Cancer and Aging

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Disposition

Epidemiological considerations
- Definition “Elderly”
- The aging population/ Life expectancy
- Cancer incidence/ prevalence of the “Elderly”
- Cancer mortality of the “Elderly”

Cancer treatment

Post-treatment health /Survivorship

Conclusion
Definition of “Elderly”

Varying and changing with life expectancy:
- 65+
- 70+
- 75+
- 80+

Has to be defined for each project.
EPIDEMIIOLOGY
Elderly population increasing from 17% now till 30% in 2050, total number diminishes 3%
Projected aging of the U.S. population

"By 2030, 1 in 5 Americans will be aged ≥65 years"

Yancik, Cancer (1997):1273
### Achieved Age

<table>
<thead>
<tr>
<th>Total</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achieved age 65</td>
<td>82,6</td>
<td>85,8</td>
</tr>
</tbody>
</table>

### Education

<table>
<thead>
<tr>
<th>Education</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤9 years</td>
<td>74,5</td>
<td>80,6</td>
</tr>
<tr>
<td>10-13 years</td>
<td>78,4</td>
<td>83,6</td>
</tr>
<tr>
<td>University</td>
<td>81,8</td>
<td>85,8</td>
</tr>
</tbody>
</table>
Cancer Incidence and Cancer Mortality: Age relation

<table>
<thead>
<tr>
<th>Age</th>
<th>Number of cases / 100 000</th>
<th>Incidence</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;65</td>
<td>223</td>
<td>(x~10)</td>
<td>68</td>
</tr>
<tr>
<td>≥65</td>
<td>2196</td>
<td>(x~16)</td>
<td>1128</td>
</tr>
</tbody>
</table>

Cancer is a typical disease of the "Elderly"
Increased cancer mortality in the "Elderly"

Yancik, SemOncol 2004, 31:128
# Estimated Cancer Prevalence per January 1, 2012 (US data)

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;60 yr</td>
<td>24%</td>
<td>34%</td>
</tr>
<tr>
<td>60-69</td>
<td>26%</td>
<td>25%</td>
</tr>
<tr>
<td>70-79</td>
<td>29%</td>
<td>22%</td>
</tr>
<tr>
<td>80+</td>
<td>21%</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td>42%</td>
</tr>
</tbody>
</table>

Ca Cancer J Clin 2012, in press
Number of cancer survivors aged >65 years (SEER 2007)

Alive >5 years: 4.4 mill

Alive >10 years: 2.8 mill

Ca Cancer J Clin 2012, in press
Typical Malignancies of the elderly population

Median age at diagnosis (USA)

All sites: 66 years

Colorectal
Lung
Pancreas \(\geq 70\) years
Bladder
CML

Ca Cancer J Clin 2012, in press
Some hypotheses
and
clinically relevant observations
Interaction between Aging and Carcinogenesis

Genetic: Instability
Inactivation of suppressor genes
Activation of oncogenes
Decrease capacity of DNA repair

Environmental: Long-lasting carcinogenic exposure

Immunological: Immune senescence
(Decreased T-B lymphocytic activity)

Metabolic: Changed endocrine activity
Changed BMI / Body composition
## Cancers in older patients may behave differently from those in younger ones

<table>
<thead>
<tr>
<th>Cancer</th>
<th>Clinical behavior in the Aged</th>
<th>Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>AML</td>
<td>More resistant to treatment</td>
<td>Increased prevalence of unfavorable genomic changes and of resistance to chemotherapy</td>
</tr>
<tr>
<td>Non-Hodgkin's lymphoma</td>
<td>Age is a poor prognostic factor</td>
<td>Increased circulating concentrations of interleukin-6 and increased risk of undertreatment</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>More indolent</td>
<td>Increased prevalence of hormone receptor rich tumors. Endocrine senescence</td>
</tr>
<tr>
<td>Ovarian cancer</td>
<td>More lethal</td>
<td>Unknown</td>
</tr>
<tr>
<td>Malignant brain tumors</td>
<td>More lethal</td>
<td>Increased prevalence of unfavorable genomic changes</td>
</tr>
</tbody>
</table>

Treatment of elderly cancer patients

→ An increasing challenge
Undertreatment of cancer in the elderly population

- The big problem with impact on Mortality and Morbidity
- In spite of several years life expectancy, even in those ≥70 years old
- Lack of treatment and survival data in the Fit versus Vulnerable versus Frail elderly population
Cancer treatment and survivorship statistics, 2012
Localized prostate Cancer (US data)

Observation
Breast cancer treatment and survival in women aged 80+

Disease specific survival in patients undergoing hormonal therapy alone versus hormonal therapy with additional treatment modalities (i.e. surgery, or a combination of surgery and radiotherapy)

Local regional recurrence in patients treated with surgery alone versus surgery and radiation

Even in the very old patients more intensive treatment save lives

The Difficult Question: Who should get what type of treatment?

The 6th International Conference on Geriatric Oncology (2001)

FIT Vulnerable Frail

Frailty: “A stage of age-related physiologic vulnerability resulting from reduced homeostatic reserve and reduced capacity of the organism to withstand stress”
Stages of aging using the CGA*

**FIT** (excellent, good)
- No functional impairment
- No significant comorbidities
- No geriatric syndromes

**Vulnerable** (good, fair)
- Dependence in an instrumental activity of daily living but not activities of daily living
- Comorbidities but not severe or life threatening
- No geriatric syndromes other than mild memory disorder or mild depression

**Frail** (poor)
- Dependence in activities of daily living
- 3 or more comorbidities or one life-threatening
- A clinically significant geriatric syndrome

* Comprehensive Geriatric Assessment
CLM in “elderly”: Step 1: Choice of regimen and dose adjustment

Comorbidities

- No
- Yes

RCHOP/CHOP

Mild Cardiopathy
- CEOP or R-CEOP

Severe Cardiopathy
- CVP or R-CVP

Diabetes
- CHO or R-CHO

Neuropathy
- CHP or R-CHP

Step 2: Dosage of chemotherapy

- ADL:
  - 6
  - 5
  - <5

- IADL:
  - 7-8
  - 5-6
  - <5

100%  75%  50%

Spina, The Oncologist(2012)17:838
Post-treatment health /Survivorship
Activities of Daily Living (ADL) in Older Individuals (70+) predict and are associated with post-treatment QoL/Health

**Personal (P-ADL)**
(Body functioning)
Dressing/undressing
washing, bathing,
toilet use, eating

**Instrumental (I-ADL)**
(Daily tasks)
Preparing hot meal¹,
Doing light house work¹,
Taking a bus²,
Paying bills²,
Ability to move outside²

Without help

Limitations slightly more frequent in male and female Cancer Survivors than controls without cancer

More frequent impairment in:
¹Males than females
²Females than males, both in Cancer Survivors and Controls

Grov, Health and Social Care 2010, 18:396
Post-treatment Quality of Life / Health of older cancer survivors, compared to individuals without cancer

Mental health: Mixed results
Social functioning: Reduced
Physical functioning: Reduced
Proportion of elderly cancer survivors vs Controls with mobility limitations and limitations of daily living

More cancer survivors than healthy Controls have mobility and ADL limitations

Stafford Cancer 1997; 80 1973
The Role of Co-morbidity

(A) Comparison of P-ADL and I-ADL problems in older cancer survivors with co-morbidity and controls with co-morbidity

(B) Comparison of P-ADL and I-ADL problems in cancer survivors with and without co-morbidity

Conclusion:
Compared to Controls without co-morbidity (A) or
Cancer survivors without comorbidity (B)
ADL problems are more frequent in
Cancer survivors with comorbidity

Groh, Health and Social Care 2010,18:396
Percentage of elderly women with functional limitations by years since diagnosis:

- Gradual decrease with increasing post-treatment time

**Walk half a mile**

<table>
<thead>
<tr>
<th>Years after cancer</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2</td>
<td>19</td>
</tr>
<tr>
<td>2-&lt;5</td>
<td></td>
</tr>
<tr>
<td>5+</td>
<td></td>
</tr>
</tbody>
</table>

**Go out**

<table>
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<tr>
<th>Years after cancer</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2</td>
<td>2,1</td>
</tr>
<tr>
<td>2-&lt;5</td>
<td></td>
</tr>
<tr>
<td>5+</td>
<td></td>
</tr>
</tbody>
</table>

**Prepare meals**

<table>
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<th>Years after cancer</th>
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<tr>
<td>&lt;2</td>
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</tr>
<tr>
<td>2-&lt;5</td>
<td></td>
</tr>
<tr>
<td>5+</td>
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</table>

Sweeney, JNCI 2006,98:521
Quality of life (SF-36, Standardized Scores) in Cancer survivors without current treatment (N: 10 930) and age-matched Controls (N: 22 072)

All QoL dimensions are reduced, but differences are small

Baker, Cancer 2003, 97:674
The BIG QUESTION:

Can we intervene?

What is the effect?
Change in (A) dietary intake and quality, (B) physical activity, (C) body mass index (BMI), and (D) physical functioning in response to the Reach Out to Enhance Wellness intervention in the immediate- versus delayed-intervention arms over 2 years. (488 patients)

Demark-Wahnefried W et al. JCO 2012;30:2354-2361
CONCLUSIONS

- Aging has a negative impact on incidence, treatment and mortality of cancer
- Elderly cancer survivors are at increased risk to report impaired ADL,
- Co-morbidity and impaired ADL must be taken into account at treatment decisions, but undertreatment has to be avoided.
- At present, limited knowledge available how to reduce these negative influences, but ongoing early research is promising
CONCLUSIONS (cont.)

- Much more research within geriatric oncology is needed
  (survival, survivorship, risk groups, co-morbidity, ADL limitations, Interventions)

- If I were a young oncologist today ........
I would specialize within

GERIATRIC ONCOLOGY
Thank you
Oslo University Hospital HF is owned by the Norwegian Health Region South-east and consists of the previous Aker University Hospital, Rikshospitalet University Hospital, and Ullevål University Hospital. The enterprise delivers specialist health services and also covers the whole country, the health region, or Oslo in various disciplines. Oslo University Hospital HF is the largest University Hospital in Norway and is responsible for a large fraction of the medical research in Norway.
Cancer treatment and survivorship statistics, 2012

CA: A Cancer Journal for Clinicians
pages n/a-n/a, 14 JUN 2012 DOI: 10.3322/caac.21149
≥80% of males dying of prostate or bladder cancer are ≥65 years old (≤70% for leukemia, NHL, pancreas)
≥80% of females dying of bladder and colorectal are ≥65 years old (50% for breast ca)
Undertreatment of cancer – the big problem

With impact on
Mortality
and
Morbidity

In spite of several years life expectancy
Percentage of functional limitations in elderly women: Decrease with increasing time

<table>
<thead>
<tr>
<th>Number of limitations</th>
<th>5-year Cancer Survivors (N: 1068)</th>
<th>Controls (N: 23 501)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>~25%</td>
<td>~20%</td>
</tr>
<tr>
<td>2</td>
<td>~13%</td>
<td>~10%</td>
</tr>
<tr>
<td>3</td>
<td>~8%</td>
<td>~7%</td>
</tr>
</tbody>
</table>

→ Elderly cancer survivors have a 40% increased risk of having more functional limitations than controls

Sweeney, JNCI 2006,98:521
Increasing life expectancy due to decreased risk of death due to frequent age-related diseases:
Cardiac infarction

Deaths due to heart attacks in Norwy, Spain, Greece and France, 1970-2010, Age group 0.64 years, Per 100,000 inhabitants
Source: WHO health For All Database, updated January 2012.