



Provincial Health Services Authority

Palliative radiotherapy near the end of life for brain metastases from lung cancer: a population-based analysis

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Provincial Health Services Authority

Disclosures

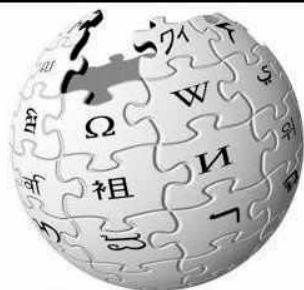
- No conflicts of interest



Learner centered objectives

- Learn basic principles of (brain) radiotherapy
- Understand the prognosis of lung cancer patients with brain metastases
- Discuss how to best select patients for brain radiotherapy

Radiation oncology



WIKIPEDIA

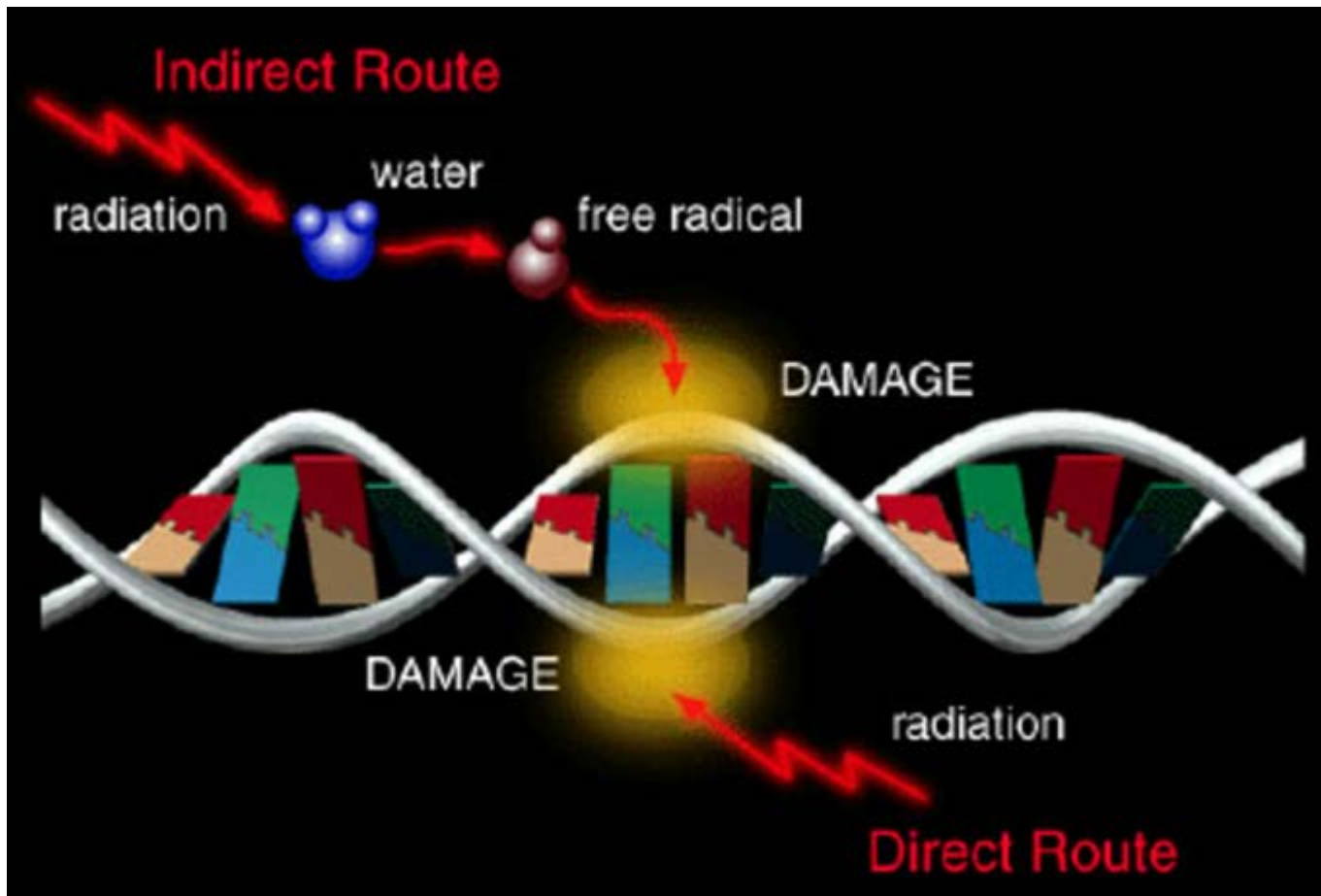
- Therapy using ionizing radiation, generally as part of cancer treatment to control or kill malignant cells and normally delivered by a linear accelerator.

Linear accelerator



<https://www.youtube.com/watch?v=pnAkPexEdk0&feature=youtu.be>

Radiation oncology

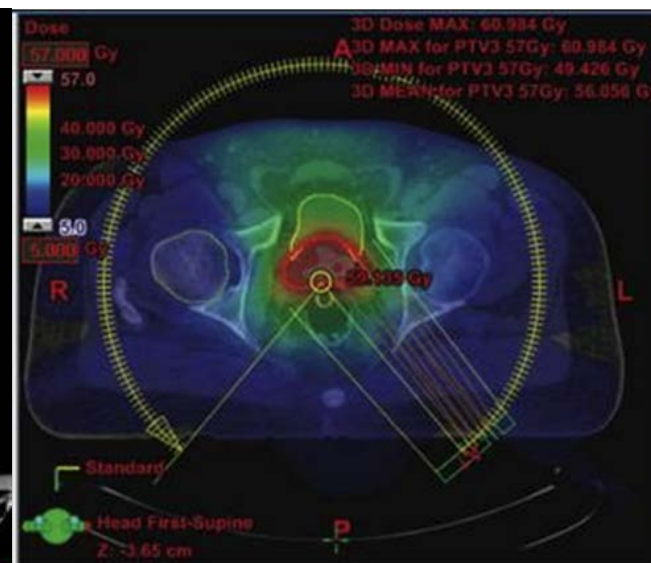
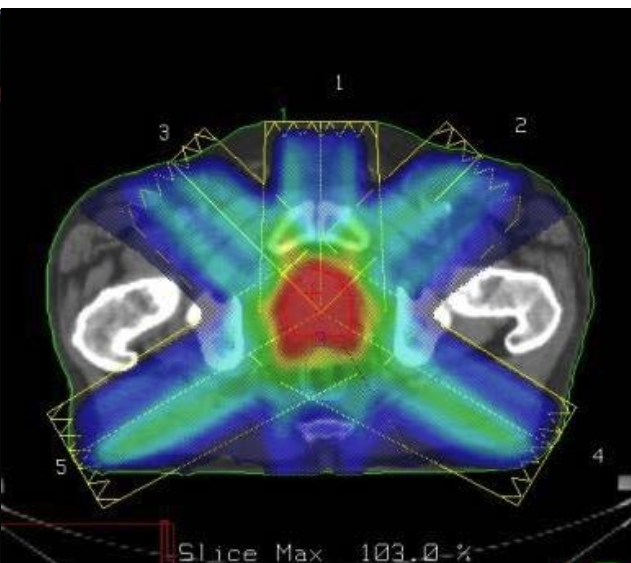
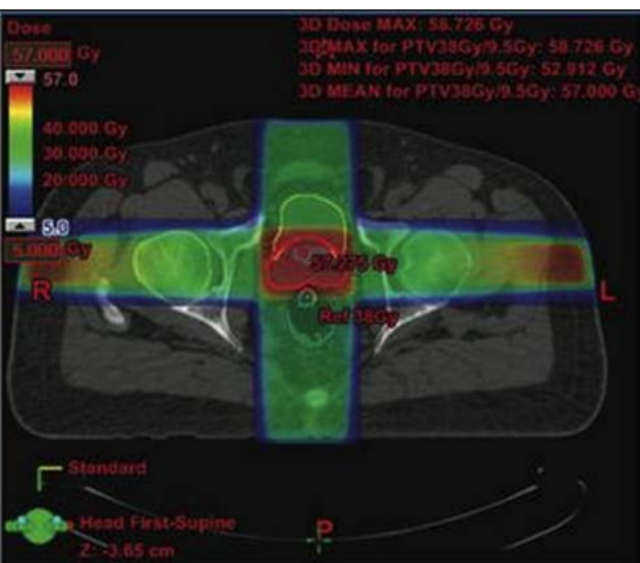


DNA damage

- DNA repair
 - Difference between normal cell and cancer cell
- Fractionation of radiation dose



Radiation (dose) planning



4 field conventional

5 field conventional

Arc Therapy

Radiation effects

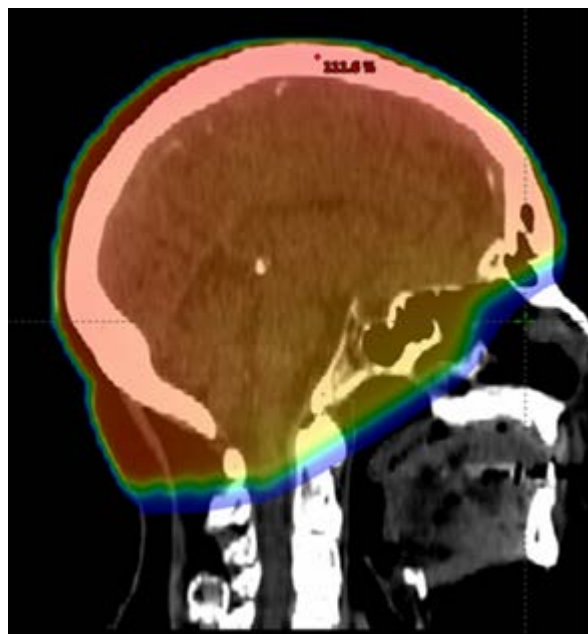
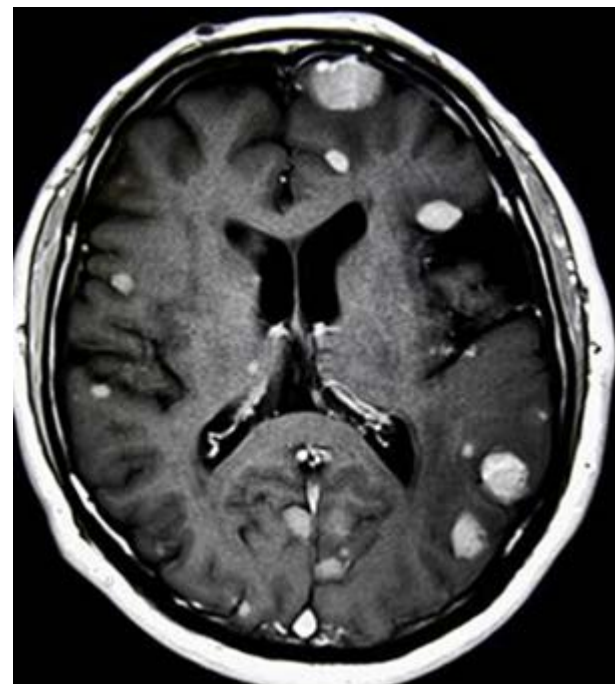


- Local treatment
 - Location
 - Total dose
 - Fraction dose
 - Volume
- Local (side-)effect
 - Tissue sensitive for RT?
 - (Fraction) dose \uparrow = (side-)effect \uparrow
 - Volume \downarrow = side-effect \downarrow



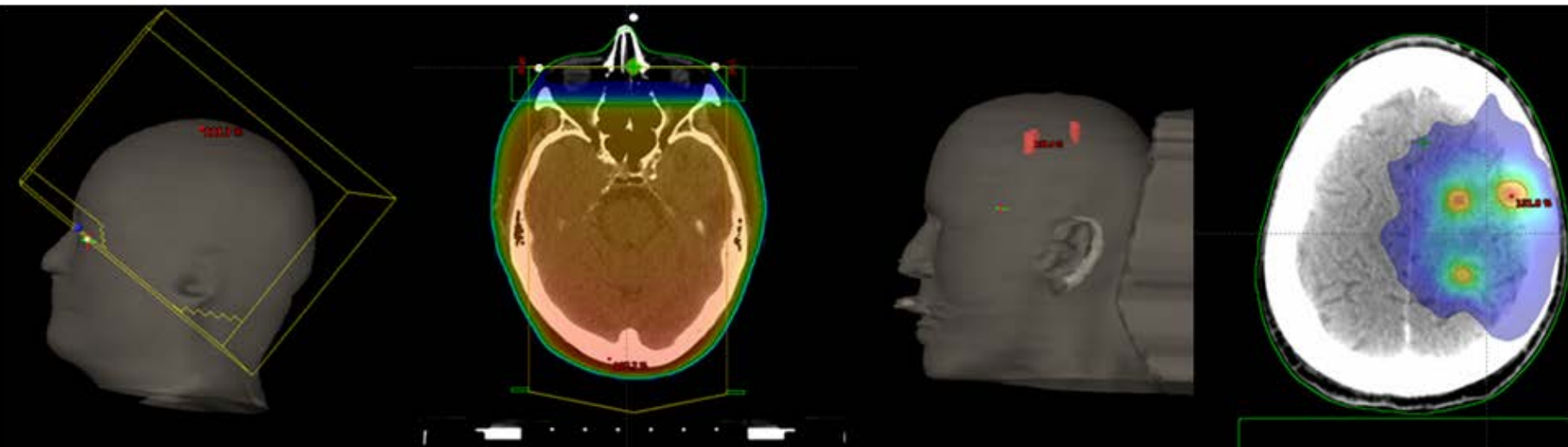
Radiation for brain metastases

- Indications
- Palliative vs. radical
- Whole-brain radiotherapy (WBRT) vs Stereotactic radiation (SRT)



WBRT vs. SRT

- WBRT
 - Palliative treatment
 - Volume = complete skull
 - Also subclinical lesions
 - Toxicity
 - 5-10 fractions
- SRT
 - Radical treatment
 - Volume = metastasis
 - Only treated lesions
 - Less toxicity
 - 1-3 fractions



Brain metastases in lung cancer

- 10% at time of diagnosis
- Large proportion of brain mets = lung primary
- Median survival 2.5-4.5 months
- Treatment impacts quality of life
- No difference WBRT vs optimal care
- SRT safe option for selected patients
- Pt selection is important

Getting back on topic



Goals

- Identify patients that died within 4 weeks and 90 days of start of radiotherapy
- Identify factors that predict which patients will not benefit from radiotherapy for brain metastases

Methods

- Database
 - Patient characteristics
 - Treatment characteristics

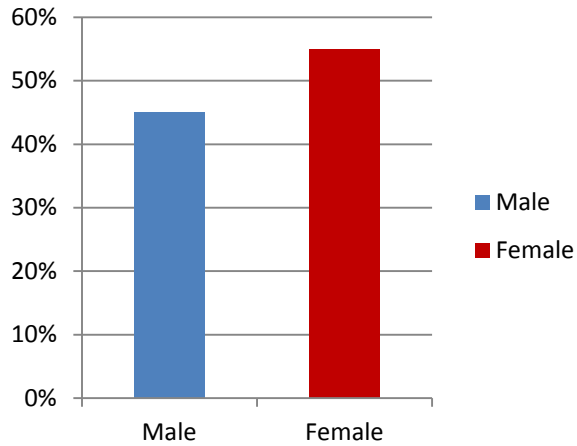
- Lung cancer patients in BC with brain metastases
 - Treated with radiotherapy

- January 2014 – December 2015

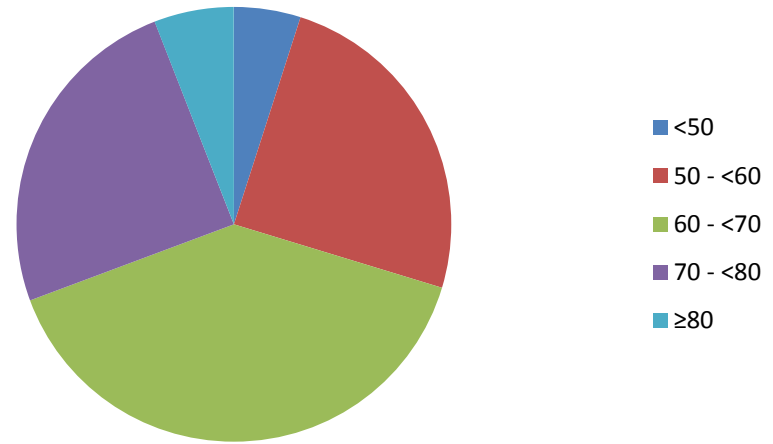
- 740 patients
- 826 courses of radiation

Patient characteristics

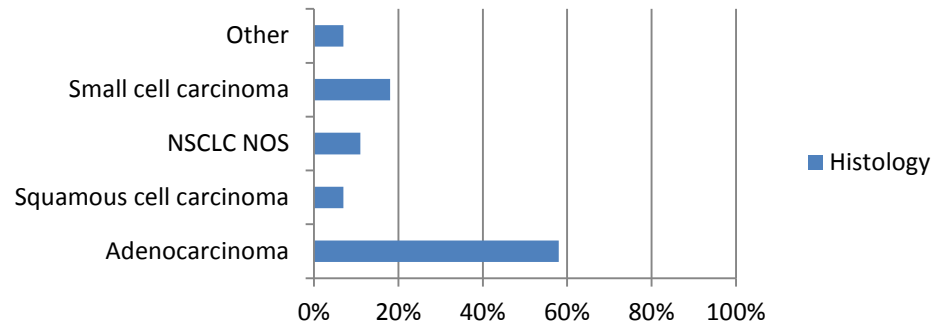
Gender



Age



Histology



Treatment characteristics

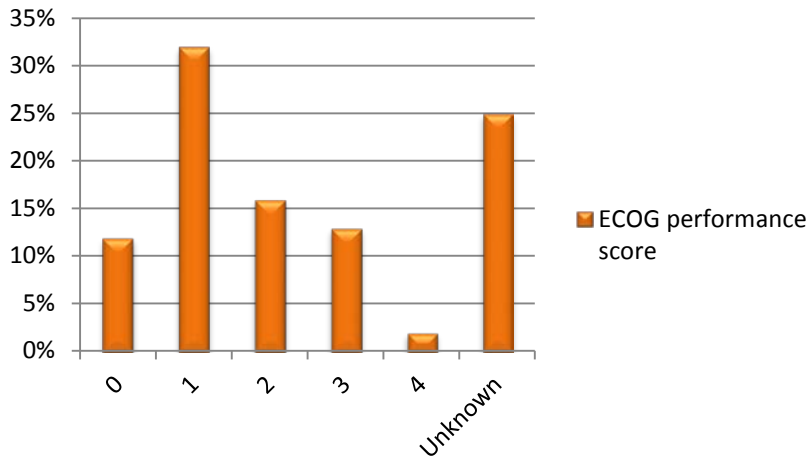
- ECOG performance score
- Initial systemic therapy
- Completion of radiotherapy
- Number of fractions
- Radiation technique
- Total radiation dose





Results

ECOG performance score



- Mortality
 - 11% after 4 weeks
 - 40% after 90 days

- Initial systemic treatment: ≈50%
- 95% completion rate
- 11% stereotactic radiation

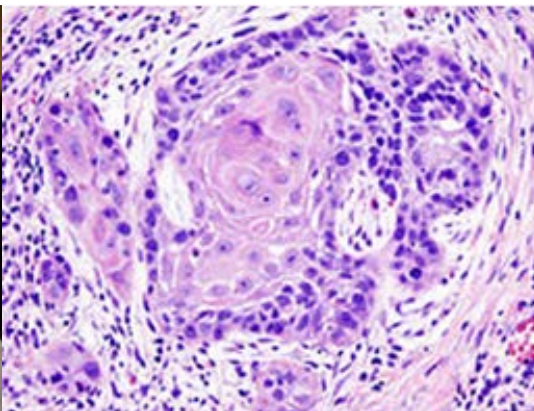
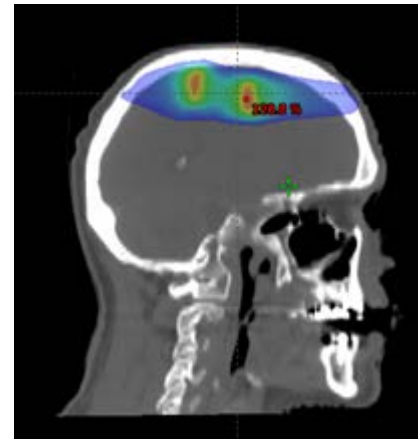
Prognostic factors

- Factors predicting 4 week mortality after radiotherapy for brain metastases in lung cancer patients
 - Initial systemic therapy – lower risk
 - >5 fractions – lower risk
 - Age 70 - <80 – lower risk



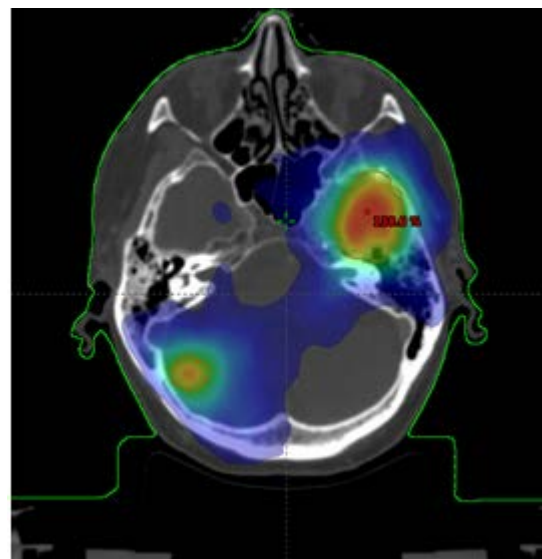
Prognostic factors

- Factors predicting 90 day mortality after radiotherapy for brain metastases in lung cancer patients
 - Higher age – higher risk
 - Squamous cell carcinoma – higher risk
 - Initial systemic therapy – lower risk
 - >5 fractions – lower risk
 - Stereotactic radiation – lower risk



Discussion

- 4 week mortality: 11%
- 90 days mortality: 40%
- Important prognostic factors
 - Initial systemic therapy
 - >5 fractions of radiation
- Selection of patients important
 - Our results possibly influenced by selection bias



Conclusions

- It's a matter of perspective
- Improve patient selection in future
 - Who benefits from treatment?
- Better use of prognostic tools



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CAN

Multivariate analysis 4 week mortality

	Odds	95.0% C.I. for EXP(B)	
		Lower	Upper
Age – continuous	1.066	0.98	1.16
Adenocarcinoma (reference)			
Squamous cell carcinoma	1.587	0.715	3.522
NSCLC NOS	1.307	0.604	2.83
Small cell lung cancer	1.28	0.634	2.585
Other histology	1.483	0.655	3.357
Initial systemic therapy	0.486	0.273	0.867
1-5 fractions conventional (reference)			
>5 fractions conventional	0.117	0.041	0.336
SRS / SFRT	0.579	0.148	2.266
Age <50	3.35	0.425	26.398
Age 50 - <60	1.063	0.39	2.897
Age 60 - <70 (reference)			
Age 70 - <80	0.365	0.139	0.961
Age 80 or higher	0.553	0.104	2.945

Multivariate analysis 90 day mortality

	Odds	95.0% C.I. for EXP(B)	
		Lower	Upper
Age – continuous	1.066	1.008	1.128
Adenocarcinoma (reference)			
Squamous cell carcinoma	2.077	1.109	3.89
NSCLC NOS	1.078	0.634	1.835
Small cell lung cancer	1.003	0.631	1.593
Other histology	1.447	0.744	2.817
Initial systemic therapy			
1-5 fractions conventional (reference)			
>5 fractions conventional	0.25	0.161	0.386
SRS / SFRT	0.296	0.13	0.67
Age <50			
Age 50 - <60	2.566	0.648	10.157
Age 60 - <70 (reference)	1.202	0.621	2.328
Age 70 - <80	0.687	0.363	1.3
Age 80 or higher	0.671	0.2	2.247