



Dorothy Fox. *Elephants*. Watercolor, 22" × 30".

*Studies focusing on the medical and psychosocial needs of adolescent and young adult cancer survivors are needed to address their specific needs and challenges.*

## Current Issues in Adolescent and Young Adult Cancer Survivorship

Hatem Soliman, MD, and Samuel V. Agresta, MD, MPH & TM

**Background:** Overall, the survival rate for cancer patients has continued to improve over the past several decades. However, those aged 15 to 29 years have not experienced the same improvements in survival. This review explores some of the challenges faced by adolescent and young adult (AYA) cancer patients and their survivorship needs.

**Methods:** Using the OVID Medline database from 1966 to present, a variety of search terms including "adolescent," "young adult," and "cancer survivorship" were entered. Articles related to those obtained by the search were also collected. Additional data were obtained from the SEER database AYA monograph, the Childhood Cancer Survivorship Study, the Report of the Adolescent and Young Adult Oncology Progress Review Group, and the Long-Term Follow-Up Recommendations of the Children's Oncology Group.

**Results:** Cancer patients in this age-group are at increased risk for second malignancies, cardiotoxicity, and reproductive difficulties. Few data exist concerning intellectual and other psychosocial issues for this specific patient population.

**Conclusions:** More research is needed to develop accurate data on treatment and survivorship for AYA patients. A separate cancer discipline focusing on improving outcomes in treatment and survivorship among AYA patients should be developed in major academic cancer centers.

### Introduction

Cure rates in pediatric cancer patients have increased from approximately 30% in the 1950s to over 75% in the 1990s. However, cancer patients aged 15 to 29 years have not fared as well.<sup>1,2</sup> Adolescents and young

adults (AYAs) have a lower survival rate compared to their younger counterparts due to several factors: a lack of specialized care guidelines, differences in the nature of their malignancies, and a relative lack of cancer treatment research.<sup>3,4</sup> This also extends into the realm of cancer survivorship for this population. There is insufficient long-term non-cancer care and follow-up available for AYA survivors.

*From the Sarcoma Program at the H. Lee Moffitt Cancer Center & Research Institute, Tampa, Florida.*

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*Address correspondence to Hatem Soliman, MD, Sarcoma Program, H. Lee Moffitt Cancer Center & Research Institute, 12902 Magnolia Drive, Tampa, FL 33612. E-mail: batem.soliman@moffitt.org*

*Abbreviations used in this paper:* AYAs = adolescents and young adults.

### Epidemiology

Cancer occurring between the ages of 15 and 29 years is 2.7 times more common than cancer occurring dur-

ing the first 15 years of life.<sup>5</sup> However, the absolute number of malignancies in this age-group accounts for just 2% of all invasive cancers in the United States.

Cancer subtypes in AYAs differ in their distribution compared with other age-groups. The following subtypes comprise 95% of cancers in the AYA age-group: Hodgkin's lymphoma, melanoma, testis cancer, female genital tract malignancies, thyroid cancer, soft tissue sarcomas, non-Hodgkin's lymphoma, leukemia, brain and spinal cord tumors, breast cancer, bone sarcomas, and non-gonadal germ cell tumors (Fig 1).<sup>6</sup> The frequency of distribution of cancer subtypes, the nature of treatment, and survivorship needs shift dramatically from age 15 to age 30. This changing spectrum of needs across this age distribution poses a challenge in the optimal allocation of attention and resources.

Since the 1970s, the diagnosis of cancer in 15- to 29-year-olds has carried a more favorable prognosis, on average, compared with cancer diagnosed at other ages. There has been little recent progress in improving

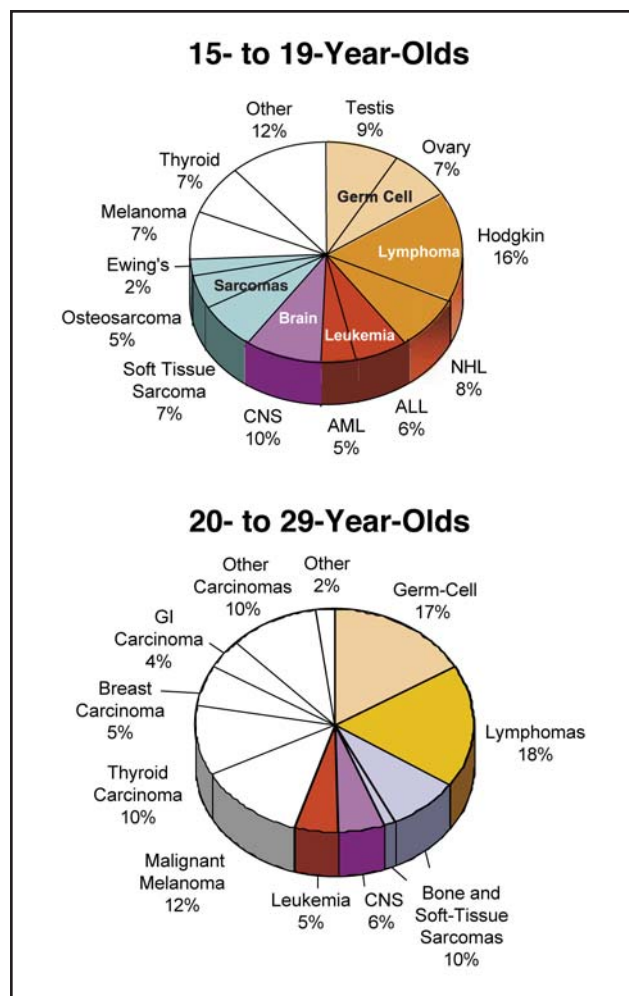


Fig 1. — SEER data, 1975-2001. Segments in color represent “pediatric malignancies.” From Bleyer A, O’Leary M, Barr R, et al, eds. *Cancer Epidemiology in Older Adolescents and Young Adults 15 to 29 Years of Age, Including SEER Incidence and Survival: 1975-2000*. National Cancer Institute. NIH Pub. No. 06-5767. Bethesda, Md; 2006. Fig 15.5.

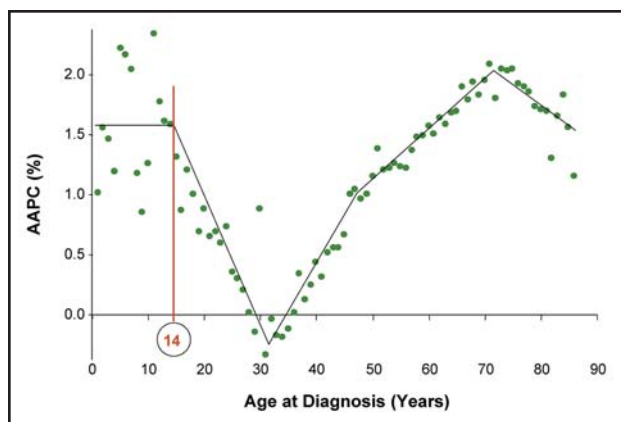


Fig 2. — SEER data. Average annual percentage change (AAPC) in relative survival for all invasive cancers. From Bleyer A, O’Leary M, Barr R, et al, eds. *Cancer Epidemiology in Older Adolescents and Young Adults 15 to 29 Years of Age, Including SEER Incidence and Survival: 1975-2000*. National Cancer Institute. NIH Pub. No. 06-5767. Bethesda, Md; 2006. Fig 15.8.

survival among older AYAs. Survival improvement trends demonstrate that survival is improving by a smaller percentage each year among patients aged 20 to 45 years compared with younger or older age-groups (Fig 2). This difference in survival is increasing with longer follow-up of survivors. Among 15- to 29-year-olds, non-Hispanic Caucasians have achieved the best survival. African Americans fare the worst, with a 20% lower 5-year survival rate compared with that of Caucasians. Asians/Pacific Islanders have the second-best survival, followed by Hispanics and American Indians/Alaska Natives. Several racial disparities in outcomes are pervasive across the age spectrum since many of the socioeconomic factors that affect older adult survivors also affect this age-group. These statistics raise the issue that before significant inroads can be made in AYA survivorship, a better understanding is needed regarding the relevant tumor biology and required optimal treatments.

### Medical Issues Facing AYA Cancer Survivors

Cancer treatment for AYA patients typically involves the combination of chemotherapy, surgery, and radiation for a period 1 to 2 years. Issues related to both cancer and non-cancer care faced by patients during their treatment can appear insurmountable. Those challenges persist for a significant proportion of patients well after their treatments have ended. Much of the data cited reflects the experience of childhood cancer survivors or older adults, and increasing evidence shows that the long-term effects vary depending on the age of initial diagnosis and treatment. The data presented in this article are not exhaustive and may have some limited applicability to the AYA cancer survivor population. However, this article does provide a framework to discuss and better understand the long-term medical issues faced by AYA cancer survivors.

This section discusses some of the more dominant medical issues that affect AYA survivors: second primary malignancies, cardiotoxicity, infertility, and amputation. Additional information regarding follow-up recommendations for those issues not covered here can be found in the Children's Oncology Group Long-Term Follow-Up Guidelines.<sup>7</sup>

### **Second Primary Malignancies**

The risks of secondary malignancies associated with chemotherapy and radiation are well established. The exact magnitude of this risk is not well characterized in the AYA population due to the lack of studies that focus on this age-group. The latest Surveillance, Epidemiology and End Results (SEER) monograph<sup>8</sup> contains the most authoritative data available in evaluating the risk of second primary malignancies in cancer survivors across all age-groups. Overall, the relative risk in cancer survivors of developing a second primary is 1.14. There is clearly a much higher overall relative risk for second primary cancers (2.37 to 6.13) in patients aged 0 to 39 years compared with those older than 40 years of age (.92 to 1.61). The relatively higher risk in younger cancer survivors is due to multiple factors such as increased intensity of initial treatment in childhood protocols and the longer life expectancies in which second primary cancers can arise in younger patients. Inherited genetic mutations such as Li-Fraumeni syndrome contribute to only a relatively small portion of the secondary malignancies described in the literature.<sup>9,10</sup> However, other unknown genetic factors may be involved that contribute to an individual's predisposition to develop an initial malignancy at a young age and a subsequent secondary malignancy. Another observation is that more than 80% of second primaries occur in a different organ than the primary cancer.

A significant increase has been seen in the incidence of MDS/leukemia in survivors whose malignancies were treated with anthracyclines and topoisomerase II inhibitors. Leone et al<sup>11</sup> reported that 6% of all myeloid leukemias in the GIMEMA archive of adult acute leukemia, including 2,964 patients from 1992 to 1996, are therapy-related. In the GIMEMA archive more than 50% of patients with secondary AML were treated for breast cancer, non-Hodgkin's lymphoma, and Hodgkin's disease. The SEER data in childhood malignancies show approximately a 2-fold higher relative risk of a second primary when radiation is combined with chemotherapy. This supports previous data demonstrating a higher risk of sarcomas and cancers of the thyroid, breast, and lung in involved field radiation for Hodgkin's disease.<sup>12-16</sup>

Women are advised to undergo yearly mammogram screenings at 25 years of age or 8 years after completion of mediastinal radiation treatments, whichever is later.<sup>17</sup> While there are no formal screening recom-

mendations in place for sarcomas, thyroid cancer, or lung cancers, increased vigilance by clinicians for these malignancies is appropriate. This highlights the need for age- and risk-appropriate screening for second malignancies in the AYA survivor group.

### **Cardiotoxicity**

Late cardiac mortality has been described in childhood and adolescent cancer survivors in multiple studies. The cardiotoxicity associated with anthracyclines and anthracenedione antibiotic antineoplastic agents is well described. Toxicities include cardiomyopathy and arrhythmias.<sup>18</sup> Mediastinal radiation increases the risk of premature atherosclerotic disease.<sup>19</sup>

In a study involving 15-year survivors of childhood and adolescent cancer, Green et al<sup>20</sup> found that 25 deaths occurred among more than 260 cases during the study period. Five deaths were due to cardiac toxicity, three of which were due to myocardial infarction. Increased risk was seen in males who had a remission duration of less than 15 years, or were treated with doxorubicin or >30 Gy of mediastinal radiation for Hodgkin's lymphoma. Risk is also increased for cumulative doses of >550 mg/m<sup>2</sup> in patients older than age 18 years and >300 mg/m<sup>2</sup> in those younger than age 18. Additional risk factors such as smoking, drug use, obesity, hyperlipidemia, and other comorbidities contribute to cardiac risk.<sup>21-24</sup>

Long-term follow-up recommendations include yearly physical examination and history, risk modification, avoidance of heavy isometric exercise in higher risk patients, periodic echocardiograms including corrected QTc intervals, and early cardiology referrals for any detected abnormalities. Higher-risk patients are those undergoing mediastinal radiation, receiving over 200 mg/m<sup>2</sup> of doxorubicin and/or those who were over 5 years of age at the time of treatment. They are recommended to get baseline echocardiograms or a multiple-gated acquisition (MUGA) scan every 1 to 2 years thereafter. Higher-risk pregnant survivors should have their cardiac status monitored for peripartum cardiomyopathy. The risk of this complication appears relatively low in women with a history of childhood cancers.<sup>25</sup> For at-risk survivors who cannot undergo repeated cardiac function tests, careful clinical assessment for signs of cardiac dysfunction is warranted, as well as a high index of suspicion for early atherosclerotic disease.

### **Infertility**

As young adults begin to form committed relationships, the ability to procreate represents an important consideration for a significant portion of AYA cancer survivors and their parents. Therefore, clinicians need to understand the risks of infertility or gonadal dysfunction associated with various treatment modalities in order to properly counsel their patients.

Table. — Fertility Preservation Options

|                | Method  | Comments  |
|----------------|---|---|
| <b>Males</b>   | Sperm cryopreservation  | Available, proven, main method used   |
| <b>Females</b> | Zygote cryopreservation/in vitro fertilization                              | Most widely used, requires fertilized eggs, higher success rate                                 |
|                | Oocyte cryopreservation/transplantation                                     | Still in early phases, lower success rates, less available, can be used in single/young females |
|                | Ovarian transposition/radiation field modification                          | Possible in limited radiation field treatments, invasive procedure                              |
|                | Inhibition of ovulation with gonadotropin-releasing hormone (GnRH) agonists | Not proven uniformly effective, may be available to women without other options                 |

**Male Infertility:** The use of chemotherapeutic agents such as alkylators and platinum affect testicular function in a dose-dependent fashion. Cumulative doses of cyclophosphamide at more than 7.5 g/m<sup>2</sup> have been shown to cause a significant degree of azoospermia that can result in prolonged or permanent sterility. In patients with germ cell tumors, a compensated insufficiency in the function of Leydig cells has been observed up to 60 months after chemotherapy with cisplatin. Among these patients, 68% showed elevated follicle-stimulating hormone levels, which reflects a functional insufficiency of the Sertoli cells with impaired spermatogenesis.<sup>26</sup>

Siimes et al<sup>27</sup> studied 109 survivors of childhood malignancies aged 16 to 25 years after receiving various chemotherapies and/or radiation. The probability of normospermia was 50% if both testicular volume and serum follicle-stimulating hormone (FSH) were within normal limits and 0% if they were abnormal. Of the 86 patients over 18 years of age, 16 had evidence of normal testicular function. Of these 16 patients, 8 had normospermia, only 1 of whom was a survivor of acute lymphocytic leukemia. A second study by Siimes et al<sup>28</sup> evaluated 66 male childhood cancer survivors and found a correlation between posttreatment testicular size, serum FSH, and spermatogenesis.

When radiation to the pelvis or brain is used, the risk of infertility increases due to disruption of the pituitary/gonadal axis. Testicular function was studied in 29 men with sarcoma who received adjuvant treatment with doxorubicin, cyclophosphamide, and high-dose methotrexate (with or without radiotherapy). Five of 17 men who received chemotherapy or chemotherapy with radiotherapy to the neck, arm, chest, or leg had normal testicular function. Eight of the remaining 12 men who provided ejaculates were oligospermic or azoospermic; serum FSH measures increased 3-fold and luteinizing hormone levels 2-fold, while testosterone levels were normal. In the 5 men with normal testicular function, FSH levels increased 4-fold during therapy but returned to normal 6 to 21 months after treatment. In men less than 40 years of age, the mean FSH was less than that of men over 40 years of age ( $P=.05$ ), suggesting that recovery from the injury was age-related. By

contrast, all 9 men who received chemotherapy plus radiotherapy to the abdomen or thigh had decreased testicular size, azoospermia, 4-fold increase in FSH levels, and 2-fold increase in luteinizing hormone levels, but testosterone concentration was normal.<sup>29</sup>

**Female Infertility:** Female cancer survivors also experience similar effects on fertility after treatment. Accurate measurement of female infertility rates can be problematic since many studies focus on ovarian failure as an end point. In a study by Chiarelli et al,<sup>30</sup> the percentage of postpubertal women who experienced infertility (defined as inability to conceive after 1 year of unprotected sexual intercourse in this study) after pelvic irradiation at 20 to 35 Gy and at >35 Gy was 22% and 33%, respectively.<sup>30</sup> Fractionated total body irradiation at >15 Gy causes high rates of ovarian failure, and this appears more likely to occur in women over 25 years of age.<sup>31</sup> Chemotherapy also carries significant risks of female reproductive dysfunction. A study by Meirow and Nugent<sup>32</sup> evaluating 168 young women (mean age 29.9 years) undergoing chemotherapy for various malignancies showed ovarian failure rates ranging from 15% to 50%. Alkylators, cisplatin, and plant alkaloids were associated with the highest risk ratios of ovarian failure. The risk of premature ovarian failure increases significantly with older age at onset of treatment because the available reserve of primordial follicles naturally declines with age. Hence, younger women are less likely to suffer complete depletion of their available primordial follicles.

Options for preservation of fertility should be routinely discussed with patients prior to initiating any treatments (Table). For males, sperm banking is the main method for preservation of fertility and should be done prior to the initiation of treatment. Fertility preservation for females is not as straightforward and needs to be customized based on the anticipated treatments. The use of gonadotropin-releasing hormone (GnRH) agonists to halt ovulation is postulated to help protect the follicles from cancer treatments, which often preferentially target actively dividing cells. The clinical data have shown success in some instances and failure in other settings such as bone marrow transplantation.<sup>32</sup> Regardless, this remains an option for

patients who cannot or will not undergo other fertility treatments. Mitigation of radiation effects for women undergoing pelvic irradiation alone can include the use of fields designed to minimize ovarian exposures or ovarian transposition surgery to move the ovaries outside of the anticipated treatment fields.<sup>33</sup> In vitro fertilization using cryopreserved zygotes is the most effective means for assisted fertility in female cancer survivors who have a partner or sperm donor. Newer techniques using oocyte cryopreservation or ovarian tissue reimplantation/transplantation are still in their nascent stages and are not as widely available or as successful. These techniques offer possible options to younger women or those with ethical objections to zygote cryopreservation. Keys to successful preservation of fertility are to mitigate the risks whenever possible and to initiate planning for fertility treatments as soon as possible in order to prevent unnecessary delays in cancer treatment.

### **Amputation**

Significant advances have been made in the use of combined-modality treatment for limb-sparing approaches in extremity sarcomas. While amputation was the only option in the past, many patients are now able to retain their affected limbs. Limb-sparing surgery offers a better cosmetic and functional outcome without compromising survival. However, both short- and long-term sequelae warrant surveillance.<sup>34</sup>

Radiation can increase the risk of subsequent soft tissue sarcomas, cause nerve damage and soft tissue fibrosis, and impair normal skeletal development in younger patients. Contractures, chronic pain, lymphatic dysfunction, infection, and malfunction of prosthetic devices are all possible postoperative effects. Patients requiring amputation might experience phantom pain, difficulties with prosthetic devices, and stump integrity.<sup>35</sup> However, advances in the biomedical engineering field have contributed greatly to improved prosthetic devices that more closely approximate the limb's natural functions. Also, hemipelvectomy women can experience obstetrical complications due to pelvic distortion.<sup>36</sup> Management of these long-term effects requires a multidisciplinary approach to maximize functional ability and address the psychosocial problems that can arise in AYA cancer survivors. Orthopedic surgeons should follow and treat patients who develop skeletal development problems such as limb length discrepancies or endoprosthetic complications. Continued physical and occupational therapy is important to assist survivors with functional limitations. Continued assessment is required as their physical statures or activities change over time. Medical management of chronic pain or infections is also important to improve quality of life in these patients. Finally, psychological counseling can help AYA survivors

deal with body image and self-esteem issues at a time when they are of paramount importance.

### **Psychosocial Survivorship Issues**

Cancer in AYAs is unique in the sense that it complicates the life of a person at an age when their lives are in a state of constant change. Cancer has a profound effect on the lives of cancer patients as well as on their caretakers and families. These effects vary widely from positive life-affirming experiences to difficult tribulations that can cause hopelessness and despair. Numerous factors including the patient's age, personality, faith, education, culture, family, social support, financial means, prognosis, and quality of life shape how AYA cancer survivors react to the many challenges they encounter. Members of the medical team need to play an active role to ensure that cancer patients are given the tools and information needed to help their patients succeed not only while undergoing treatment but also in the long term. Understanding these psychosocial issues can help the health care team anticipate these needs and provide guidance on how to best deal with them.

### **Psychiatric Effects**

Chronic health conditions and life-threatening illnesses such as cancer can make patients and their caretakers susceptible to depression and anxiety. In a study of 226 adult survivors of childhood cancer (mean age, 28 years) seen in a survivor clinic, 29 participants (12.83%) reported suicidal ideations and 11 were diagnosed with major depression.<sup>37</sup> Another study of 450 cancer survivors and 587 of their siblings reported that the frequency of lifetime major depression in survivors (men, 15%; women, 22%) did not appear to differ from that of their siblings (men, 12%; women, 24%) and was similar to those reported in the literature for the general population. The usual correlates of depression (gender, marital status, perception of health) were observed independent of a history of a childhood malignancy. No differences were seen in the reported frequencies of suicide attempts, running away, or psychiatric hospitalizations for either sex.<sup>38</sup> Other studies have shown an increased risk of depression in survivors that is attributed to the chronic sequelae (eg, pain, disfigurement) that affects quality of life. Posttraumatic stress disorder is typically attributed to sudden, violent stressors such as rape or trauma. A study of AYA cancer survivors showed that 16% demonstrated symptoms consistent with posttraumatic stress disorder.<sup>39</sup> This and other studies show that the battle against cancer can inflict emotional damage in the same manner as a physical confrontation can.<sup>40,41</sup>

In general, AYA cancer survivors do not appear to be susceptible to major psychiatric illnesses solely on the basis of their prior cancer diagnosis.<sup>42</sup> Rather, this susceptibility needs to be assessed regularly and treat-

ed appropriately by clinicians. This is especially true in AYA cancer survivors who may have chronic medical issues or difficulty attaining certain life goals such as those discussed below.

### **Education and Social Functioning**

AYA cancer survivors inherently suffer setbacks in their educational and social goals. Studies on the social adjustment of younger cancer patients and how they perform after returning to school may provide some insights into the functioning of older AYA patients still pursuing an education. Standardized assessment tools have shown that youths with acute lymphocytic leukemia are at risk for some behavioral adjustment problems, particularly anxiety, somatization, adaptability, attention, and withdrawal. One study noted that cognitive and academic abilities are linked to how well-adjusted the children are following treatment.<sup>43,44</sup> Another study reported that children between the ages of 8 and 18 years who had shown considerable problems in schoolwork 1 year after diagnosis were more at risk for behavioral problems in the future.<sup>45</sup>

Another issue is whether a patient has received intrathecal chemotherapy and/or cranial irradiation. A total of 110 survivors of childhood acute lymphocytic leukemia (mean age, 20.8 years) treated on the Cancer and Leukemia Group B (CALGB) 7611 study were analyzed. Survivors who had received cranial radiation with intrathecal methotrexate had significantly poorer academic achievement ( $P=.0001$ ), poorer self-images with regard to their bodies ( $P=.001$ ), and greater psychologic distress ( $P=.005$ ).<sup>46</sup> Many of these patients are older adolescents at the time of treatment, and these problems may further impair their progress in higher education and careers. These findings have implications for the provision of support to AYA cancer patients, their families, and their teachers who may help to prevent later problems in adjustment. Effort should be made to allow them to interact with other AYA patients going through similar experiences if they so desire. The availability of peer group support was emphasized as a top priority in a survey of AYA patients who ranked the importance of various aspects of their cancer experience.<sup>47</sup> The use of Internet support groups and forums dedicated to AYA cancer patients can help them navigate this challenge.

A review of the Childhood Cancer Survivor Study (CCSS) data showed that cancer survivors were less likely to marry compared with the general population, but once married they were less likely to divorce. While a cancer diagnosis does not play a major role in their decisions to start or end a serious relationship, it may cause hesitancy to procreate out of fear of conferring their cancer risk to their offspring. Overall, it appears that the ability of cancer survivors to engage in successful long-term relationships is associated to their

current overall well-being rather than to a reluctance to commit due to uncertainty about their future.<sup>48,49</sup>

### **Financial Concerns**

AYAs represent a particularly vulnerable segment of the population with regard to the financial ramifications of a cancer diagnosis. AYA patients, especially the young adult segment, are more likely than adult patients to be uninsured, or they may be in a state of transition between their parents' insurance coverage and their own. It can be a challenge for young cancer survivors to find health insurance as they are typically considered high-risk candidates. In interviews with 227 childhood cancer survivors, 11% reported some form of employment-related discrimination, a level significantly lower than that of prior reports. Company-offered health insurance was provided to 92.4% of full-time and 90.0% of part-time employed respondents. Life insurance was purchased by 60% of full-time employed men and 55% of women. These percentages are lower than those reported for the general US population. Among those who were able to obtain life insurance, 24% had difficulty obtaining it.<sup>50</sup>

Analysis of the CCSS data regarding the ability to obtain health insurance demonstrated that survivors were less likely than their siblings to be insured, albeit by a small margin.<sup>51</sup> At study entry, 83.9% of adult survivors, compared with 88.3% of siblings, had health insurance coverage ( $P<.01$ ). Six years later, a small but significant survivor/sibling difference remained (88% vs 91%;  $P<.01$ ). Twenty-nine percent of survivors reported having had difficulties obtaining coverage compared with only 3% of siblings ( $P<.01$ ).<sup>51</sup> These data have limited relevance to individuals who are diagnosed and initiate treatment as young adults. Obtaining insurance is more difficult for those whose cancer diagnosis was more recent because of their potentially higher risk of recurrence. They may not be able to absorb the high costs of treatment since many are transitioning off their parents' health insurance and may not have adequate student health or work insurance in place at the time of diagnosis. Young adults who are the primary wage earners in a family without adequate disability coverage face the prospect of bankruptcy due to medical costs and lost income. Thus, a prior diagnosis of childhood cancer several years in the past causes some financial hardships, and a current cancer diagnosis in young adulthood can result in financial hardship for many patients.

Financial assistance for AYA cancer survivors needs to be integrated into a survivorship plan. Securing sources for health care funding, insurance, debt relief, and disability income for this patient population requires a coordinated effort from social workers to help survivors navigate the maze of paperwork and regulations that they face.

## Conclusions

The relative lack of attention and outreach in the AYA cancer population is evident in the primary literature. Many reports focus on children or older adults with specific malignancies. AYA cancer patients have inferior survival outcomes, and insufficient data are available to accurately characterize the needs of AYA cancer survivors. A concerted effort is needed to increase funding for additional research to improve outcomes in AYA cancer treatment. The development of a separate discipline focusing on the care of the AYA cancer population should be undertaken at comprehensive cancer centers where possible. Establishing a network of like-minded medical professionals at these major centers would serve as a framework with which AYA cancer care can be improved in the regions they serve. Coordination of research, acute care, and survivorship follow-up would be more effective if this age-group received the type of support available at academic comprehensive cancer centers. Survivorship studies focusing on the AYA age-group are needed to answer questions about their medical and psychosocial needs. Addressing these issues is essential to achieving the same progress in the AYA cancer population as has been made in other patient populations. Collaboration by private organizations such as the Lance Armstrong Foundation and the National Cancer Institute's AYA Oncology Progress Report Group has generated much-needed advocacy for this population. As more attention is focused on the needs of AYAs coping with cancer, the outlook for providing them with a happy and productive future will improve.

## Disclosures

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