

## ABSTRACT

Although the incidence of lung cancer has been decreasing in the United States over the years, there has been no significant improvement in survival rates. The survival rates of non small cell lung cancer (NSCLC) vary depending upon tumor size and initial treatment provided. Access to care is a key predictive factor to a successful treatment of lung cancer. Louisiana (LA), a state recently ranked 49<sup>th</sup> yet again for health care, experiences a high degree of lung cancer mortality. We examined NSCLC incidence, comparing tumor size, treatment and survival in LA compared to the rest of the United States (RON). LA experiences significantly higher incidence rates of NSCLC than RON. We also found racial disparities in the treatment received based on tumor size. More studies from diverse populations are needed to address racial disparities in treatment and survival.

## INTRODUCTION

Lung cancer is the second most commonly diagnosed cancer and the most common cause of cancer related death in the US with 5-year survival of just 15%. Racial disparities in lung cancer incidence, diagnosis, survival, and mortality have been well documented. The state of Louisiana has higher level of racial disparities in health care delivery system in the US. This includes diagnosis, treatment and access to care. Lung cancer incidence has been decreasing in the US over the years, but incidence in LA has been decreasing rather slowly and has been consistently higher than RON. Louisiana also experiences higher mortality and lower survival for lung cancer patients compared to RON. The survival rates of NSCLC vary depending upon tumor size and initial treatment. The objective of this study was to examine tumor size based incidence rates, treatment and survival difference in the LA compared to RON.

## METHODS

Data from cancer registries affiliated with the National Cancer Institute's (NCI) Surveillance, Epidemiology and End Result (SEER) program were used in this study. We conducted the data analysis for incidence cases of NSCLC using SEER\*Stat from 2004-2008. The cases included in which the primary site of cancer were lung or bronchus cancer (C34). We included all non small cell carcinoma categorized in squamous cell carcinoma (8050-8084), large cell carcinoma (8011-8015), and non small-cell carcinoma, NOS (8046). Variables included in the analyses were age, gender, race, stage, tumor size (< 2cm, 2-3.9cm, 4-5.9cm, 6-7.9cm, 8-9.9cm, >10cm), histology, year of diagnosis, type of treatment, SEER registry location.

## STATISTICAL ANALYSIS:

We examined age adjusted incidence rates of NSCLC by frequency and percent distribution. We conducted the analysis by age, gender, race, ethnicity, number of primaries, AJCC (American Joint Committee on Cancer) staging, treatment type (e.g. surgery, radiation). We also analyzed survival rates for NSCLC based on demographic, and/or clinical variables of interest.



# Non small cell lung cancer incidence rates, treatments and survival based on tumor size: A comparative analysis for State of Louisiana (LA) to the rest of the United States (RON)

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## RESULTS

A total of 153,469 NSCLC cases were diagnosed from 2004 to 2008 in all SEER registries. The overall age adjusted incidence (2004-08) of NSCLC was significantly higher in LA compared to RON (32.04 vs 22.04). The rates of NSCLC were significantly higher for whites (30.96 vs 22.75) and blacks (36.14 vs 29.75) in LA vs RON, although other races did not show significant differences. The rates of NSCLC were significantly higher for all age groups in LA compared to RON except in age less than 20 years (see table).

The 5-year relative survival was significantly lower for LA compared to the RON (12.4% vs 14.2%). Both gender had significantly lower survival rate in LA compared to the RON (Males 12.6% vs 13.4% and Females 11.9% vs 15.4%). The relative 5-year survival rates were lower for LA compared to the RON for whites (16% vs. 18.6%) and for blacks (12.9% vs. 15.5%). Surgery is an important treatment option in early stages of NSCLC. For all tumor sizes of NSCLC, patients in LA were less likely to receive any surgery compared to the RON. Moreover, patient in LA were more likely to receive radiation therapy in advance stages of NSCLC compared to RON.

Males in LA had significantly higher incidence rates for all tumor sizes compared to RON, while females in LA had significantly higher incidence rates for all tumor sizes > 2cm compared to RON. We observed significantly lower rates for Blacks to be diagnosed with tumor sizes < 4 cm than in whites in LA which was reversed for tumor size >4 (see figure 1). We did not find any significant differences based on race for other tumor sizes. In our analysis, blacks were less likely to receive any type of surgery for NSCLC tumor sizes < 4cm than whites in the both LA and RON. Blacks were significantly more likely to receive radiation for tumor sizes > 6 cm in LA than whites, while this trend was observed for tumor size > 2 cm for blacks in RON. We also observed statistically significant racial differences in the treatment delivered.

Figure 1- Incident rates of NSCLC based on race vs tumor size (2004-2008) in LA

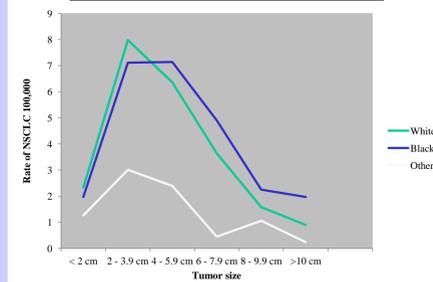


Figure 2 - Incident rates of NSCLC based on race vs tumor size (2004-2008) in RON

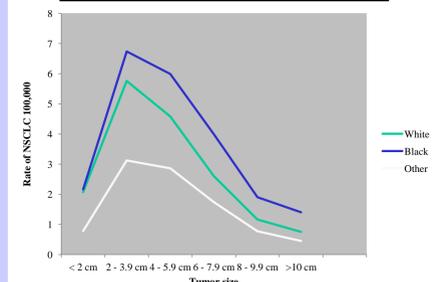


Table 1: Descriptive characteristics – rates based on demographic characteristics and tumor size – LA vs RON

Characteristics	Louisiana (LA)	Rest of the US (RON)
Overall rate	32.03	22.04*
<b>Gender</b>		
Male	47.61	29.97*
Female	20.30	16.65*
<b>Race</b>		
White	30.96	22.75*
Black	36.14	29.75*
Others	10.98	13.39
<b>Age groups</b>		
<20 years	0.02	0.00
20-39 years	0.56	0.31*
40-59 years	24.23	12.82*
60-79 years	159.39	112.91*
>80 years	132.75	120.66*
<b>Tumor size</b>		
< 2cm	2.23	1.95*
2-3.9 cm	7.73	5.58*
4-5.9 cm	6.50	4.52*
6-7.9 cm	3.91	2.62*
8-9.9 cm	1.74	1.17*
>10 cm	1.17	0.77*

Rates are per 100,000 and age-adjusted to the 2000 US standard population. \*Rate is significantly different for LA than RON. (p<0.05)

Table 2 – Rates and rate ratio for surgery or radiation not as a preferred mode of treatment based on the tumor size

Tumor size	No surgery of primary site		Rate Ratio: LA vs RON	Tumor size	No radiation treatment		Rate Ratio: LA vs RON
	LA	RON			LA	RON	
< 2 cm	1.38	1.00*	1.38	< 2 cm	1.28	1.29	0.99
2 cm – 3.9 cm	5.65	3.72*	1.52	2 cm – 3.9 cm	3.97	3.31*	1.20
4 cm – 5.9 cm	5.43	3.52*	1.54	4 cm – 5.9 cm	2.97	2.32*	1.28
6 cm – 7.9 cm	3.47	2.19*	1.58	6 cm – 7.9 cm	1.58	1.26*	1.23
8 cm – 9.9 cm	1.59	1.00*	1.59	8 cm – 9.9 cm	0.72	0.55*	1.31
≥ 10 cm	1.04	0.67*	1.55	≥ 10 cm	0.48	0.36*	1.33
Unknown	8.53	5.32*	1.60	Unknown	4.69	3.30*	1.42

Rates are per 100,000 and age-adjusted to the 2000 US standard population. \*Rate is significantly different for LA than RON. (p<0.05)

Figure 3- Rates of radiation LA vs RON by tumor size (2004-2008)

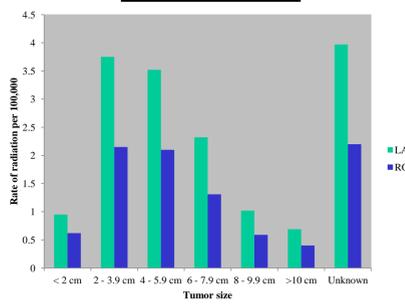
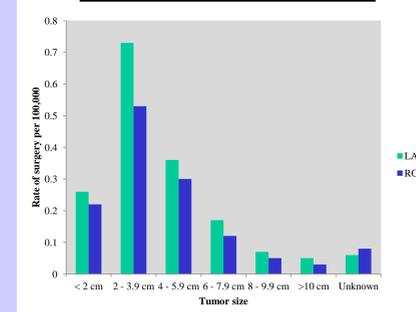


Figure 4- Rates of surgical treatment by tumor size in LA vs RON (2004-2008)



## CONCLUSIONS

LA population has significantly higher incidence rates of RON for NSCLC. Moreover, we found racial disparities in treatment received in both the regions based on the tumor size. Studies focusing on access to care and early diagnosis affecting outcome should be conducted. More studies from diverse populations are needed to address racial disparities in treatment and survival. Policy makers also need to focus on poor lung cancer outcomes in LA compared to RON.

## REFERENCES

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