

## Danish University Colleges

### Assessing tumor response to treatment inpatients with lung cancer using Dynamic Contrast-Enhanced CT-A systematic review.

Strauch, Louise Søborg; Eriksen, Rie Østbjerg; Sandgaard, Michael; Kristensen, Thomas; Lauridsen, Carsten Ammitzbøl; Nielsen, Michael Bachmann

*Publication date:*  
2016

*Document Version*  
Peer reviewed version

[Link to publication](#)

*Citation for published version (APA):*  
Strauch, L. S., Eriksen, R. Ø., Sandgaard, M., Kristensen, T., Lauridsen, C. A., & Nielsen, M. B. (2016). *Assessing tumor response to treatment inpatients with lung cancer using Dynamic Contrast-Enhanced CT-A systematic review..* Poster session presented at Dansk Radiologisk Selskabs 11. årsmøde, Odense, Denmark.

#### General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

#### Download policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

# Assessing tumor response to treatment in patients with lung cancer using Dynamic Contrast-Enhanced CT - A systematic review

Louise S. Strauch<sup>1,2</sup>, Rie Ø. Eriksen<sup>1,2</sup>, Michael Sandgaard<sup>1</sup>, Thomas S. Kristensen<sup>1</sup>, Carsten A. Lauridsen<sup>1,2</sup>, Michael B. Nielsen<sup>1</sup>

<sup>1</sup>Department of Diagnostic Radiology, Rigshospitalet, Copenhagen University Hospital

<sup>2</sup>Department of Technology, Faculty of Health and Technology, Metropolitan University College

## BACKGROUND

- Lung cancer is one of the leading causes of cancer death
- Anti-angiogenic drugs have shown great potential in treatment of lung cancer
- Anti-angiogenic drugs cytostatic effects changes vascularity of tumor earlier than changes in size of the tumor.
- New ways of assessing treatment response in patients treated with anti-angiogenic drugs are required
- DCE-CT are already established as a tool to assess acute strokes

## AIM

The aim of this study was to provide a complete summary of the literature available on whether DCE-CT may be a useful tool to evaluate treatment response, in patients diagnosed with lung cancer.

## METHOD

- This systematic review was compiled according to PRISMA guidelines.
- The literature search was performed in PubMed, Embase, Web of Science and Cochrane Library.
- The search was limited to studies in English, which were published within the last 10 years to include the most recent research.
- Only original research articles concerning treatment response in patients with lung cancer measured with DCE-CT, were included.
- To assess the quality of each study we will implement Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2) tool.

## STUDY SELECTION

The initial search yielded 651 publications, of these 16 articles were included in this study. The articles were divided into four groups of treatment.

- Eight studies included patients who were treated with chemotherapy with or without anti-angiogenic drug
- Three studies enrolled patients who were treated with radiotherapy.
- In one study patients were treated with either chemotherapy, radiotherapy or concurrent chemoradiotherapy.
- Four studies included patients who were treated with various treatments such as target therapy or thermotherapy, these were categorized as others.

## PRELIMINARY RESULTS & CONCLUSION

The included studies have a wide variety of scan protocols, scan parameters and time between treatment and DCE-CT scans.

Preliminary results indicates a trend of decrease in blood flow and permeability between baseline and follow-up scans in patients treated with chemotherapy with or without anti-angiogenic drugs.

Blood volume seems to increase in patients treated with radiotherapy.

DCE-CT may be a useful tool in assessing treatment response in patients with lung cancer. However the heterogeneity in scan protocols, scan parameters and time between treatment and DCE-CT scans complicates the comparison of the included studies. Further studies are needed to clarify DCE-CT ability to evaluate treatment response, in patients diagnosed with lung cancer.

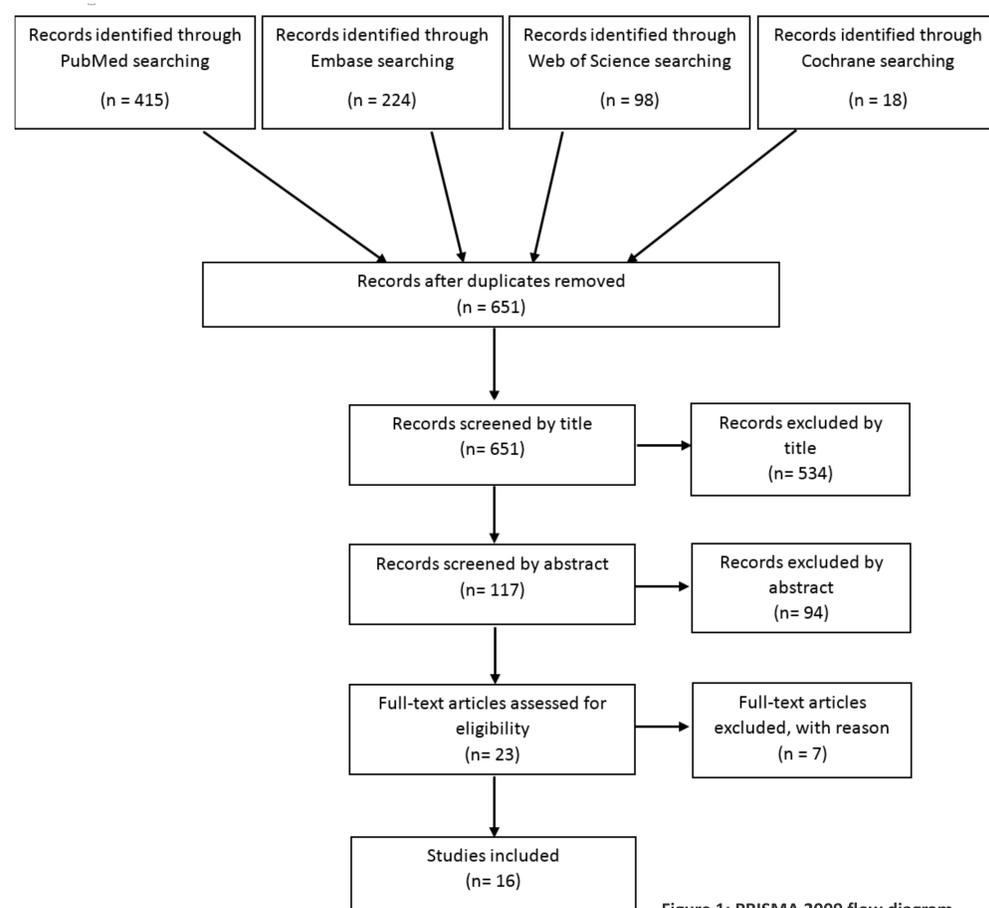


Figure 1: PRISMA 2009 flow diagram

Author, year	Study design	Patients	Diagnosis	Scan parameters			Kinetic model	Treatment	Perfusion scan	DCE-CT values	Gold standard	Results	Conclusion
				Slice	kVp mAs	Contrast							
<b>Chemotherapy (+/- anti-angiogenic drug)</b>													
Fraioli et al. 2011	Prospective	45	Lung adenocarcinoma	64	100 kVp 120 mAs	90 ml	Two-compartmental (Patlak)	Chemotherapy combined with anti-angiogenic drug	Baseline, 40 (n=45) and 90 days after treatment (n=14)	BF BV TTP PS	RECIST	Significant decrease from baseline to follow-up in BF (p=0.018) and PS (p=0.013). Significant decrease in BF (p=0.0001), BV (p=0.02), TTP (p=0.012) and PS (p=0.001) when comparing second follow-up with baseline and first follow-up.	DCE-CT may allow evaluation of lung cancer angiogenesis demonstrating alterations in vascularity following treatment.
<b>Radiotherapy</b>													
Ng et al. 2010	Prospective	15	NSCLC	16	80 kVp 60 mAs	108 ml	Two-compartmental (Patlak)	Palliative fractionated radiotherapy	2 x baseline and 1 week later	BV	N/A	BV increased significant (p=0.049) following radiotherapy using whole tumor evaluation but not with single level evaluation.	BV is highly variable across tumor, hence whole tumor measures should be used to provide the most representative assessment.

\*DCE-CT = Dynamic Contrast-Enhanced CT, BF = Blood flow, BV = Blood volume, TTP = Time to peak, PS = Permeability surface, RECIST = Response evaluation criteria in solid tumors, NSCLC = Non-small cell lung cancer.

Table 1: An example of data extraction of two studies from group 1 & 2