Decision analysis can be an extremely useful tool in the approach to cancer in the elderly. Several factors contribute to this: the paucity of direct evidence from randomized trials, comorbidity, and wide variations in functionality and life expectancy. On an individual basis, the respective advantages of various treatment choices need to be estimated precisely enough to support the decision-making process. On a population level, political decisions need to be made, such as screening recommendations. We will address these various points below.

**1. PAUCITY OF DIRECT DATA**

Clinical trials tend to accrue younger and healthier patients than the average population of cancer patients.\(^1,2\) This is due to design constraints, such as toxicity of treatment (e.g. high-dose Ara-C), or requirements for intact organ function (especially for early phase studies). It is unfortunately also due to a lesser propensity of physicians to offer trials to the elderly, despite a similar acceptance rate from the patient.\(^3\)
2. COMORBIDITY

Comorbid diseases can interact with cancer in several ways. They can first interfere with diagnosis, either by favoring incidental finding of early stage tumors, or by masking symptoms from a growing tumor. Certain diseases are associated with an increased incidence of cancer. This is the case for several autoimmune diseases. We describe some of them in a parallel chapter. However, more common diseases, such as diabetes, can increase the incidence of epithelial tumors, usually poorly sensitive to immune regulation, such as colon cancer. Comorbidity can also alter significantly a patient’s life expectancy (Table 1)\(^4\). It can do it independently from the tumor, or altering the prognosis of the tumor itself\(^5\)\(^-\)\(^7\). Finally, comorbidities such as cardiovascular diseases, chronic diarrhea, etc., can force a different treatment choice than the standard treatment. Trials can rarely address comorbidity in detail. Therefore decision analysis models can be very helpful to integrate it in treatment decisions\(^8\)\(^,\)\(^4\).

3. FUNCTIONALITY AND LIFE EXPECTANCY

Functional status (e.g. ECOG PS) has been repeatedly shown to alter the prognosis of cancer and its treatment\(^9\). However, in our experience, most elderly cancer patients do have a good performance status (0 or 1). Geriatric instruments, such as the Activities of Daily Living\(^10\) and the Instrumental Activities of Daily Living\(^11\), can provide additional insight into the functioning of older adults. About 60% of older cancer patients present some dependence in IADLs\(^12\). This is mostly a need for help rather than a full dependence. Nevertheless, geriatric studies have shown that even elderly with a low level of impairment in their function where at higher risk of developing dependence or death over the next 3 years\(^13\). This group of people is increasingly recognized as “vulnerable elderly”, a state between a healthy and a frail elderly. Some studies did show that ADL and IADL add prognostic information when compared to ECOG PS in a multivariate model\(^14\)\(^,\)\(^15\).

4. COST-EFFECTIVENESS

The cost-effectiveness of many interventions is age-dependent. To state the obvious, life expectancy decreases as age advances. Competing causes of mortality will blunt the effect of cancer treatment on overall survival.