Decision making in geriatric oncology
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Introduction
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**Demographic changes**

In Western societies, the population is ageing. In the Netherlands, the proportion of inhabitants aged 75 years and older has increased from 5% in 1990 to 7% in 2012, and will continue to increase rapidly to 14% by 2030 before plateauing at around 15% by 2040.\(^1\)

These changes are caused by two separate demographic developments. First, the post-war baby boom generation - clearly visible as a wave passing through the demographic pyramid (Figure 1) - is soon reaching their seventies. Second, due to medical advances and increased prosperity, the elderly are becoming older. In the course of the past 50 years, life-expectancy has risen by 10 years for women and by 8.5 years for men.\(^1\) Another 5 years will be added in the coming thirty years, meaning that by 2040, the average life-expectancy will be 87.4 years for women and 84.5 years for men.\(^1\)

Ageing is very much an individual process, in the course of which differences in genetic predisposition and life-style will become apparent, intercurrent and chronic diseases will leave their mark and the speed with which physiologic reserves decline will vary from person to person. Essentially, in the course of a life-time an individual will become more and more unique and as a result, the elderly form a highly heterogeneous population.

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\(^1\) Source: Statistics Netherlands (cbs.nl)

*Figure 1: Age structure of the Dutch population in 2012, 2025 and 2040*
Ageing and cancer
As the population ages, many diseases that predominantly affect the elderly will become more prevalent. This also holds true for cancer: in the past 20 years, the number of newly diagnosed cancer patients rose by 67% in the Netherlands, from 57,000 to over 95,000. Although malignant disease can occur at all ages, it disproportionally strikes those aged 75 years and older. While only 7% of Dutch inhabitants currently falls into this age group, 30% of malignancies occur in individuals aged 75 years and older as well as 46% of cancer-related deaths, and these percentages are expected to rise even further over the coming decades. Optimal cancer care for the older patient ideally strikes the golden mean between overtreatment and undertreatment and must be tailored to the individual patient as well as the customary disease-related factors incorporated in treatment guidelines. Cancer specialists are now collaborating with geriatricians to optimize the decision-making process. However, such initiatives are complicated by the lack of elderly-specific data from clinical trials or even observational cohort studies on which to base such decisions.

Aim and outline of this thesis
The aim of this thesis is two-fold: first, to study current treatment practice and decision making in older cancer patients and second, to investigate the potential value of a comprehensive geriatric assessment in this decision-making process.

Part I consists of four cohort studies, focusing on current patterns of care for breast cancer in elderly patients. Chapter 1 is a retrospective analysis of the diagnostic process and treatment in a single centre breast cancer outpatient clinic and compares these to national guidelines. In Chapter 2 the trends in these treatment practices over a six-year period is studied, as well as the impact of the introduction of a multidisciplinary breast cancer team. Chapter 3 examines survival and cause of death in a historical cohort of 187 patients with resectable breast cancer for whom surgery was omitted. Chapter 4 addresses decision making and referral practices for elderly patients residing in nursing homes who are suspected of breast cancer. As Chapter 5 demonstrates, accrual of elderly patients in clinical trials is not straight-forward, emphasizing the value of observational studies in understanding and optimizing cancer treatment for these patients.

In Part II, current treatment practices for older patients with two other cancer types are studied. Chapter 6 compares treatment choices and outcome for older colon cancer patients with their younger counterparts. Iron-deficiency anaemia can be a first sign of colon cancer, and in Chapter 7, we assessed diagnostic decision making and clinical outcome for a cohort of 112 patients with this condition. Chapter 8 addresses age-related differences in the treatment of head and neck cancer, and the consequences of guideline discordance for cancer-specific survival.
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Part III focuses on the potential value of the comprehensive geriatric assessment (CGA) in decision making for older cancer patients. In Chapter 9, the value of CGA for patient care and prognostication is studied in a cohort of elderly cancer patients acutely admitted to hospital. Chapter 10 addresses the ability of a CGA to predict toxicity and survival in patients undergoing chemotherapy for metastatic breast cancer. This issue is addressed further in a systematic review in Chapter 11, focusing on the value of geriatric assessments in predicting treatment tolerance and prognosis in older cancer patients. As a CGA is a time-consuming process, Chapter 12 addresses the value of frailty screening tools for selecting patients likely to benefit from further geriatric assessment.

Finally, Part IV contains a summary of the main findings of this thesis, and a discussion of the potential consequences of these finding for clinical practice and future research.

References
1. www.cbs.nl
2. www.cijfersoverkanker.nl