients' perception of age – concordance with number of concomitant symptoms, pain severity, and longevity -- this study was unable to demonstrate that self-perception of age is associated with any of these other clinical outcomes. A younger self-perception of age is associated with better functional outcomes and more favorable survival in the studies referenced earlier in this manuscript, but such is not the case in the patients with cancer who participated in this study. We can only speculate on the reasons behind the observations described here. Admittedly, our study may have been somewhat underpowered to detect a survival difference, but, in addition, a strong desire to maintain hope might explain why patients appear so optimistic with respect to their perceived age, even in the setting of numerous cancer symptoms, pain, an incurable malignancy, and a limited life expectancy [7].

The observations reported here are important because they underscore the need to carefully consider the meaning of patient-reported data. A burgeoning literature emphasizes the importance of gathering and acting upon patient-reported data, emphasizing in particular

their robust ability to predict survival [8,9]. In fact, our study also attests to the importance of patient-reported data, as we observed that the number of patient-reported symptoms was a strong predictor of survival. However, not all patient-reported data are clinically relevant, as was also observed in this study: patients' perception of aging was not associated with any other clinical measure or outcome. Thus, this study points to the need to scrutinize categories of patient-reported data and to validate such data prior to using them in clinical decision making. Clearly, the results of the current study demonstrate that if an older patient states that he feels younger than his actual age, discussions of prognosis and decisions on chemotherapy dosing should not be modified based on that patient's report.

Finally, this study has limitations. First, this study design was single institution, partially retrospective, and exploratory in nature. Hence, the findings reported here require further study in other clinical settings. Second, the study population was quite heterogenous, including patients with various cancer types and a variety of cancer treatments. Although we were able to detect survival differences based on symptomology, this heterogeneity may have impaired our ability to detect survival differences based on perception of age. Third, the study team was very specific in looking only at number of symptoms, pain severity, and survival in seeking validation of self-perceptions of aging. We did not look at other factors such as socio-economic status, race, other psychosocial parameters such as loneliness, or duration of ongoing cancer treatment to assess associations with self-perception of aging. It appeared important to focus the study in this manner in part because of sample size. However, the neutral negative results reported here should not be interpreted to mean that self-perception of age among patients with cancer does not have any clinical relevance whatsoever. Further study of whether self-perception of age is associated with a variety of other clinical variables may merit further study.

In summary, although self-perception of age is associated with a variety of clinical outcomes in other individuals, our findings suggest that such is not the case in patients with cancer. Interestingly, the majority of patients with cancer in this study viewed themselves as younger than their actual age -- and this observation was particularly salient among chronologically older patients. However, this study suggests that this patient-reported information should not be used in clinical decision-making.

Acknowledgments

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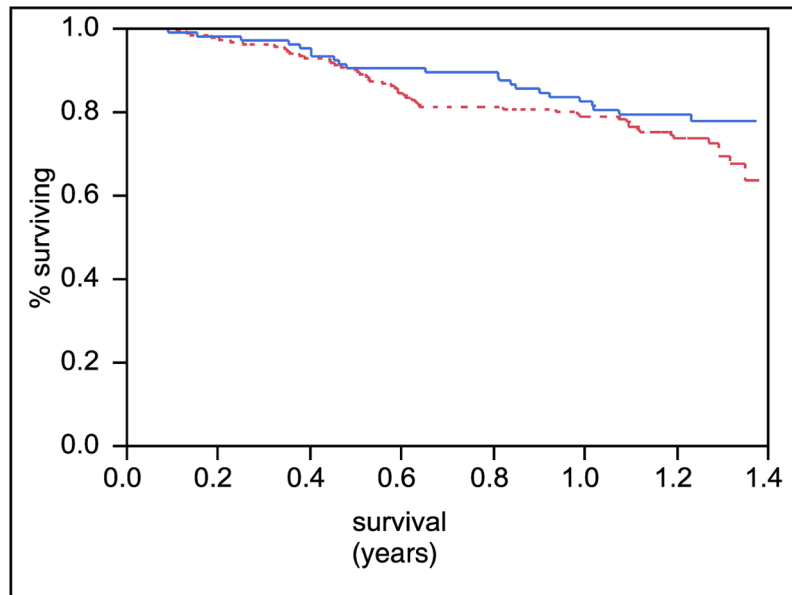


Figure 1. Survival Based on Age Perception

The median survival for any group as defined by age self-perception had not yet been reached, but no statistically significant difference in survival was detected between patients who perceive themselves to be younger (solid line) versus older/same ($p=0.20$).

Table 1

Baseline Demographics

	AGE PERCEPTION (%) [*]		
	YOUNGER (n=185)	OLDER (n=45)	SAME (n=56)
Mean age, in years (standard deviation)	63 (11)	54 (12)	60 (10)
Sex			
Male	74 (40)	17 (38)	29 (52)
Female	111 (60)	28 (62)	27 (48)
Cancer curable?			
Yes	129 (70)	13 (29)	20 (36)
No	55 (30)	32 (71)	36 (64)
Not sure	1	0	0
Median number of symptoms (range)	2 (0, 22)	5 (0, 26)	1 (0, 26)
Median pain score (range)	2 (0, 8)	2 (0, 9)	2 (0, 8)

* Numbers in parentheses denote percentages within each cohort unless otherwise specified in that row.

Table 2

Logistic Models for Predicting Younger Age Self-Perception

	UNIVARIATE ANALYSES		MULTIVARIATE ANALYSES	
	ODDS RATIO (95% confidence interval)	P-VALUE	ODDS RATIO (95% confidence interval)	P-VALUE
Sex (male versus female)	0.73 (0.45, 1.18)	0.20	0.65 (0.4, 1.1)	0.097
Cancer Curable? (yes versus no)	0.91 (0.54, 1.52)	0.13	0.93 (0.5, 1.6)	0.80
Actual Age	1.04 (1.02, 1.07)	0.0001	1.05 (1.02, 1.07)	0.0001
Number of symptoms	0.98 (0.94, 1.02)	0.35	0.97 (0.93, 1.02)	0.28
Pain score	0.94 (0.84, 1.05)	0.27	0.96 (0.85, 1.08)	0.51

Table 3

Univariate and Multivariate Survival Analyses

Variable	N	1-Year Survival % (95% CI)*	log-rank p-value	Cox Univariate Hazard Ratio (95% CI)	Cox Univariate Score p-value	Cox Multivariate Hazard Ratio (95% CI)	Cox Multivariate Likelihood Ratio p- value (n=290)
Younger?			0.20		0.20		0.45
No	107	83 (75, 90)		--		--	
Yes	185	79 (73, 85)		1.38 (0.84, 2.28)		1.23 (0.71, 2.15)	
Curable?			<0.0001		<0.0001		<0.0001
No	203	73 (66, 79)		--		--	
Yes	89	98 (95, 100)		0.14 (0.06, 0.35)		0.09 (0.03, 0.28)	
Gender			0.27		0.27		0.90
Women	167	82 (76, 88)		--		--	
Men	125	78 (70, 85)		1.29 (0.82, 2.04)		0.97 (0.60, 1.56)	
Actual Age	292	80 (76, 85)	Not applicable	1.03 (1.01, 1.05)	0.01	1.02 (0.99, 1.04)	0.10
Number of Symptoms	292	80 (76, 85)	Not applicable	1.045 (1.01, 1.09)	0.02	1.06 (1.02, 1.10)	0.01
Pain Score	292	80 (76, 85)	Not applicable	1.01 (0.90, 1.13)	0.88	1.01 (0.90, 1.13)	0.88

* CI= confidence interval.