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Focus on treatment complications and optimal management: Radiation Oncology

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Disclosure

None to declare



Side-effects and incidence

- Esophageal damage
 - Acute: grade 3 or more:
 - Concurrent chemo-radiation: 20 %- 30 %
 - Sequential chemo-radiation: < 5 %
 - Late: strictures grade 2 or more: < 5 %
- Lung damage: 5 % - 30 %
- Skin reactions: severe: < 10 %
- Rib fractures: 10 % - 30 %

Dose-limiting side-effects

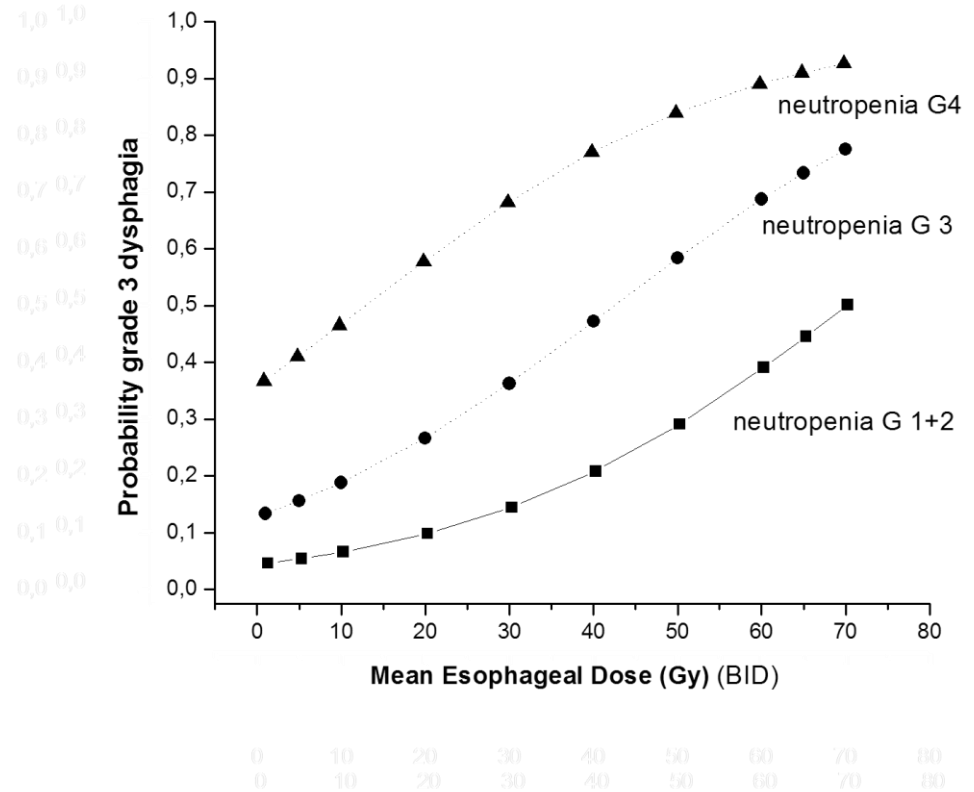
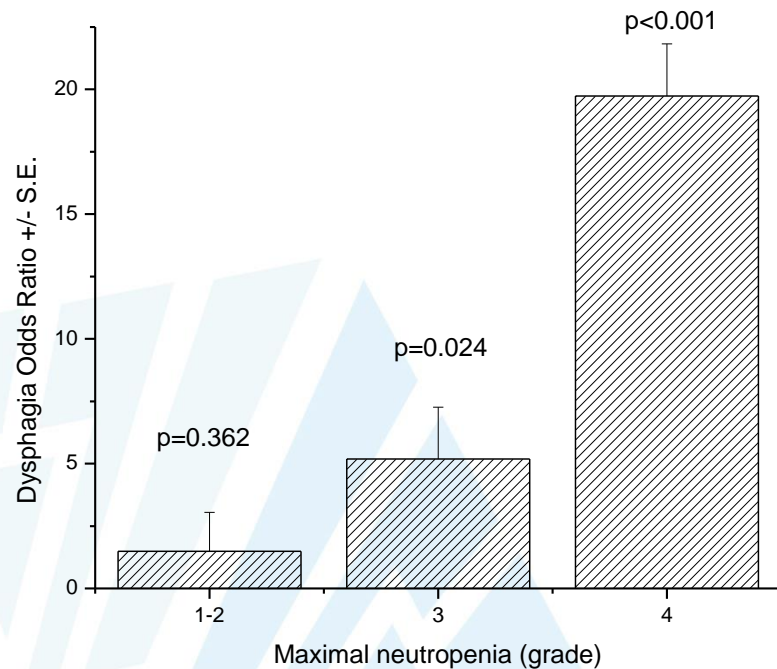
- Esophageal damage
 - Acute: grade 3 or more
 - From \pm week 3 during therapy to 2-6 weeks post-radiation
 - Late: grade 2 or more
 - 3 months to many years post-radiation
- Lung damage
 - Acute: grade 2 or more
 - 1-6 months post-treatment (“Radiopneumonitis”)
 - Late: grade 2 or more
 - 6 months and more post-radiotherapy (“Fibrosis”)

Parameters related to acute esophagitis

- Most important: concurrent administration of chemotherapy
- NTCP models
- DVH parameters (highly correlated with each other)
 - Mean dose
 - Max. Dose
 - V_{55}
 - Circumference > 80 %
 - Overall treatment time (“BID” as a surrogate)
 - Length not consistent
 - ...

Correlation between acute esophagitis and neutropenia.

n=328



Restrictions for acute esophagitis


- No consensus: Mean dose and V_{55} , V_{35} most often used
- EORTC: e.g. Mean Esophageal Dose < 34 Gy

(De Ruysscher et al. J Clin Oncol 2010)

- RTOG: Mean Esophageal Dose < 34 Gy.

“This is not an absolute requirement, but is strongly recommended unless other, more critical constraints force the situation.”

Treatment of radiation-induced acute esophagitis

- Empirical, no hard data
 - Crucial: maintain intake of food and fluid!
 - Symptomatic
- 

Treatment of radiation-induced acute esophagitis

- RTOG suggestions
 - Ketoconazole 200 mg PO q day **OR** Fluconazole 100 mg PO q day until the completion of radiation
 - Mixture of: 2% viscous lidocaine: 60 ml
 - Mylanta: 30 ml
 - Sucralfate (1 gm/ml): 10 ml (take 15-30 ml PO q3-4 hrs prn. *Contraindications: Dilantin, Cipro, Digoxin*)
 - Ranitidine 150 mg PO BID (or other H2 blocker or a proton pump inhibitor such as omeprazole) until the completion of radiation
 - Grade 4 esophagitis: hold RT + chemotherapy until grade 2 or less

Late esophagitis

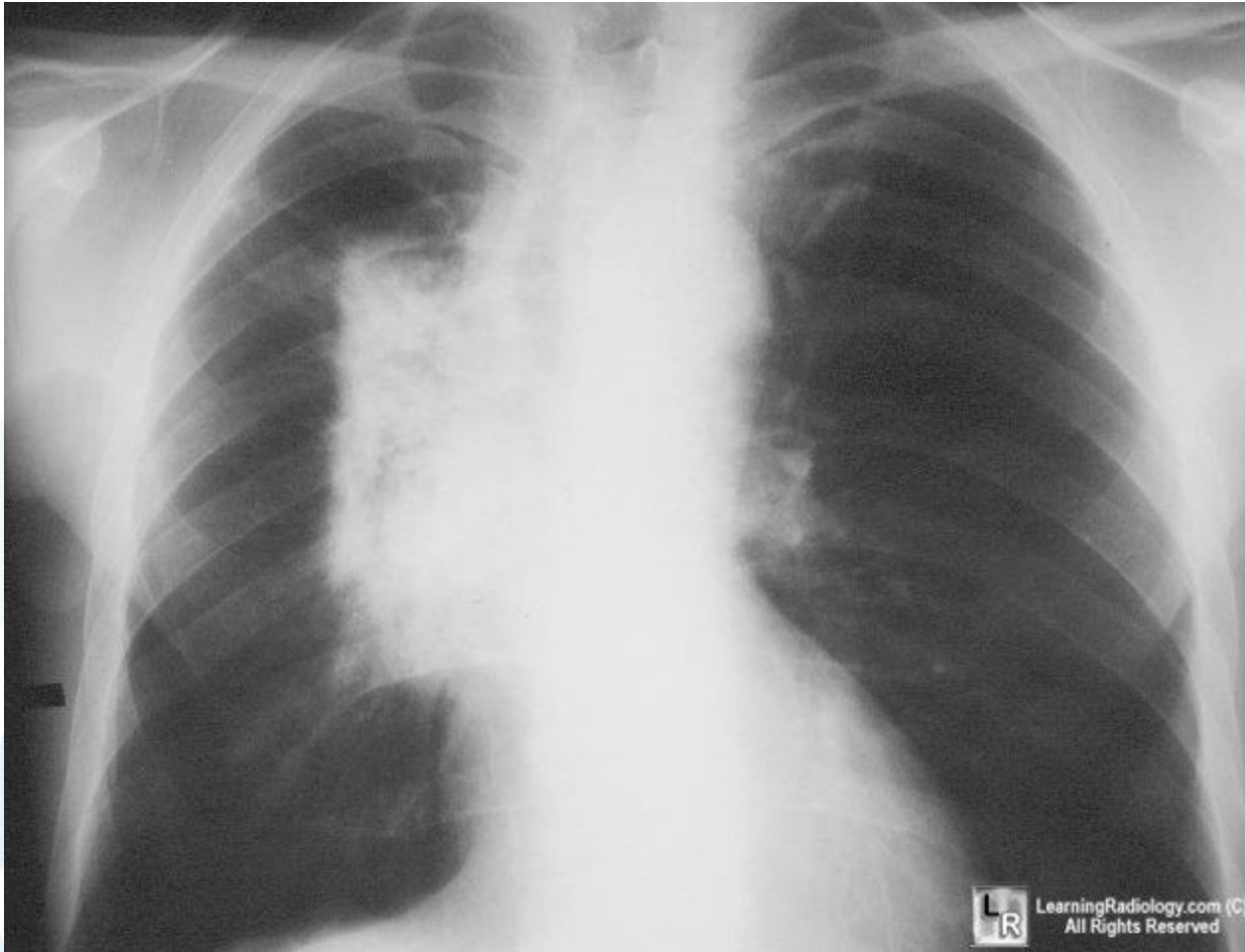
- Most consistent: maximal dose
- Constraint: Maximal dose < 75 Gy (< 5 % grade 2 strictures)
- Treatment:
 - Grade 1: diet
 - Grade 2-3: dilatation

Radiation-Induced Lung Toxicity (RILT)

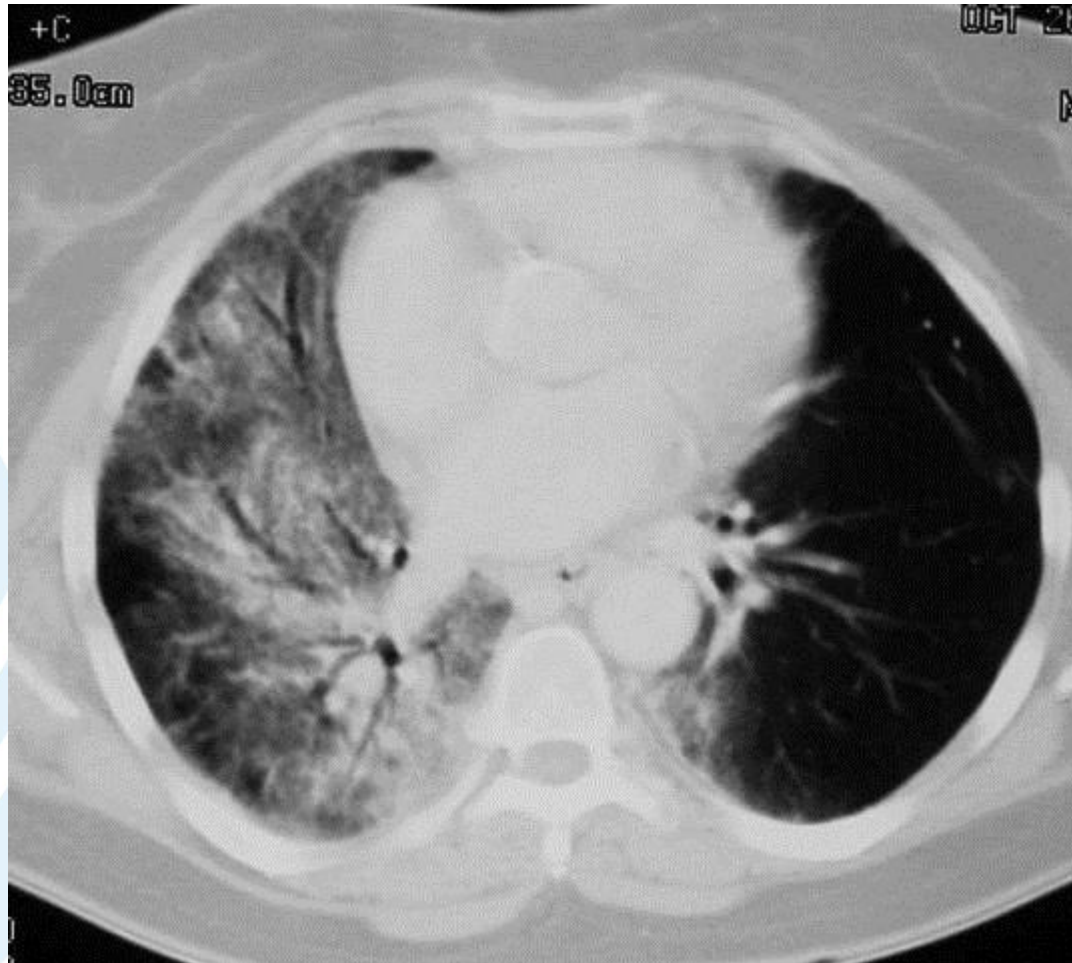
- Problems:
 - No consistent definition: RTOG? CTC? Steroids required?
 - Mostly only the peak reaction is reported: Reversible?
 - At least 25 % of patients have “pneumonitis” due to COPD exacerbation

“Radiopneumonitis” is a diagnosis of exclusion!

Radiation Pneumonitis



Radiation Pneumonitis



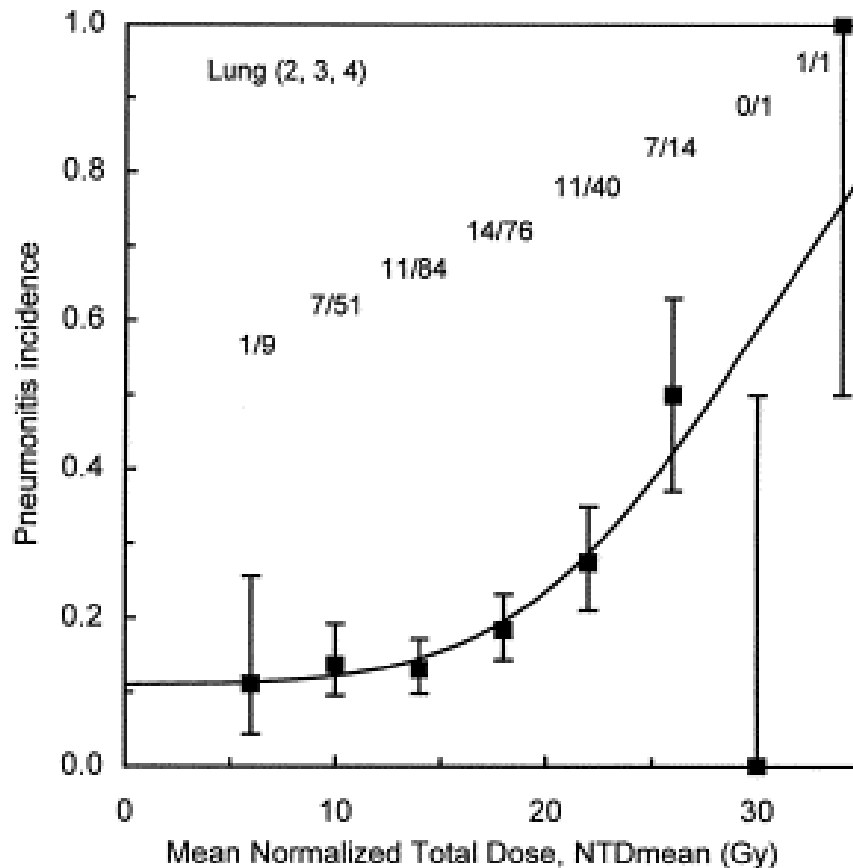
Parameters related to RILT

- **NOT**: concurrent administration of cisplatin, vinorelbine, etoposide; careful with docetaxel
- NTCP models
- DVH parameters (highly correlated with each other)
 - Mean dose
 - V_{20}
 - V_5
 - Smoking: *less* RILT

De Ruysscher et al. J Clin Oncol 2010

Palma DA et al. Int J Radiat Oncol Biol Phys 2013

Restrictions for RILT



Maximal

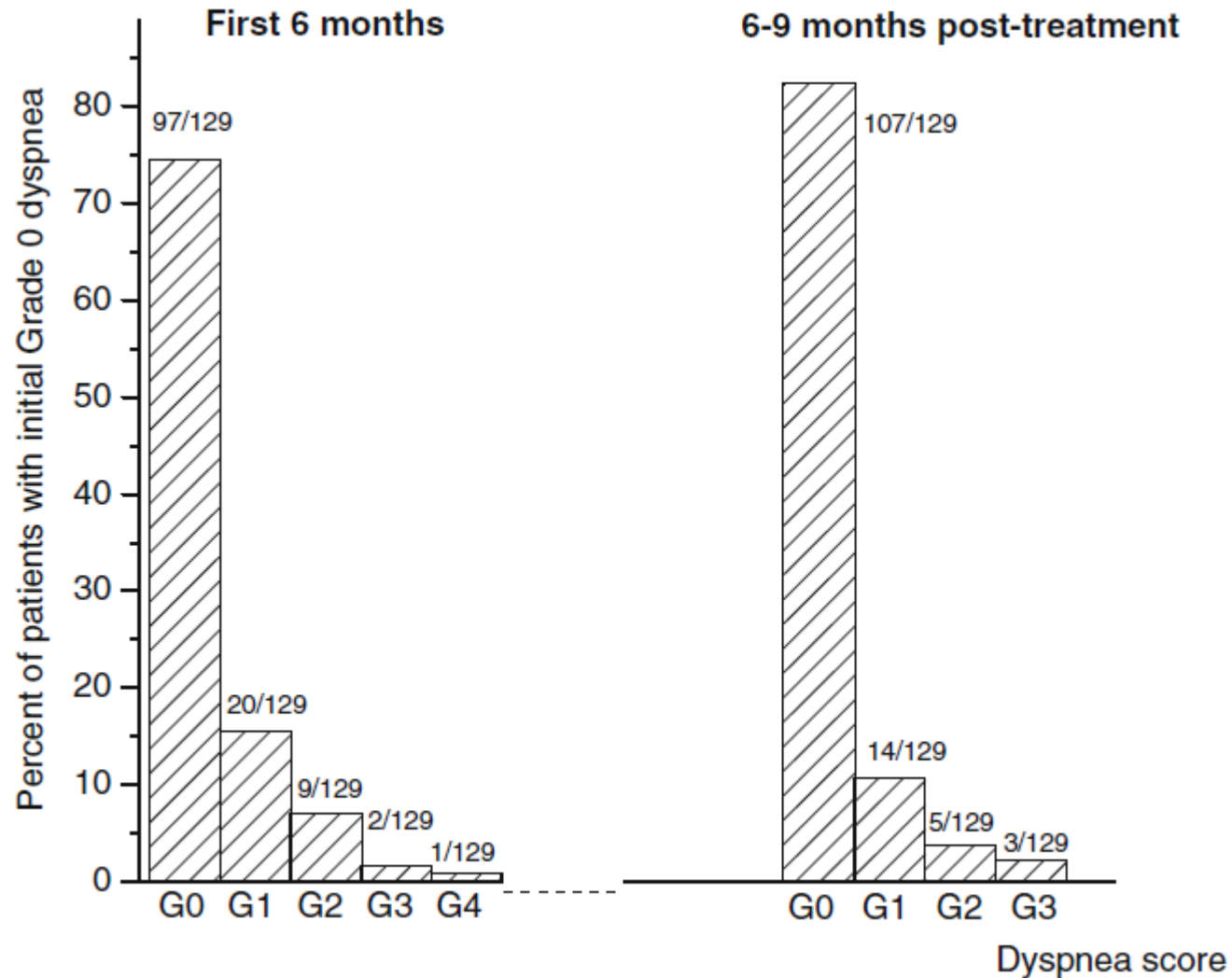
MLD = 20 Gy

$V_{20} = 35 \%$

Below MLD = 20 Gy and $V_{20} = 35 \%$ no clear dose-response relation

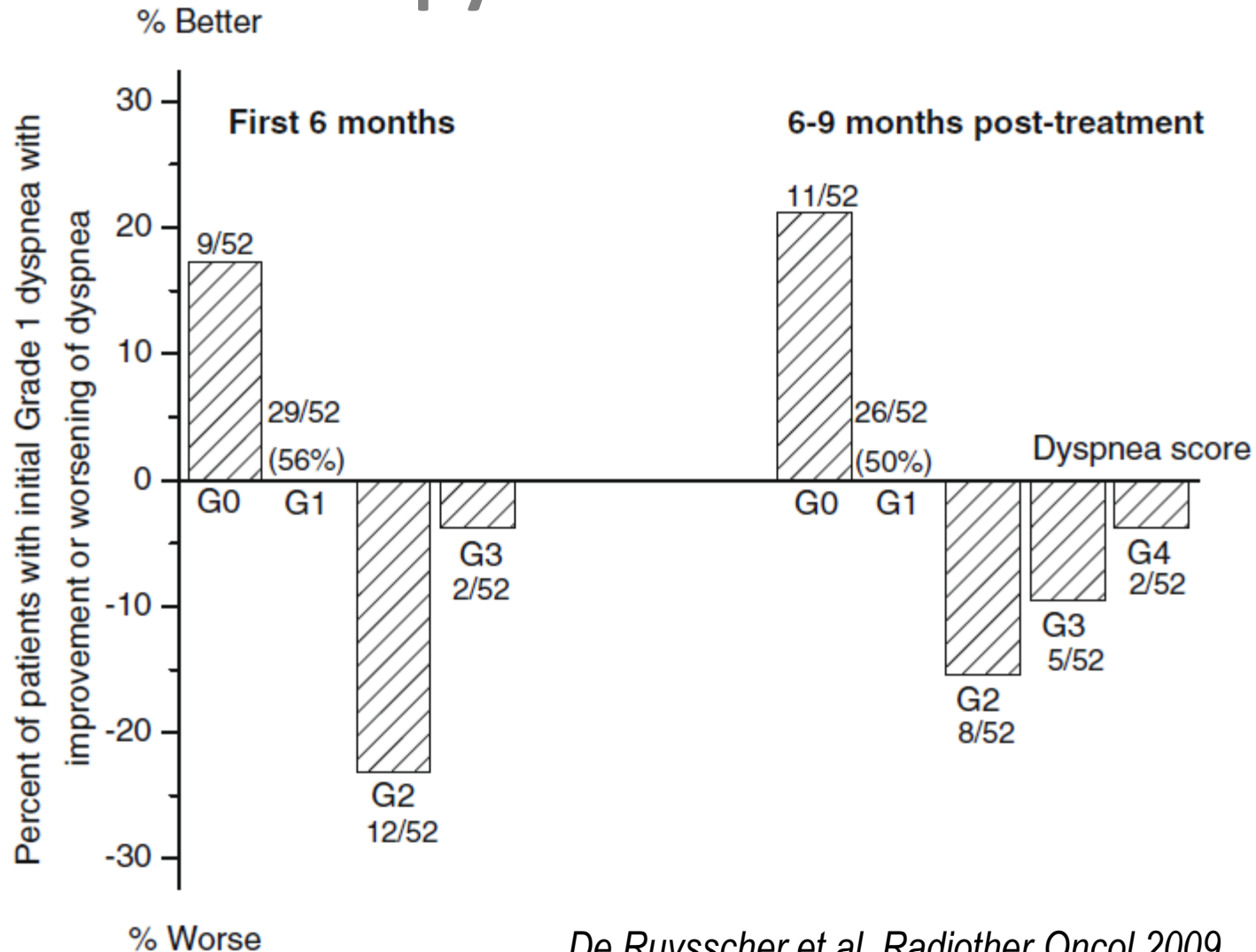
Kwa et al. Int J Radiat Oncol Biol Phys 1998; Dehing et al. Radiother Oncol 2009

Dyspnea evolution after radiotherapy: No baseline dyspnea

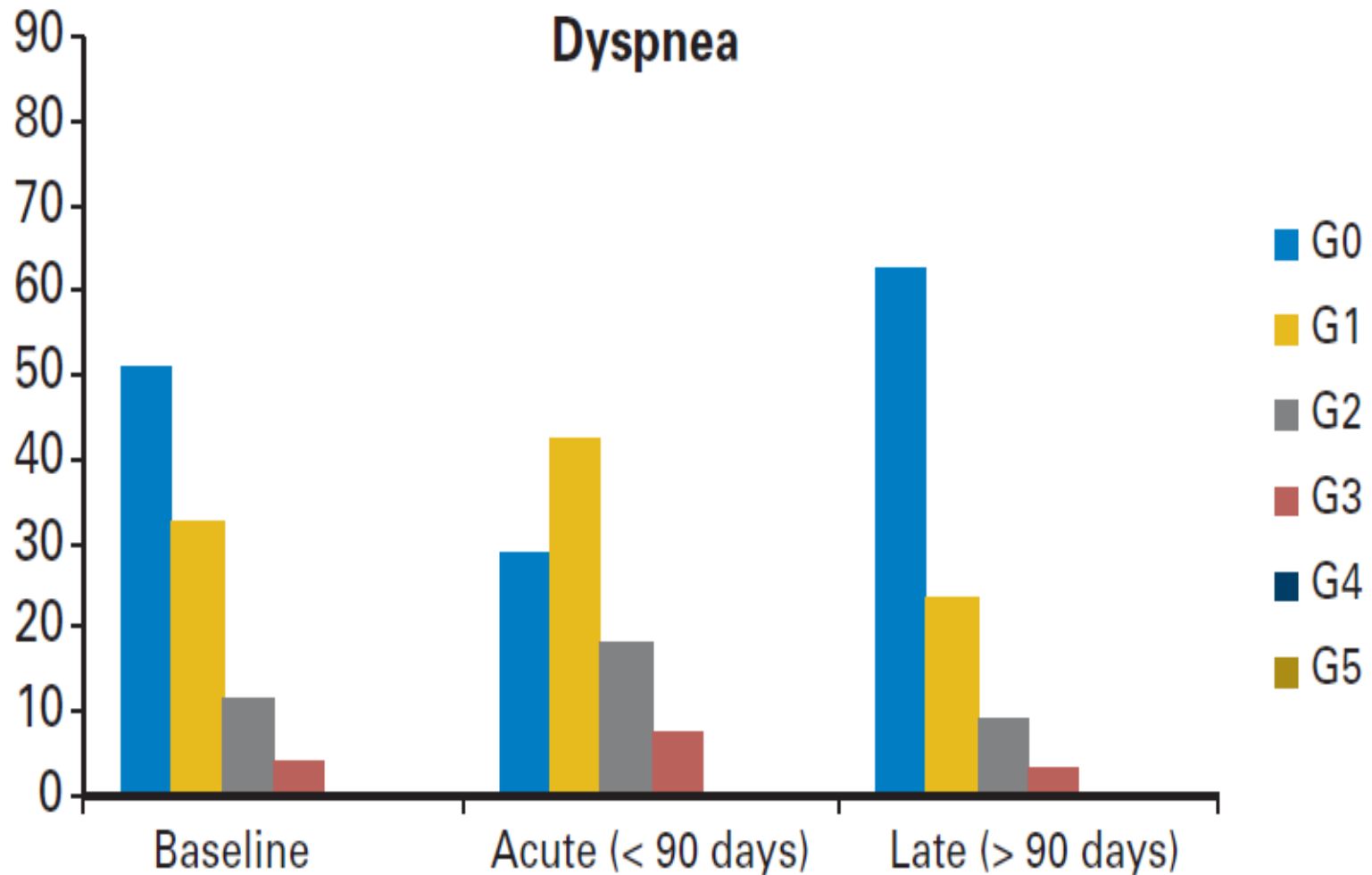


Dyspnea evolution after radiotherapy:

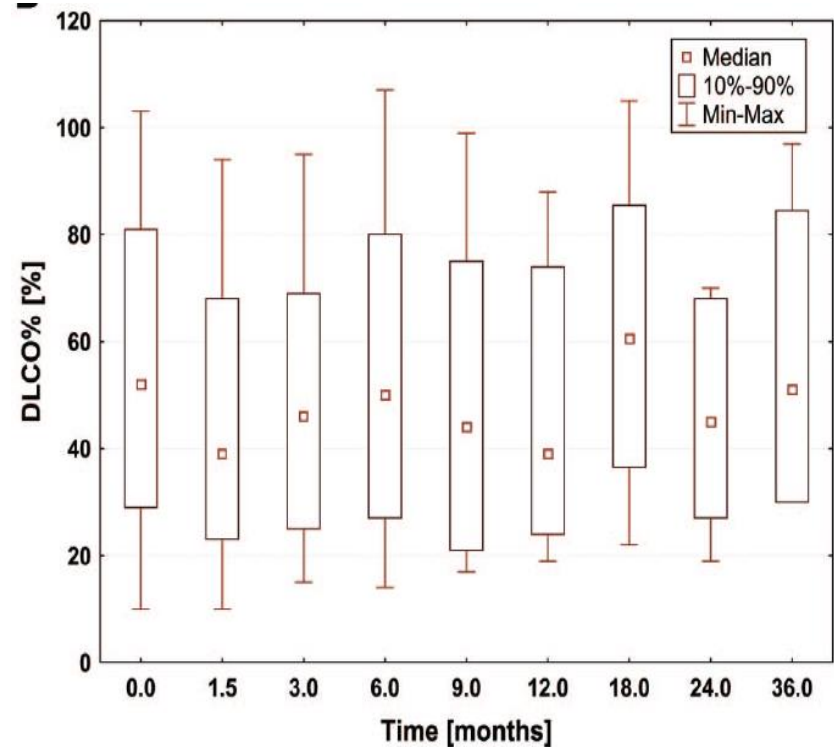
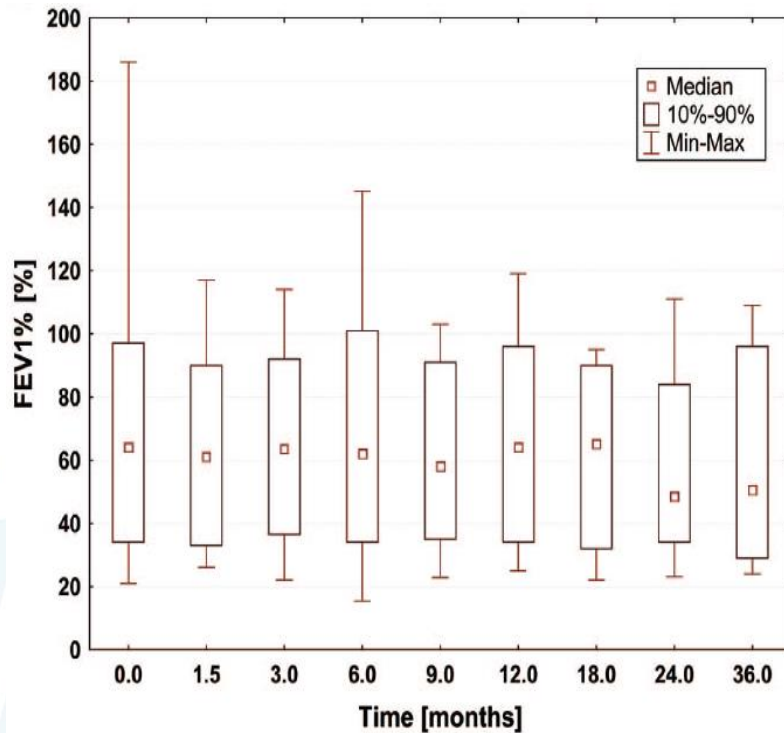
Baseline dyspnea grade 1: 20 % no dyspnea after radiotherapy



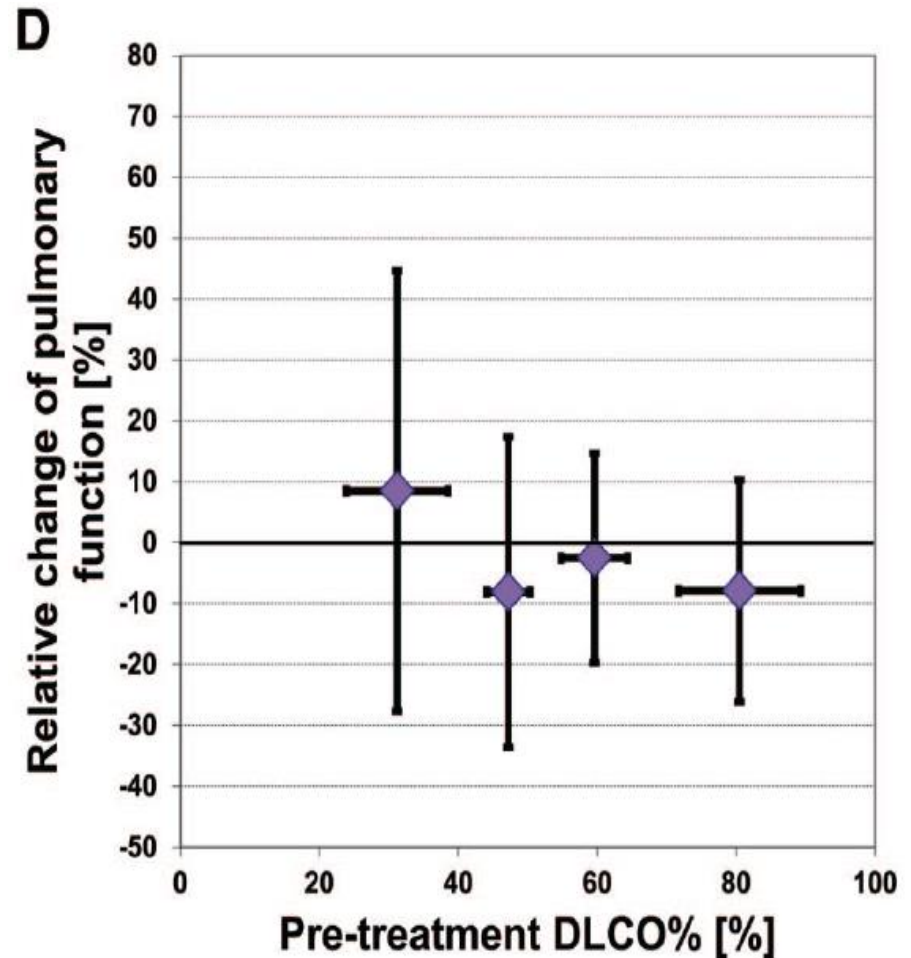
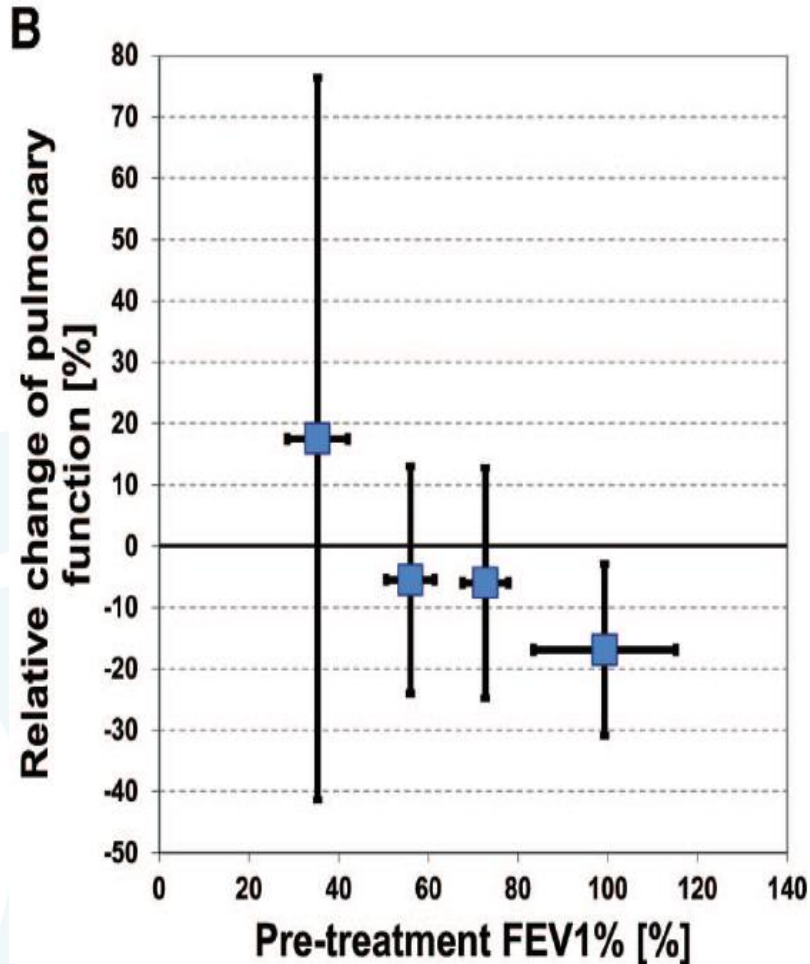
Dyspnea evolution after individualised radiotherapy: 10 % less patients with dyspnea



SBRT: No change of FeV1 or DLCO over time



SBRT: No decline in FeV1 or DLCO in patients with poor pulmonary function



Treatment of acute RILT

- Empirical
- Symptomatic
- ! Other causes; e.g. Infections: *chest physician*
- Not severely ill patient:
 - Inhalation bronchodilators + steroids
 - Codein
 - When not effective: oral steroids: e.g. Prednison 30 mg/day, 10 days
- Severely ill patient:
 - Chest physician
 - High-dose corticosteroids

Late RILT

- Risk factors: same as acute RILT
- Treatment (?): Symptomatic

