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Elderly cancer survivorship: An integrative review and conceptual framework

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A B S T R A C T

The intersection of ageing and cancer in the phase of post-treatment survivorship represents a large and growing population with unique needs.

Purpose: The goal of this work is to review and integrate the current gerontology and oncology literature relevant to elderly cancer survivorship, to identify knowledge gaps and research opportunities and to propose a conceptual model to guide future research. The long-term, global goal is the prevention of morbidity and mortality in elderly cancer survivors by identification of vulnerable elders, maintenance of independence, tailoring of treatment, establishing intervention guidelines and planning for necessary resources within the entire trajectory of cancer survival for older survivors.

Methods: Targeted and integrative review of selected literature from multiple disciplines. Search engines included PubMed, article reference lists and internet searches for epidemiological data (US Census, World Health Organization, American Cancer Society, Canadian Cancer Cancer Society, etc).

Results: A conceptual model that incorporates the gerontologic, oncologic and personal characteristics of older cancer survivors is proposed that may provide a comprehensive approach by which to frame elderly survivorship research.

Conclusion: Cancer survivorship among the elderly is quantitatively and qualitatively different from cancer survivorship among other age groups. The current large numbers and predicted increase in elderly cancer survivors in the near future mandate attention to this population. Future research must consider the complexity of intersecting needs in the gero-oncology population.

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Introduction

With improvements in early cancer detection, novel and expanding treatment options and the growing elder population, the number of cancer survivors is burgeoning. Worldwide, over 25 million people (13.8 million in the US, 2 million in the United Kingdom, 695 049 in Canada and 654 977 in Australia) are living with a history of cancer (Australian Institute of Health and Welfare, 2008; Canadian Cancer Society, 2009; National Cancer Survivorship Initiative, 2008; Mariotto et al., 2010). Cancer is generally diagnosed in those greater than 65 years of age and over 58% of the projected 13.8 million *survivors* in 2010 in the US are greater than 65 (Mariotto et al., 2010). Research has demonstrated that among cancer survivors of all ages, the majority enjoy a quality of life comparable to population norms however an estimated 20% of survivors often sustain treatment- or disease-related health problems that persist for many years (Ashing-Giwa et al., 1999; Casso et al., 2004; Deimling et al., 2005; Ganz et al., 2002; Mols et al., 2005; Sapp et al., 2003; Tomich and Helgeson, 2002; Trentham-Dietz et al., 2003; Wenzel et al., 2002). Potential long-term and late effects of cancer include symptoms (neuropathies, fatigue, pain, cardiovascular compromise, lymphedema, depression, and sexual dysfunction), cognitive and functional decline, secondary malignancy, and cancer recurrence. Adding the normal physical and psychosocial changes associated with ageing to these cancer sequelae may compound the problems and potential disability inherent in elderly cancer survivorship (Boyle, 2006; Costanzo et al., 2009; Maccormick, 2006; Mao et al., 2007; Stein et al., 2008).

Paradoxical to the disproportionate prevalence of cancer among the elderly, a charge of pervasive and often invisible ageism has been made that results in age-based disparities in care including limited treatment options, fewer referrals to specialists, poor representation

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in clinical trials, and the under-treatment of symptoms in the elderly (Hurria et al., 2006; Kagan, 2008; Miller, 1999). Basic epidemiological and descriptive data which examines the intersection of ageing and cancer survivorship while limited, is emerging in the growing field of survivorship research (Aziz, 2007; Bellizzi et al., 2008a; Bellizzi et al., 2008b; Clough-Gorr et al., 2008; Keating et al., 2005; Litchman et al., 2007; Stava et al., 2007). Studies specific to older cancer survivors have generally indicated that functional needs persist for years post-diagnosis, that long-term survivors have poorer health, poorer quality of life, and poorer functional status, more comorbidities, disability, frailty, and geriatric syndromes than the noncancer population, and that a cancer diagnosis doubles the chance of poor health (Avis and Deimling, 2008; Extermann and Hurria, 2007; Hewitt et al., 2003; Mohile et al., 2009; Schootman et al., 2009a). Recent and increasing interest in the cancer-ageing interface has been demonstrated by multiple initiatives which are predominantly *treatment* oriented (Table 1). Those same initiatives have identified elderly survivorship as a priority area for future research.

Gero-oncology

Kagan (2004) suggested that current research perspectives approach ageing and cancer as either distinct or inseparable. The first view inserts chronologic age as a separate variable and findings are reported by age without considering the complexity of ageing issues. The second view considers ageing and cancer redundant and minimizes differences attributable to age. Both perspectives fail to consider the "complexity and chronicity" of the gero-oncology paradigm (p. 293). Kagan suggested the term "gero-oncology" as a label for the cancer and ageing interface that is essentially interdisciplinary, relevant to older adults, and comprehensive in scope.

Survivorship has been defined by multiple organizations. In 1985 the National Coalition of Cancer Survivors (NCCS) proposed a definition of cancer survivorship stating that "from the time of diagnosis and for the balance of life, a person diagnosed with cancer is a survivor". That definition has since been expanded to include caregivers as survivors as well. Feuerstein (2007) proposed a working definition of survivorship to guide the newly established *Journal of Cancer Survivorship*: from the completion of primary treatment up to end-of-life care.

Therefore gero-oncology survivorship refers to the post-treatment, comprehensive, interdisciplinary care and research of older survivors of cancer. The nursing profession has historically and consistently embraced the needs of the whole person (Bourbonniere and Kagan, 2004). A holistic description of elderly survivorship, inclusive of both relevant gerontology and oncology domains, is broad and challenging as the following review will demonstrate.

The primary purpose of this paper is to review the current knowledge relative to older cancer survivors, to identify knowledge gaps and to synthesize current knowledge into a holistic conceptual model to guide and focus future research. This was a nonsystematic review due to the breadth of content and much of the search was targeted to specific domains of evidence. We used the PubMed search engine, review of pertinent article reference lists, review articles and personal article collections to access articles. In addition to targeted searches (e.g. nutrition and elderly) the search terms cancer survivor*, cancer, oncology, ageing, older, and elder were used to locate articles specific to older cancer survivors. Only English language articles were reviewed. We will present three major bodies of evidence: 1) gerontologic concerns guided by the domains included in comprehensive geriatric assessment recommendations; 2) oncologic variables relative to the cancer diagnosis (treatment modality, long-term and late effects, and length of survivorship; and 3) personal characteristics both modifiable (smoking, body mass index or BMI, and physical activity) and non-modifiable (age, gender, ethnicity, education, and income). We begin by introducing the research, physical and psychosocial components of gero-oncology.

Cancer and ageing

Research

The greatest risk factor for the development of cancer is advancing age (Litchman et al., 2007; Yancik, 1997). In the US the chance of developing invasive cancers among men increases from a 1 in 6 chance (1 in 10 for women) in the 60–69 age range to a 1 in 3 chance (1 in 4 for women) in the 70 and older age range (ACS, 2008). The ongoing effects of cancer treatment (e.g. fatigue or pain) often mirror declines associated with ageing and may accelerate the ageing process (Cohen, 2006; Garman et al., 2003; Maccormick, 2006; Schmitz et al., 2007). Even at the cellular level there is speculation that ageing and cancer are related (White and Cohen, 2008).

However this predominance of cancer incidence with age is not reflected in cancer research. Much of treatment-related oncology research has focused on younger healthier patients and the underrepresentation of older patients in clinical trials is consistently noted (Balducci, 2000; Ganz et al., 2009; Kagan, 2008; Lewis et al., 2003; Litchman et al., 2007; Muss et al., 2007). Challenging aspects of conducting clinical trials inclusive of older individuals can include diversity within older groups, choice of a meaningful endpoint, patient comprehension of informed consent, need for assistance to travel to trial site and changing attitudes toward disease and ageing compared to younger groups (Balducci, 2000). Cohen (2006) stated that older cancer *survivors* (defined as greater

Table 1
Cancer survivorship initiatives.

Survivorship Initiatives (all ages)	Recent Survivorship Initiatives Specific to Older Survivors
• Office of Cancer Survivorship with in the US National Cancer Institute (1996) • Institute of Medicine report *From Cancer Patient to Cancer Survivor: Lost in Transition* (Hewitt et al., 2005), • National Cancer Survivorship Initiative within the Department of Health in the UK (2008) • Advocacy and support groups: ○ National Coalition for Cancer Survivorship (1986) ○ Lance Armstrong Foundation (1997) ○ ACS Cancer Survivors Network (2007)	• *Cancer* supplement issue (2008) dedicated to cancer and aging research • Institute of Medicine workshop, Cancer in Elderly People (2007) • Joint position paper between the Oncology Nursing Society and the Geriatric Oncology Consortium (2007) • Cancer and Aging Research Group collaboration with the John A. Hartford Foundation, American Society of Clinical Oncology (ASCO) and City of Hope (2007) • ASCO's dedicated geriatric oncology web page and conference tracts • National Comprehensive Cancer Network (NCCN) Senior Adult Oncology Clinical Practice guidelines. • Exploring the Role of Cancer Centers for Integrating Aging and Cancer Research Workshop (2001), National Institute on Aging (NIA) and the National Cancer Institute

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