

# Prospective Evaluation of Limited Stage Small Cell Lung Cancer (LS-SCLC) Fractionation Regimen Usage and Toxicity in a Large Statewide Quality Collaborative

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# Disclosures

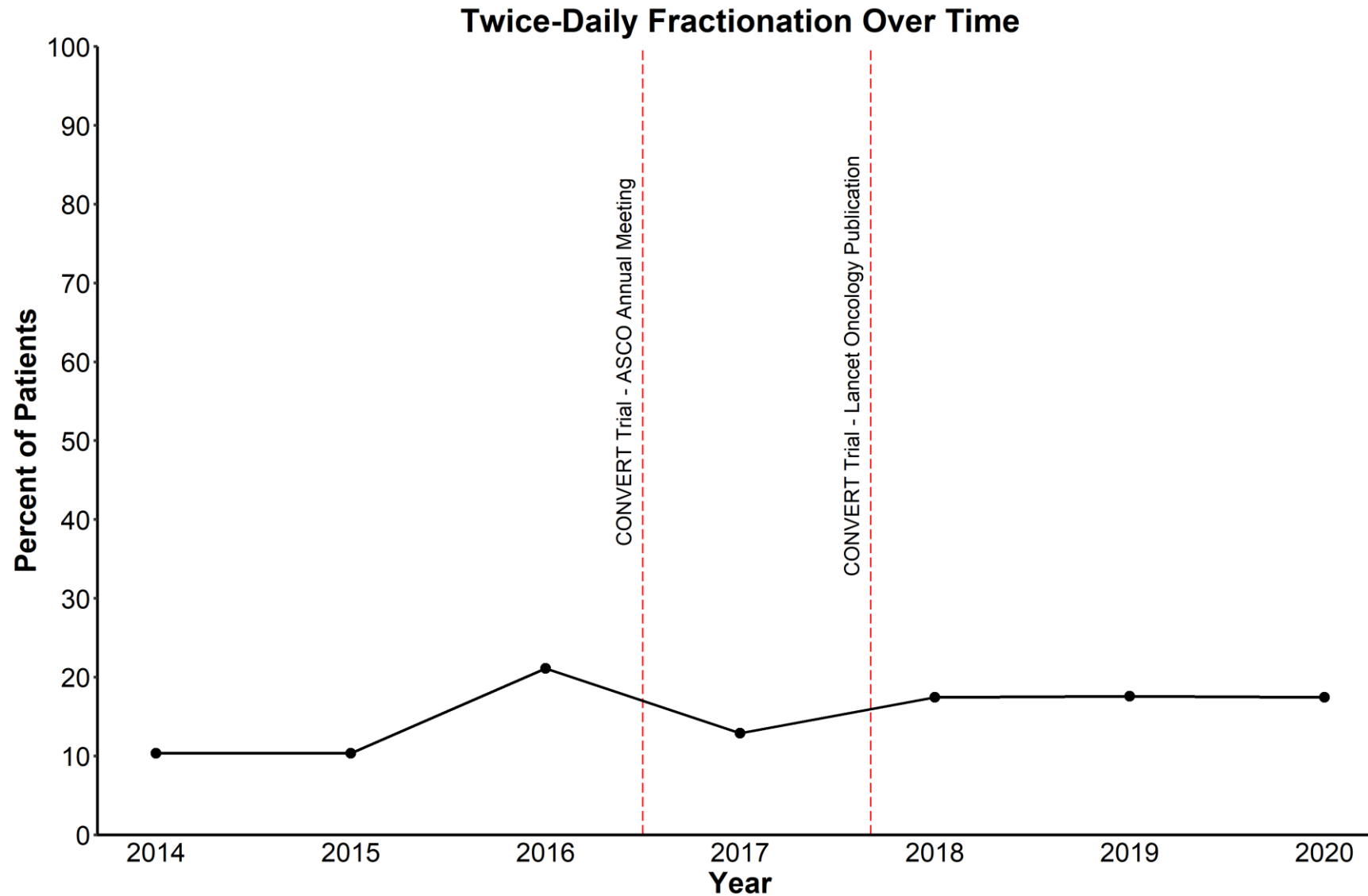
- I am employed by the University of Michigan.
- I have no relevant commercial interests.
- MROQC is financially supported by Blue Cross Blue Shield of Michigan and the Blue Care Network as part of the BCBSM Value Partnership program.

# Broad-reaching data on LS-SCLC fractionation/toxicity is lacking

- Current understanding based on:
  - Small retrospective series
  - Provider surveys
  - National databases without radiation specifics or detailed toxicity reporting
- Statewide quality improvement initiative with prospective collection of clinical, dosimetric, and physician- and patient-reported outcomes
  - 29 participating academic/community institutions
  - 60% of radiation oncology volume in state
  - 3,884 lung cancer cases from 2012-2021
  - 680 cases were SCLC (17.5%)
  - **499 cases with LS-SCLC and known fractionation**



# Statewide use of twice-daily fractionation was constant



Faivre-Finn, et al. CONVERT trial. Lancet Oncology 2017.

# Health and pulmonary factors were similar between regimens

	Radiotherapy Fractionation			p-value <sup>2</sup>
	All Patients, N = 499 <sup>1</sup>	Once-Daily, n = 421 <sup>1</sup>	Twice-Daily, n = 78 <sup>1</sup>	
<b>Age</b>	66 (59-72)	66 (59-72)	65 (58-71)	0.3
<b>Sex</b>				>0.9
Female	303 (61%)	256 (61%)	47 (60%)	
Male	196 (39%)	165 (39%)	31 (40%)	
<b>ECOG</b>				0.9
0	239 (51%)	201 (51%)	38 (53%)	
1	168 (36%)	142 (36%)	26 (36%)	
2+	60 (13%)	52 (13%)	8 (11%)	
<b>Charlson Comorbidity Index</b>				0.12
0-1	53 (11%)	39 (9.3%)	14 (18%)	
2	96 (19%)	81 (19%)	15 (19%)	
3	121 (24%)	102 (24%)	19 (24%)	
4+	229 (46%)	199 (47%)	30 (38%)	
<b>Body Mass Index</b>				0.5
Underweight	83 (17%)	71 (17%)	12 (15%)	
Normal	136 (27%)	109 (26%)	27 (35%)	
Overweight	135 (27%)	116 (28%)	19 (24%)	
Obese	145 (29%)	125 (30%)	20 (26%)	
<b>Percent Weight Loss Prior</b>	0.0 (0.0-1.0)	0.0 (0.0-0.2)	0.0 (0.0-3.5)	0.5

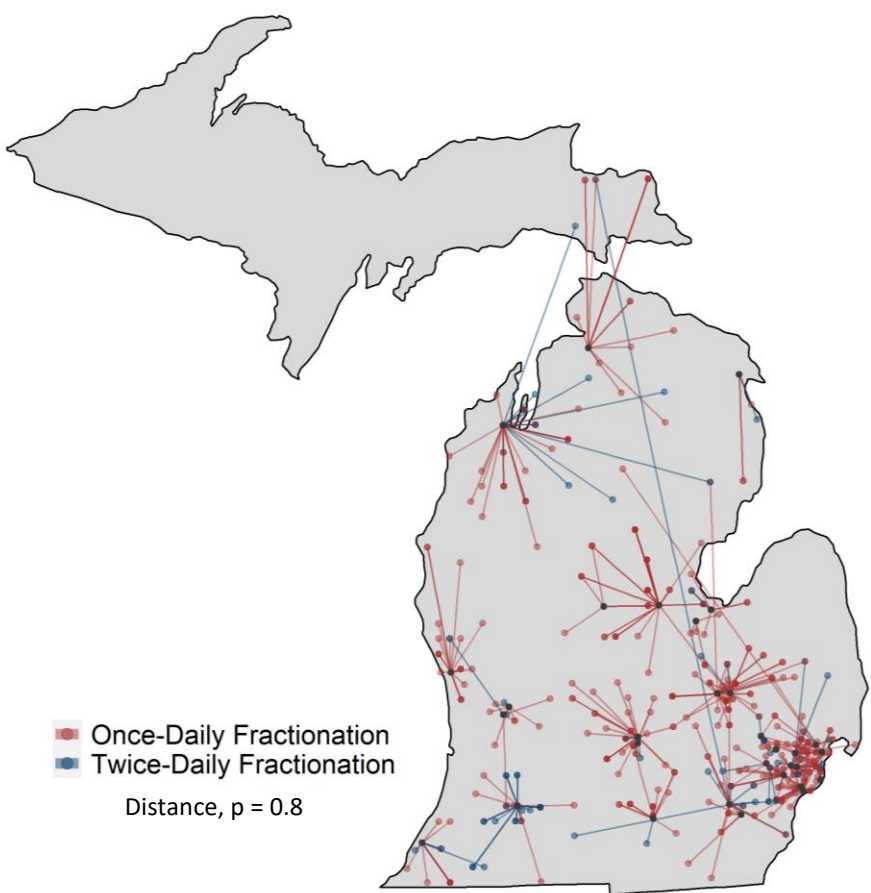
	Radiotherapy Fractionation			p-value <sup>2</sup>
	All Patients, N = 499 <sup>1</sup>	Once-Daily, n = 421 <sup>1</sup>	Twice-Daily, n = 78 <sup>1</sup>	
<b>Smoking Status</b>				0.14
Current	228 (46%)	186 (44%)	42 (55%)	
Former	259 (52%)	226 (54%)	33 (43%)	
Never	9 (1.8%)	7 (1.7%)	2 (2.6%)	
<b>Smoking Duration (pack-years)</b>	45 (30-60)	45 (30-60)	40 (30-52)	0.3
<b>Oxygen at Start of Treatment</b>				0.2
No	435 (88%)	364 (87%)	71 (92%)	
Yes	59 (12%)	53 (13%)	6 (7.8%)	
<b>Spirometry Performed</b>	193 (39%)	161 (39%)	32 (41%)	0.7
<b>FEV1 (L)</b>	1.88 (1.38-2.39)	1.82 (1.35-2.35)	1.96 (1.69-2.48)	0.3
<b>FEV1 (% predicted)</b>	69 (53-85)	69 (53-87)	69 (53-80)	0.6
<b>Diffusing Capacity Measured</b>	157 (33%)	134 (33%)	23 (31%)	0.7
<b>DLCO (% predicted)</b>	58 (47-74)	58 (46-73)	59 (49-76)	0.4

<sup>1</sup> Median (IQR); n (%); Mean ± SD

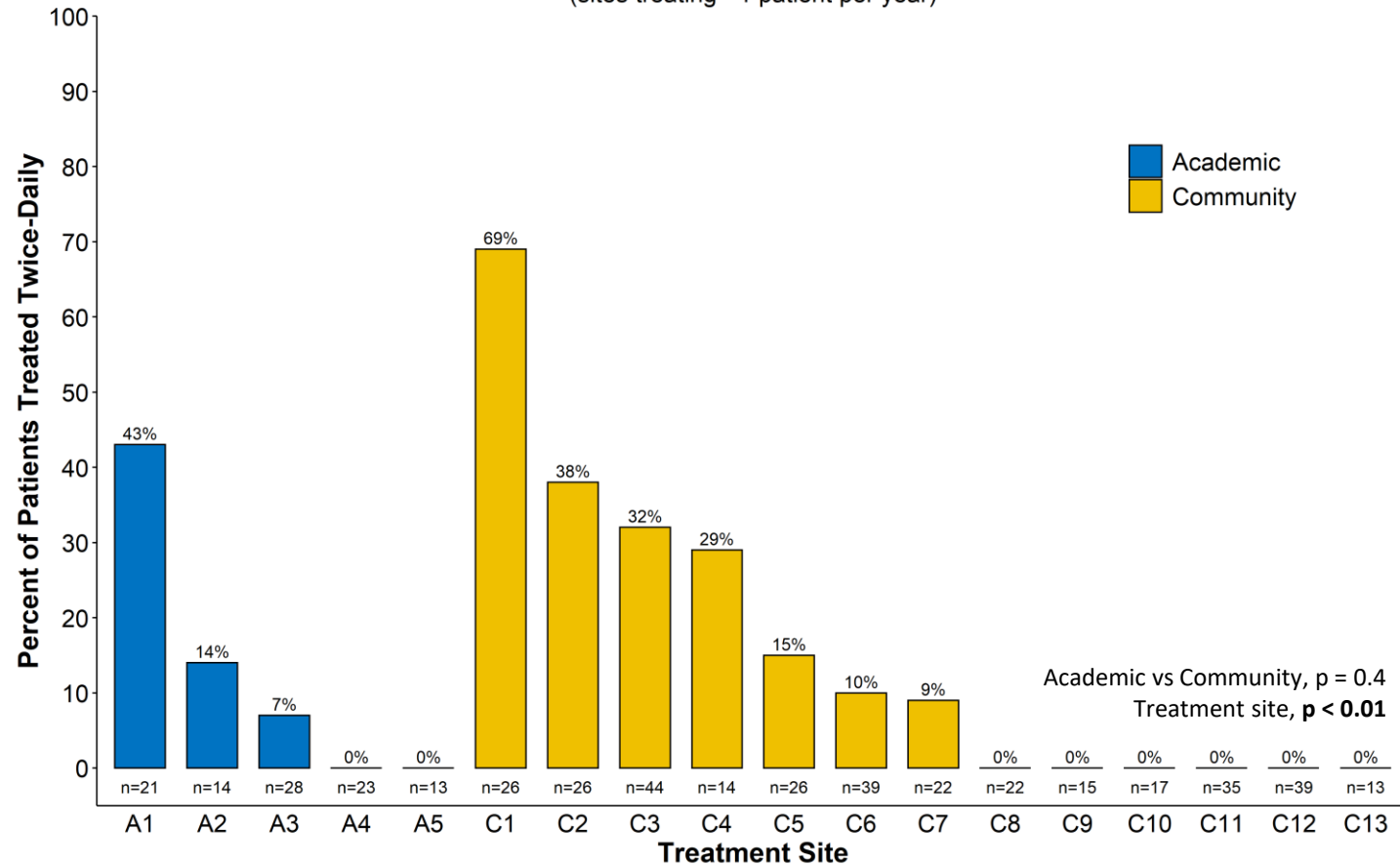
<sup>2</sup> Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test

# Fractionation scheme depended on treatment site and social status

Distance Traveled to Treatment Site



Twice-Daily Fractionation by Treatment Site  
(sites treating >1 patient per year)



Married/living with someone: 65% twice-daily vs 51%,  $p = 0.018$

# Treatment breaks were more common in once-daily treated patients

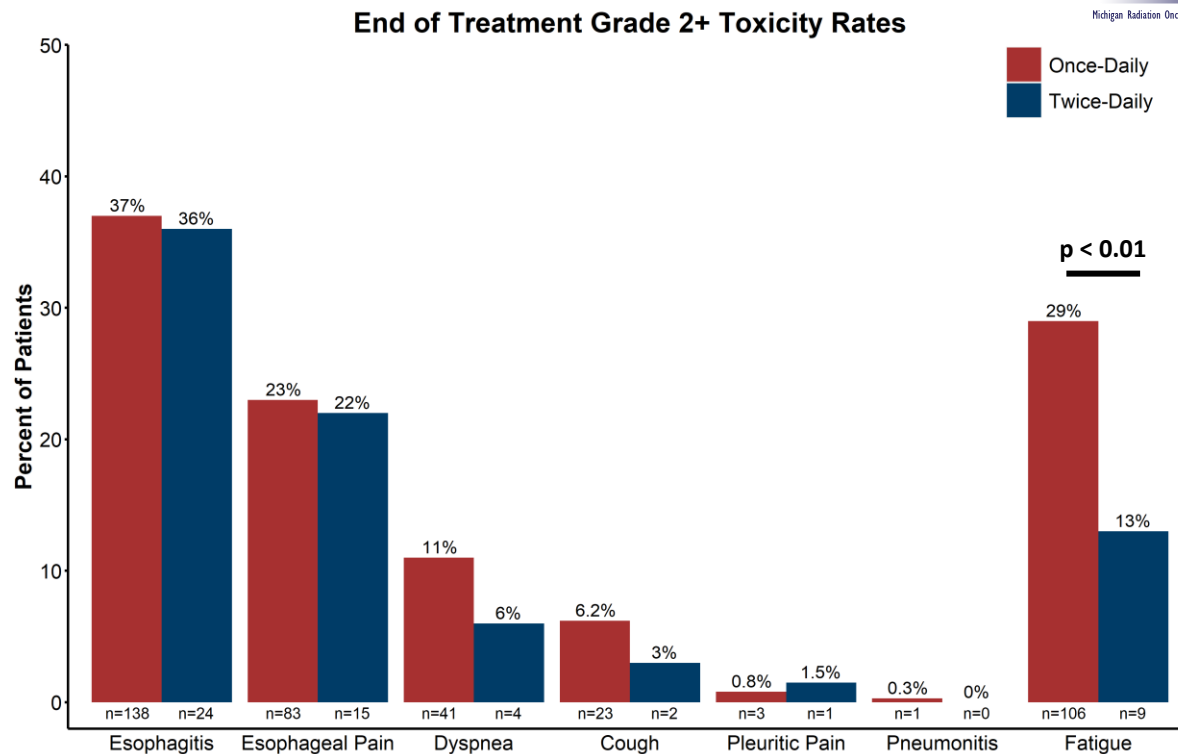
	All Patients, N = 499 <sup>1</sup>	Radiotherapy Fractionation		p-value <sup>2</sup>
		Once-Daily, n = 421 <sup>1</sup>	Twice-Daily, n = 78 <sup>1</sup>	
Total Dose (Gy)		60 (60-65)	45 (45-45)	
Fractions		30.0 (30.0-33.0)	30.0 (30.0-30.0)	
Received Chemotherapy	482 (98%)	405 (98%)	77 (99%)	>0.9
PTV volume (cc)	402 ± 276	398 ± 278	418 ± 267	0.4
Break During Treatment				<b>&lt;0.001</b>
No	343 (78%)	280 (75%)	63 (94%)	
Yes	95 (22%)	91 (25%)	4 (6.0%)	

<sup>1</sup> Median (IQR); n (%); Mean ± SD

<sup>2</sup> Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test

	Overall treatment time (days)							
	<19	19‡	20-21§	>21¶	<45	45‡	46-47§	>47¶
Twice-daily radiotherapy (n=249)	15 (6%)	158 (63%)	24 (10%)	52 (20%)	..	..	..	..
Once-daily radiotherapy (n=240)	..	..	..	..	41 (17%)	114 (48%)	43 (18%)	42 (18%)

Faivre-Finn, et al. CONVERT trial. Lancet Oncology 2017.



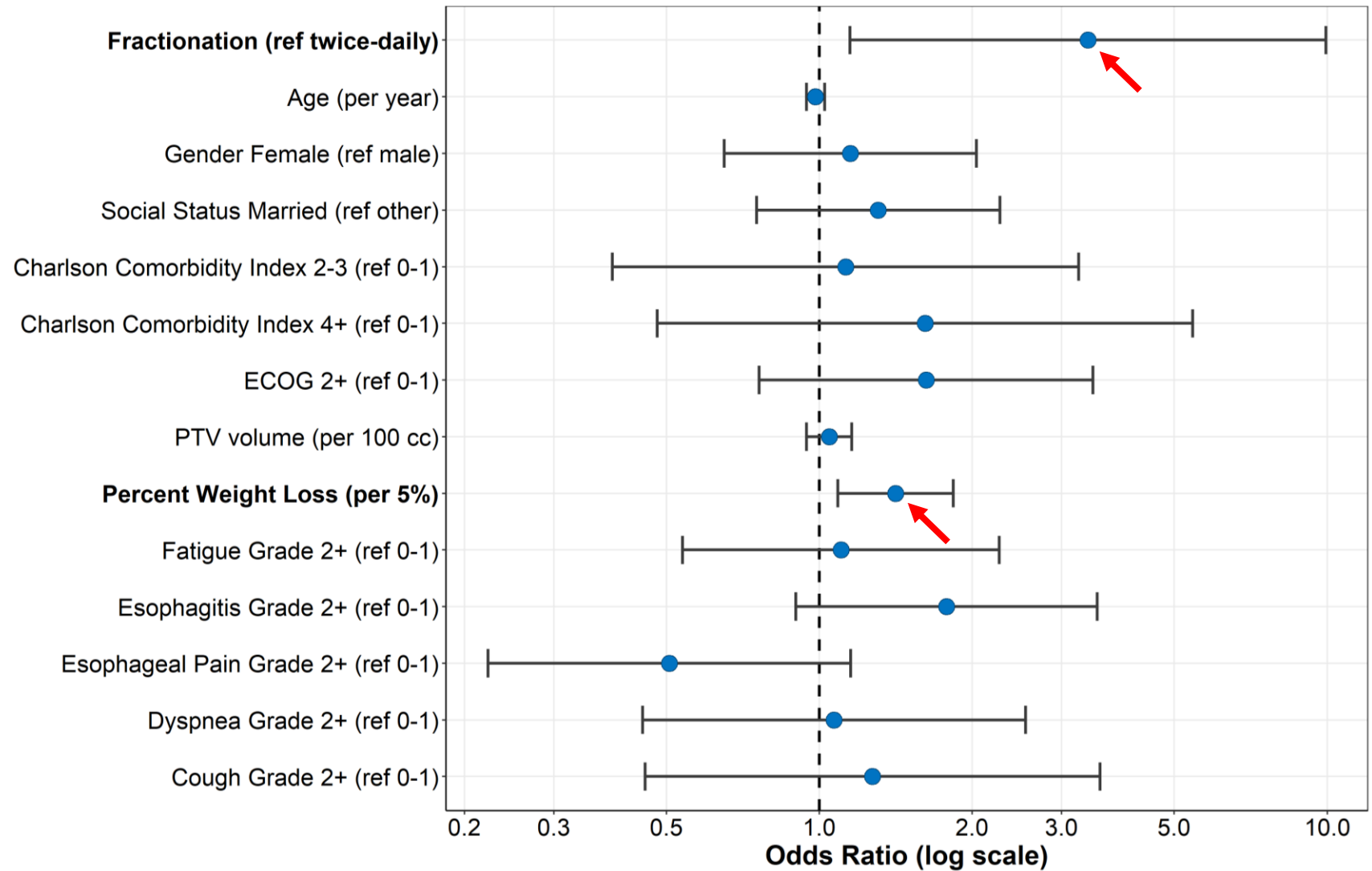
	Radiotherapy Fractionation		p-value <sup>2</sup>
	Once-Daily <sup>1</sup>	Twice-Daily <sup>1</sup>	
<b>Patient-reported Swallow Ability</b>			>0.9
No Problems or Mild Soreness Only	61% (n=123)	61% (n=20)	
Difficulty or Inability Swallowing Solids/Liquids	39% (n=78)	39% (n=13)	
<b>Percent Weight Change</b>	-2.4% ± 5.7%	-0.9% ± 4.0%	<b>0.038</b>

<sup>1</sup> % (n), mean ± SD

<sup>2</sup> Pearson's Chi-squared test, Fisher's exact test, Wilcoxon rank sum test

# Weight loss, once-daily treatment increased odds of treatment break

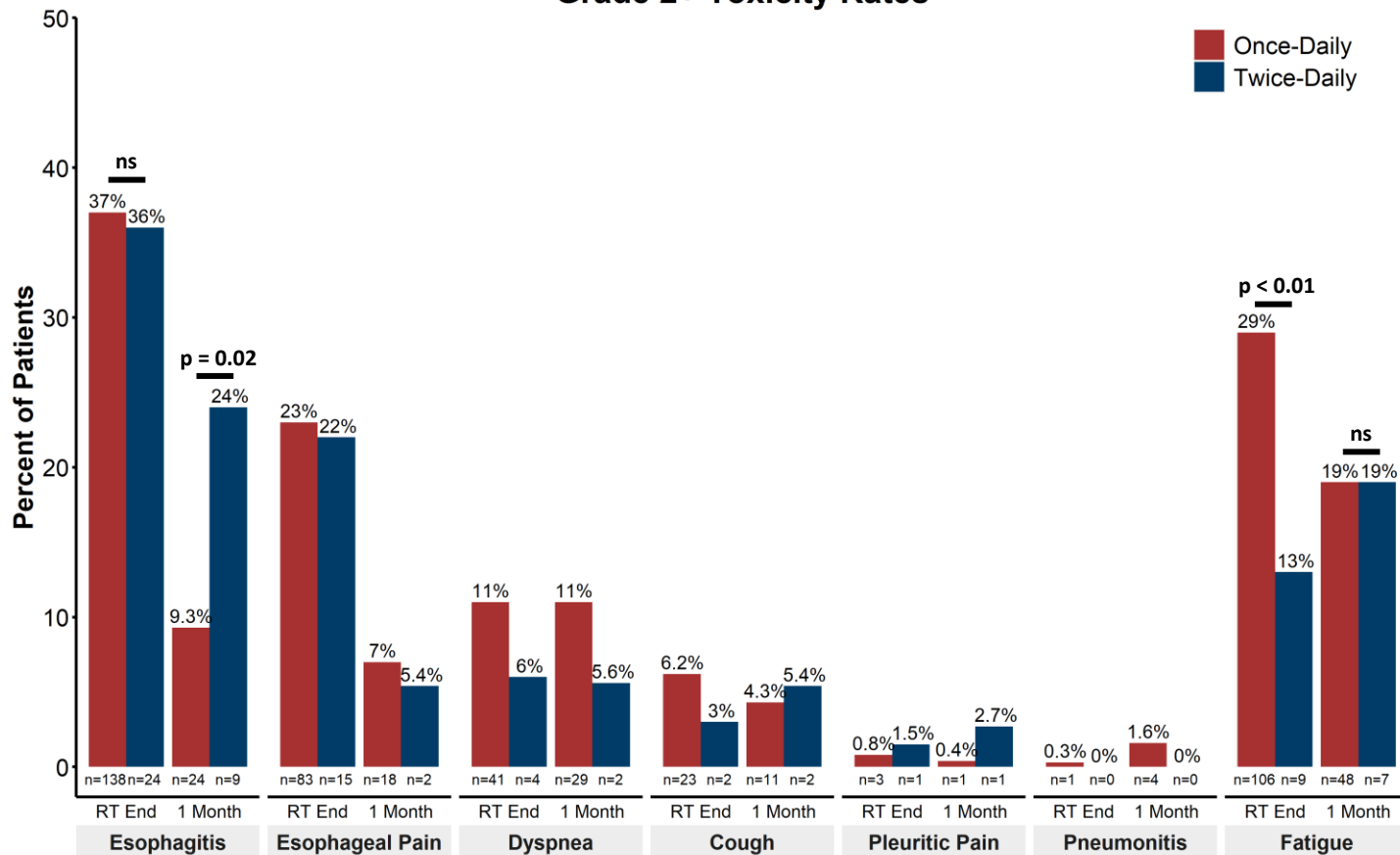
Factors Associated with Treatment Break





# Twice-daily esophageal toxicity persisted 1 month after treatment

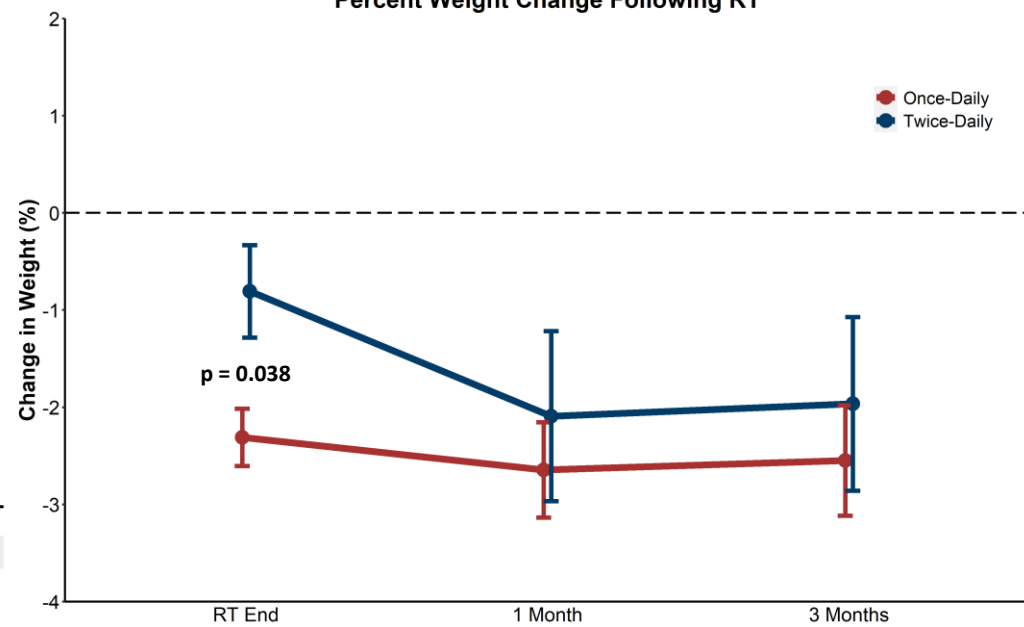
## Grade 2+ Toxicity Rates



	Radiotherapy Fractionation		
	Once-Daily <sup>1</sup>	Twice-Daily <sup>1</sup>	p-value <sup>2</sup>
<b>Patient-reported Swallow Ability</b>			<b>0.028</b>
No Problems or Mild Soreness Only	81% (n=115)	62% (n=16)	
Difficulty or Inability Swallowing Solids/Liquids	19% (n=27)	38% (n=10)	

<sup>1</sup> % (n=n)  
<sup>2</sup> Pearson's Chi-squared test

## Percent Weight Change Following RT



# Summary

- Approximately 15% of LS-SCLC patients are treated twice-daily
- Selection of twice-daily regimen was highly dependent on treatment site and associated with social status but not baseline clinical factors
- Once-daily treated patients were more likely to experience a treatment break, as on the CONVERT study
  - Weight loss during treatment and once-daily fractionation were significantly associated with a greater odds of a treatment break
  - The difference may be partly explained by delayed toxicity of twice-daily regimen

# Acknowledgements



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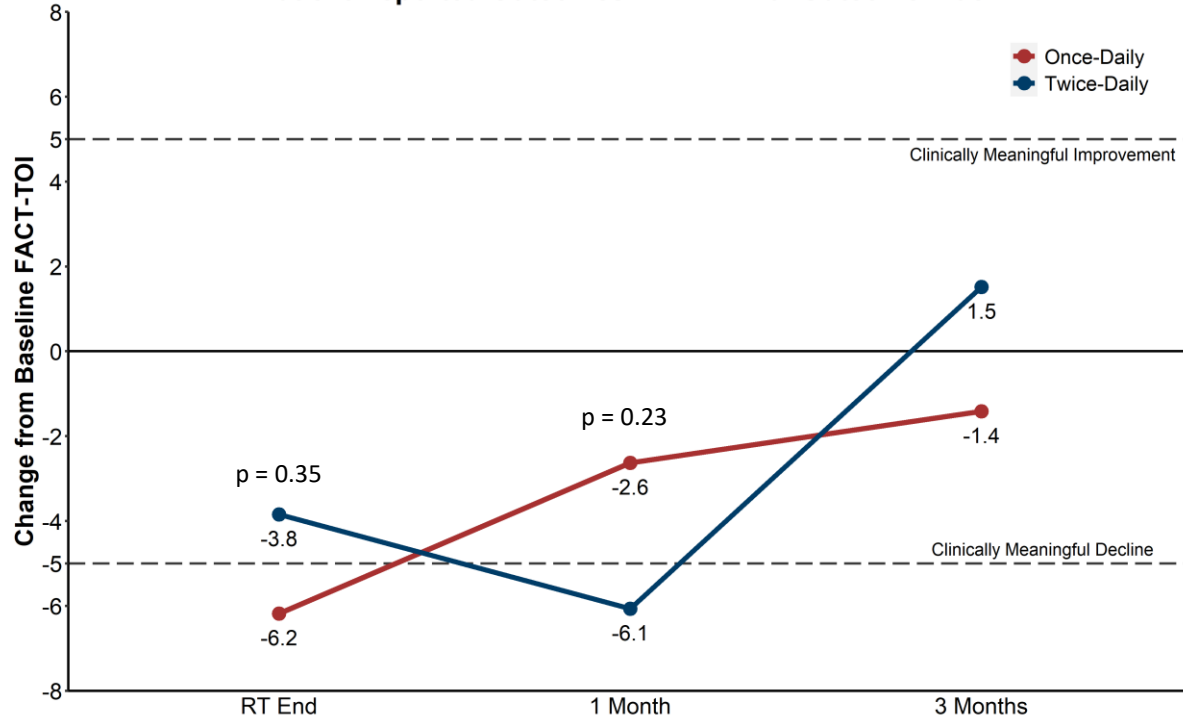
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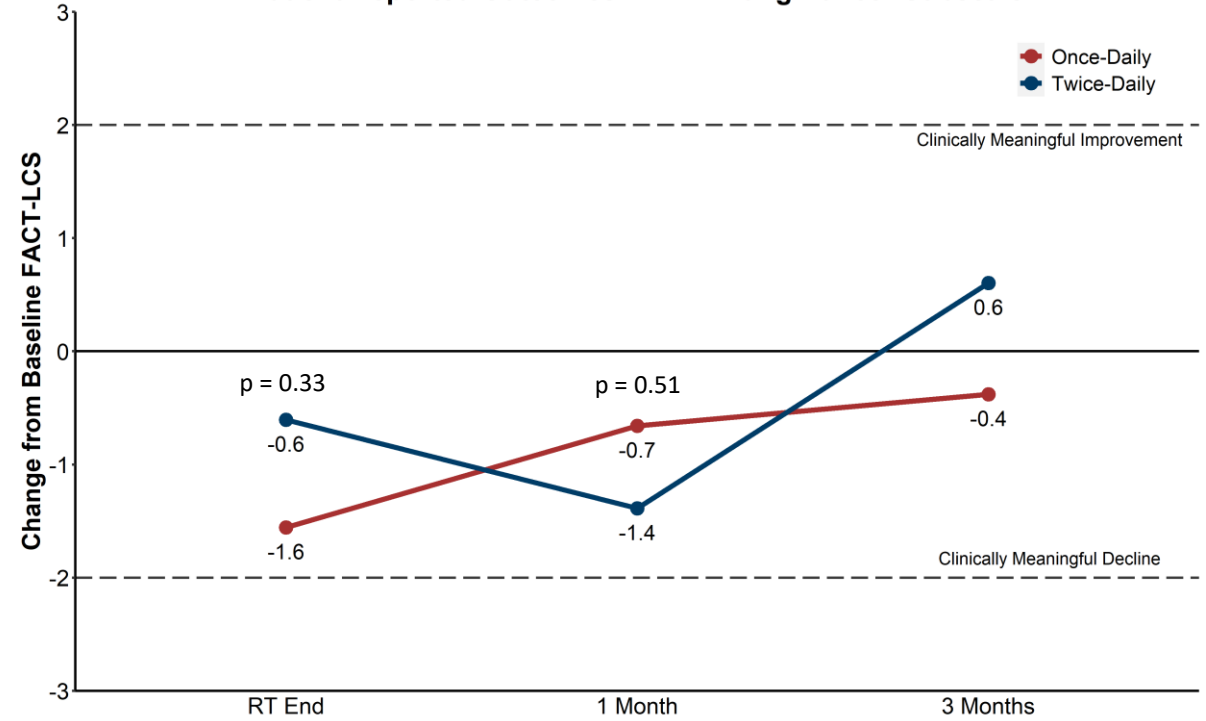
For more information on MROQC, please visit [www.mroqc.org](http://www.mroqc.org).



**Patient Reported Outcomes - FACT-Trial Outcome Index**



**Patient Reported Outcomes - FACT-Lung Cancer Subscale**



## Twice-Daily Fractionation by Treatment Site

(sites treating <1 patient per year)

