INTRODUCTION

Cancer is a leading cause of death in the United States. Eighty percent of newly diagnosed cancer cases are diagnosed in localized or curative stages, but curative cures are rare.

OBJECTIVE

To estimate the fraction of the population that could potentially be cured for the full spectrum of cancer types at each stage.

METHODS

Data Source

We used a variable-yield cure model for all stages simultaneously for 23 cancers with standard American Joint Committee on Cancer (AJCC) staging at the American cancer society.

Population Survival

Population survival is modeled as a mixture of two populations. The mixture models two states, depending on whether the patient dies or is cured.

Figure 3. Illustration of Mixture-Cure Model Applied to Stage I Gallbladder

Figure 4. Simultaneous Fits of the Model Across All 4 Stages for Gallbladder

The exponential hazard for the long-term survivors (cured) is constrained. We estimate a mixture cure model for all stages simultaneously. Dashed blue line represents the individuals surviving in the “cured” subset of the population. The inserts show the difference in long-term survivor fraction (LTS) for the two subsets.

CONCLUSIONS

A noticeable fraction of long-term cancer survivors were evident at early stages for each of 20 cancer types examined.

Cancer-specific survival fractions were greatly reduced by the time cancer reached metastatic.

Although 5-year survival is not itself long-term survival, differences in 5-year cancer-specific survival are strong predictors of differences in long-term cancer-specific survival in a cancer type.

The observed differences in long-term survivors suggest that early and late stage cancer-specific survival curves do not correlate to true life-table.

This analysis provided statistical evidence in support of the potential for detection of cancer in early stages to result in long-term cancer-specific survival for many stageable cancer types, including ones with no current screening modality.

REFERENCES


Conclusions: The 5-year cancer-specific survival for each early stage and the different cancer-specific survival rates for each of the two subsets were estimated for the population at risk. The mixture cure model for each stage simultaneously for 23 cancers with standard American Joint Committee on Cancer (AJCC) staging at the American cancer society.

The mixture models two states, depending on whether the patient dies or is cured.

The model estimates an overall cure rate for each stage simultaneously for 23 cancers with standard American Joint Committee on Cancer (AJCC) staging at the American cancer society.

The model is fit using a Markov chain Monte Carlo (MCMC) approach to

Rueda OM, Sammut SJ, Seoane JA, et al. The fraction of long-term survivors is constrained to decrease with later stage of cancer. The mixture models two states, depending on whether the patient dies or is cured.

Liver/Portal

Cardiac/Thoracic

Figure 1. Nine Illustrative Cancer Types Selected Long-Term Survivor Fraction by Stage

Figure 2. Standard Metrics and Long-Term Survivor Differences in 5-Year Survival Correlates (0.07) With Long-Term Survivors

We estimate a mixture-cure model for all stages simultaneously. Dashed blue line represents the individuals surviving in the “cured” subset of the population. The inserts show the difference in long-term survivor fraction (LTS) for the two subsets.