Jensen and coauthors present the first large-scale, population-based report of endocrine late effects among adolescent and young adult (AYA) cancer survivors. Including all Danish cancer survivors diagnosed at ages 15 to 39 years, between 1976 and 2009, the authors identified 32,548 one-year cancer survivors and compared their risk of endocrine diseases with 188,728 cancer-free individuals matched by year of birth and sex. This study demonstrated a 73% higher relative risk of endocrine disease among AYA cancer survivors than the general population. The complications with the highest absolute excess risks were thyroid disease, testicular dysfunction, and diabetes mellitus, with the highest at-risk groups for complications being survivors of leukemia, Hodgkin lymphoma, and brain cancer. An increased incidence of endocrine late effects was noted in those treated at younger ages, presumably related to the diseases with the highest complication rates being more prevalent at younger ages. The authors conclude that these results demonstrate a need for counseling and follow-up to enhance prevention and surveillance for endocrine complications of therapy in AYA survivors.

While the choice to limit the definition of endocrinopathy to one that required contact with a hospital was only mentioned briefly by the authors in the limitations section, it is an important area for discussion with regard to methodology. As conditions such as hypothyroidism and type 2 diabetes mellitus are commonly seen by primary care providers, many additional cases likely were diagnosed outside the hospital setting, and thus the reported prevalence of these late effects in this study is likely to be a significant underestimate of the actual risk. Based on what is known about late effects from the pediatric oncology literature, having AYA cancer survivors present to the hospital with these common and anticipatable late effects, so severe that many required hospitalization, is another indication of the need for surveillance programming.

It is widely recognized that provision of cancer care for AVAs requires understanding and considerations that are distinct from those in children and older adults, and that there is a lack of evidence about late effects specific to this group. High-quality articles are beginning to emerge examining some of the most common and devastating late effects of cancer therapy, including cardiac dysfunction and secondary malignancies, creating a body of evidence to which this article contributes. While there are considerations such as sexuality, oncofertility, and transition that are particularly important to the AYA group, many of the specific late effects noted in the article by Jensen et al, as well as their predisposing factors, including treatment-related risk factors, are analogous to those in the childhood cancer group. A recent *Lancet Diabetes and Endocrinology* series summarized the evidence for the agent- and dose-specific endocrine risks of cancer therapy. Cranial radiotherapy has been demonstrated to predispose to hypothalamic and pituitary dysfunction, explaining the findings by Jensen et al of multiple endocrine risks among brain cancer survivors, most notably a 112-fold relative risk of pituitary hypofunction. Similarly, neck and chest radiotherapy, a mainstay of Hodgkin lymphoma treatment, has been demonstrated to predispose to thyroid dysfunction with an absolute excess risk of 362 per 100,000 person-years noted in the Danish cohort study. While it is important to determine whether AYA cancer survivors are at any additional specific risk of late effects, a lack of strong evidence in this group should not be used to dismiss the need for appropriate surveillance informed by the pediatric literature.
There is a large body of information about surveillance for late effects in pediatric oncology. Reports from large survivor cohorts, such as the Childhood Cancer Survivor Study in the United States and Canada and the British Childhood Cancer Survivor Study, have been distilled into risk-based surveillance guidelines, like those published by the Children's Oncology Group, which are openly available and can be followed by any health practitioner involved in survivorship care. The National Comprehensive Cancer Network is also creating surveillance guidelines for use in adults. The recent formation of the International Late Effects of Childhood Cancer Guideline Harmonization Group, whose aim is to "establish a common vision and integrated strategy for the surveillance of chronic health problems and subsequent cancers in childhood, adolescent, and young adult cancer survivors," may serve to bridge information from the various groups and across the age spectrum. While endocrine-specific surveillance guidelines from this group are not yet available, this work is under way and is likely to serve as the gold standard for AYA survivorship moving forward.

Development of survivorship care programs for AYAs is often deemed impossible because of financial constraints and the need for oncologists to focus on their active oncology practices. Yet, there is growing evidence that viewing these issues with a wider lens proves these concerns unfounded. With regard to the financial issues, a recent study of 5-year melanoma survivors indicated unmet care needs in half of the patients, and an associated economic analysis suggested that survivorship interventions to target those needs would likely reduce overall health costs in addition to meeting the needs of those patients. Given that melanoma survivors were the least affected group with endocrine late effects in the analysis by Jensen et al, the potential to mitigate the severity of late effects with early detection and management through surveillance programs for those at higher risk offers an even greater financial opportunity for health systems.

Many oncology programs delivering care to AYAs provide survivors with individualized survivorship care plans at the end of treatment, to accompany follow-up with their primary care providers. While such plans are a start, many AYA cancer survivors report a preference for survivorship care from specialists with knowledge about their specific risks. Adhering to patient preferences is essential for maximizing accrual and retention of survivors, as it is well described that screening and prevention for late effects is higher among those engaged in long-term follow-up than in those who drop out. Moreover, the issues of importance to AYA cancer survivors must have high priority. There are a few examples of integrative programs that aim to meet the continuing needs and preferences of AYA cancer survivors, an example being the program at the Princess Margaret Cancer Centre in Toronto, Ontario, Canada. This program is coordinated by a clinical nurse specialist in AYA oncology at the center who liaises with the community-based primary health care team, specialists in areas specific to AYA care, and, at the end of treatment, a transdisciplinary survivorship team. Under such a model, provision of surveillance and survivorship services are tailored to the specific treatment-related risks of each patient and are able to meet his or her individual needs as care evolves with research in the field.

Jensen et al provide an excellent, population-based report of endocrine late effects in AYAs following cancer treatment. Given the prevalence of these and other late effects, survivorship care for this group is a critical imperative that must be addressed by health systems. Experience from pediatric oncology can inform the development of these programs, and there are AYA-specific models that are both feasible and demonstrably successful in meeting the considerable needs of this underserved population of cancer survivors.
REFERENCES


