



Exploring Survival Rates and Gene Mutations of Lung Cancer Patients Based on Sex and Smoking History

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Effects of Lung Cancer Worldwide



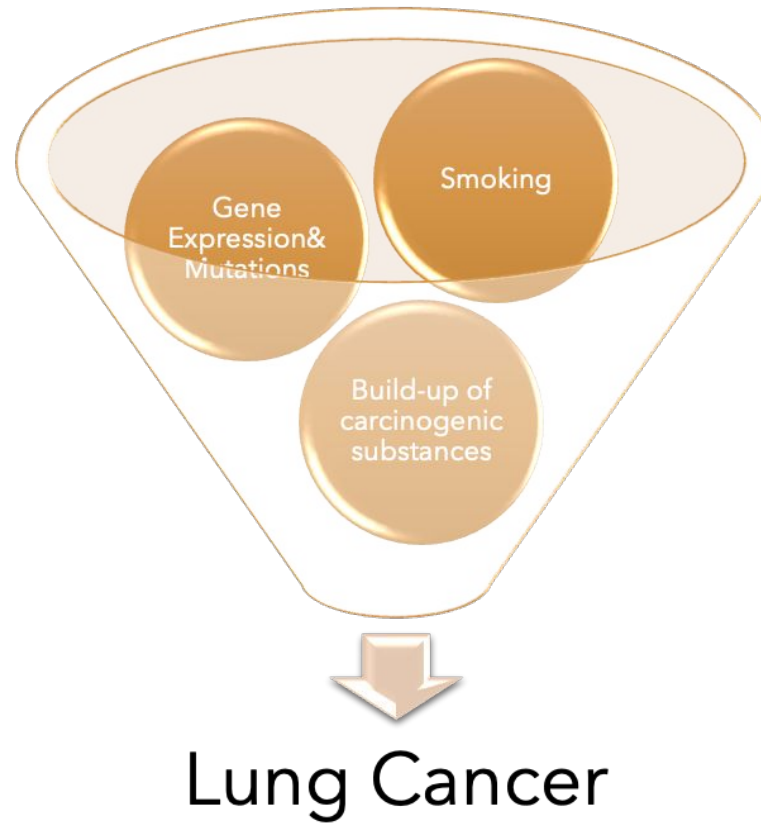
Most diagnosed cancer

- 2 million diagnoses per year

Highest worldwide death rate

- 1.8 million deaths per year

Introduction



Introduction



Previously Known Overexpressed Lung Cancer Genes

- CYP1A1 and GSTM1

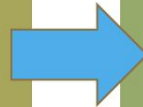
Previously Known Smoking-Affiliated Lung Cancer Genes

- KLF6, TERT, MSH5, GATA3

Research Question



Are certain genes expressed differently in males and females that present with lung cancer?



Does smoking affect gene expression/mutation rates and can that difference be discerned between biological sex?

Clinical Data from TCGA



	Males	Females	Total
Nonsmokers	25	58	83
Current Smokers	74	59	133
Reformed Smokers (>15)	78	69	147
Reformed Smokers (≤ 15)	75	107	182
Total	252	293	545

Methods



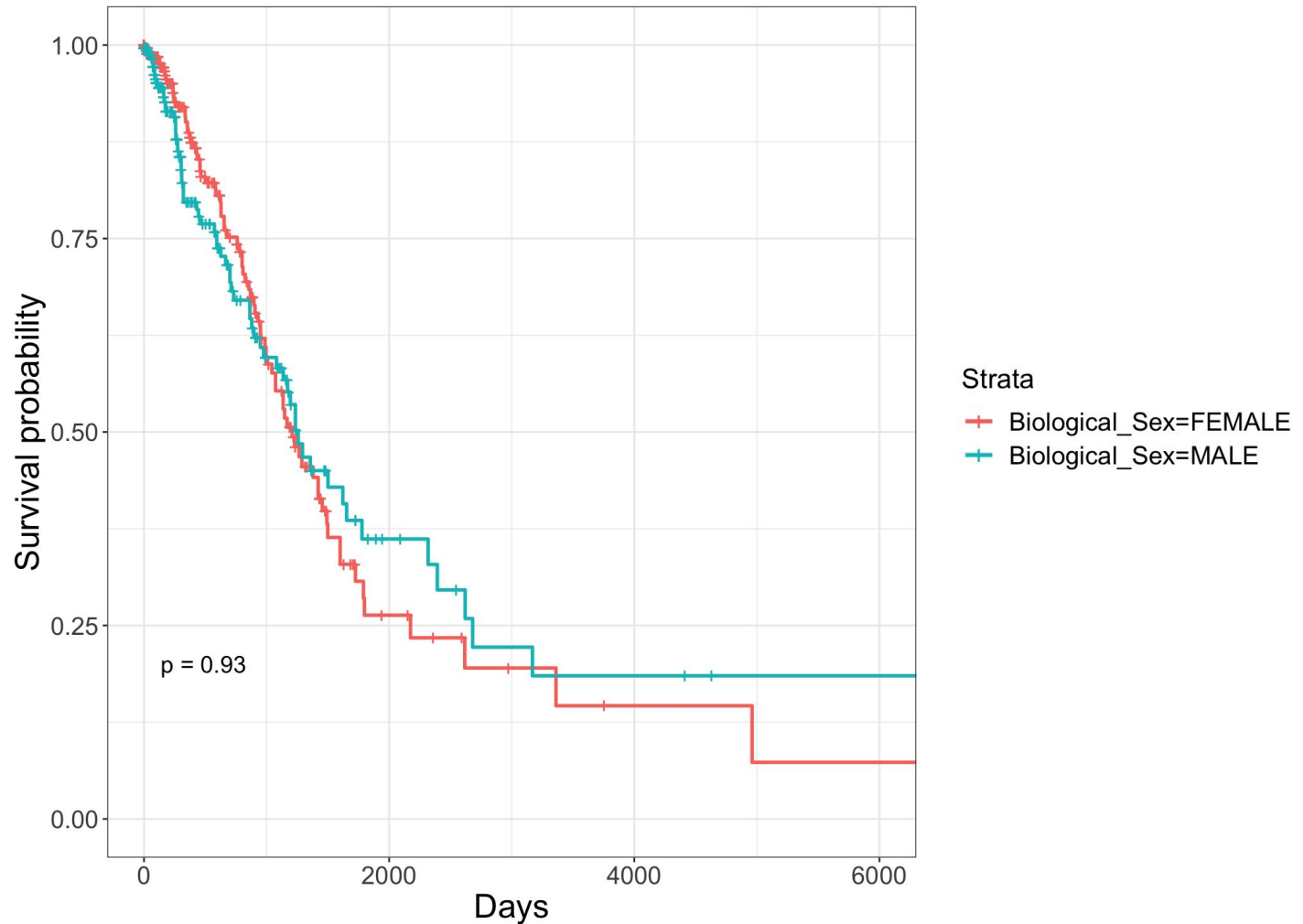
R

- TCGABioLinks
- DESeq2
- maftools
- survival & survminer

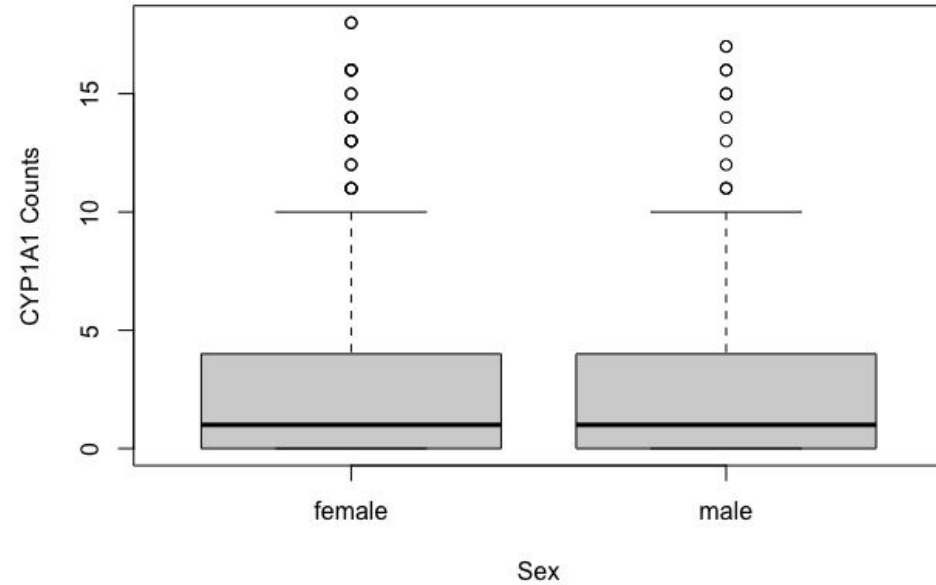
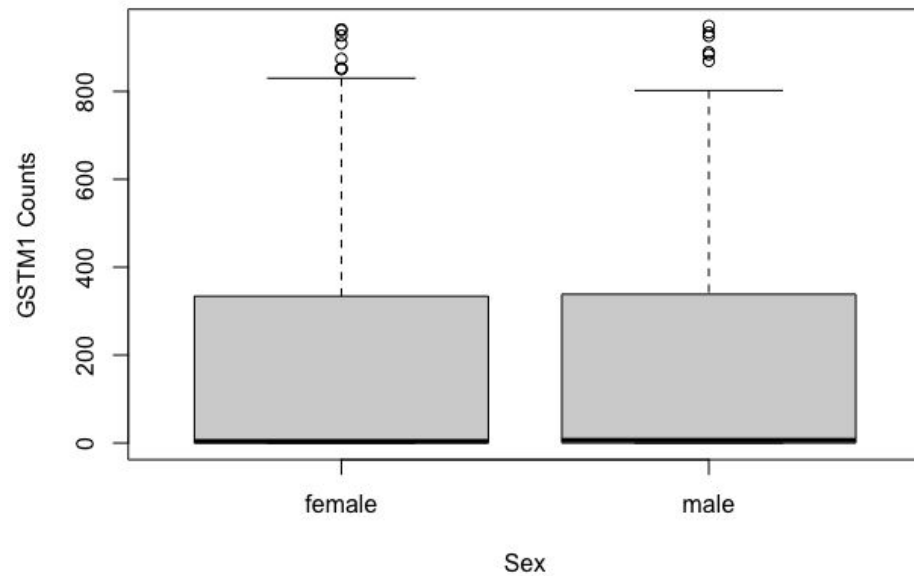
Python

- Seaborn
- CPTAC
- Matplotlib
- SciPy

Kaplan-Meier Plot Shows No Significant Difference in Survival Between Males and Females



Boxplot Shows No Significant Difference in CYP1A1 and GSTM1 Gene Counts Between Sex



Discussion



Are certain genes expressed differently in males and females that present with lung cancer?

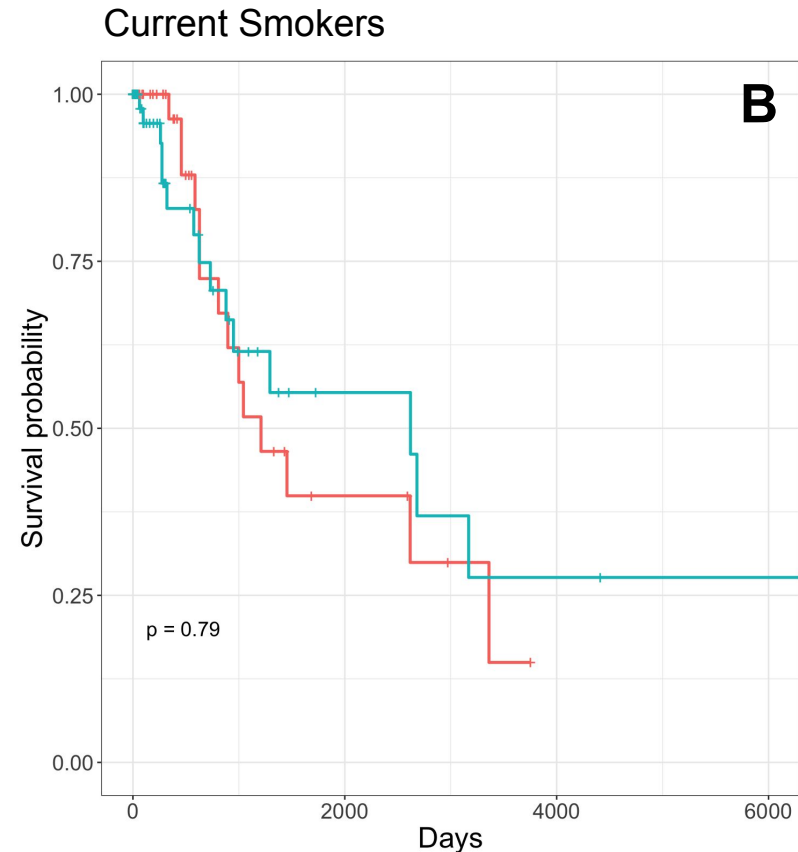
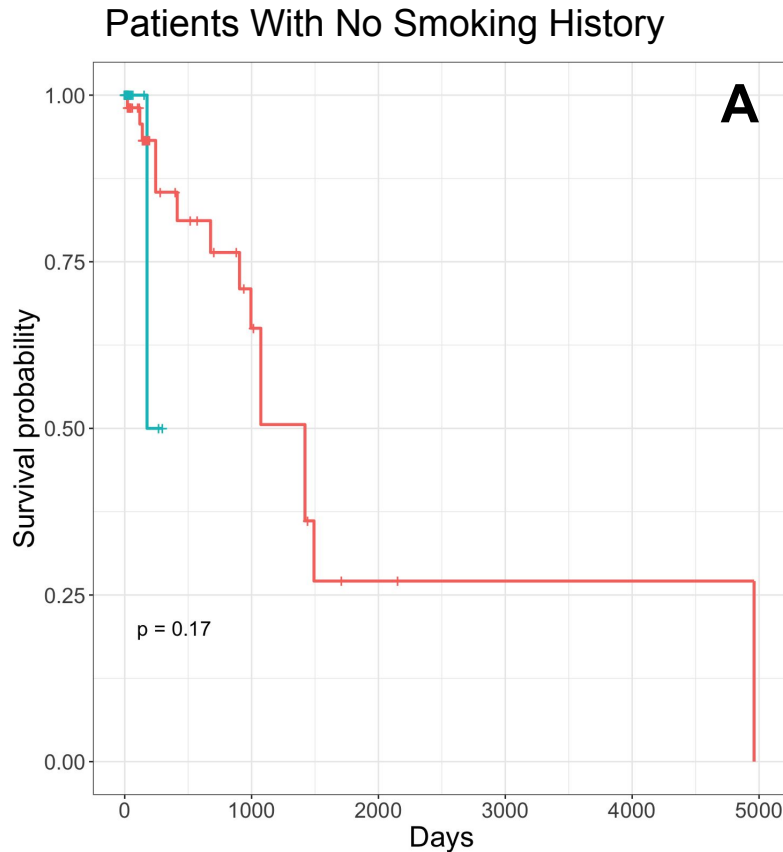


Hard to answer the question since no significant difference in sex and genes counts

- Kaplan-Meier Plot in Survival Between Males and Females
- Boxplot in CYP1A1 and GSTM1 Gene Counts Between Sex

Limitation: Small sample size leads to the inaccurate result

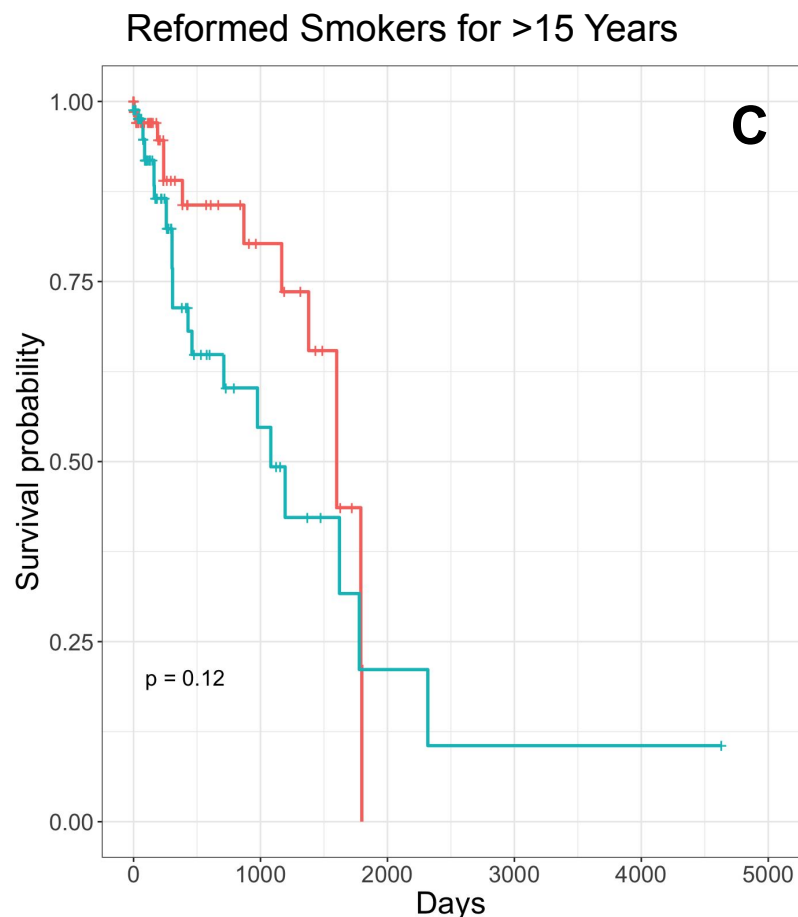
Kaplan-Meier Plots Show No Significant Difference in Survival Between Sex of Different Tobacco Smoking History



Strata

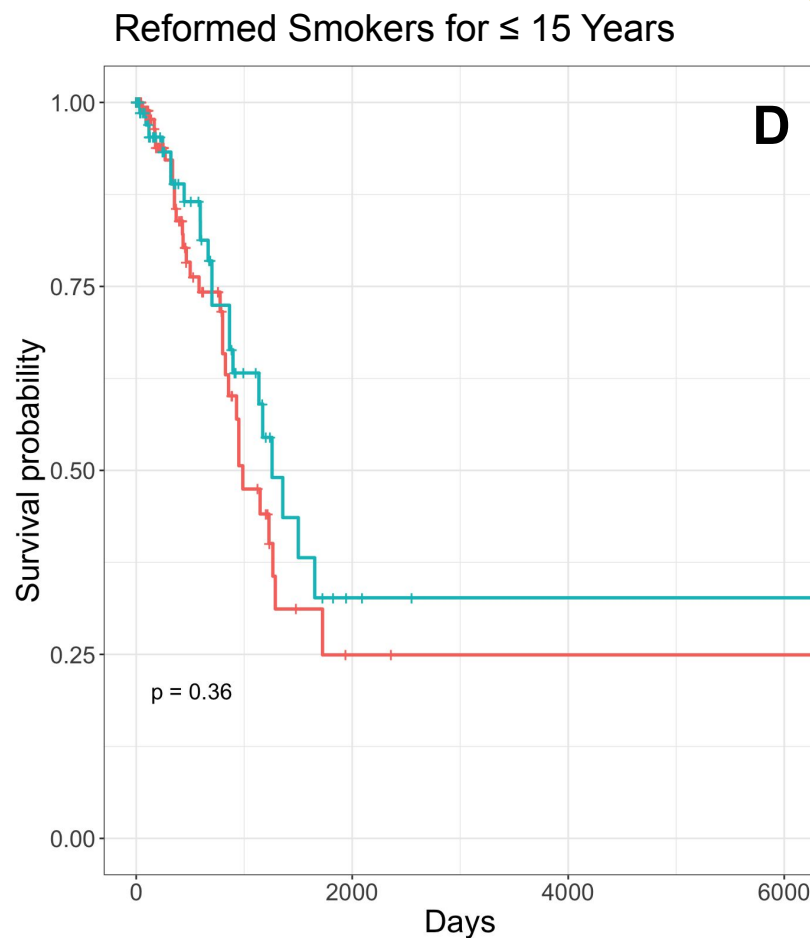
- + Biological_Sex=FEMALE
- + Biological_Sex=MALE

Kaplan-Meier Plots Show No Significant Difference in Survival Between Sex of Different Tobacco Smoking History (Cont.)



Strata

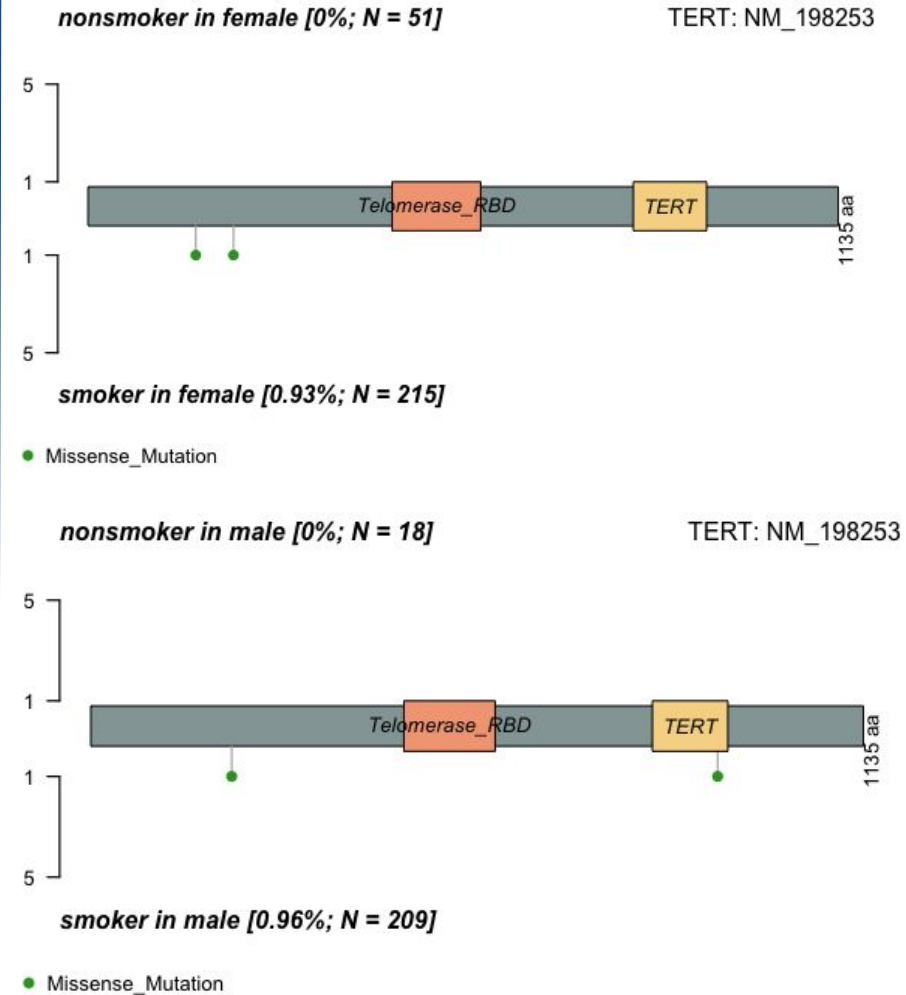
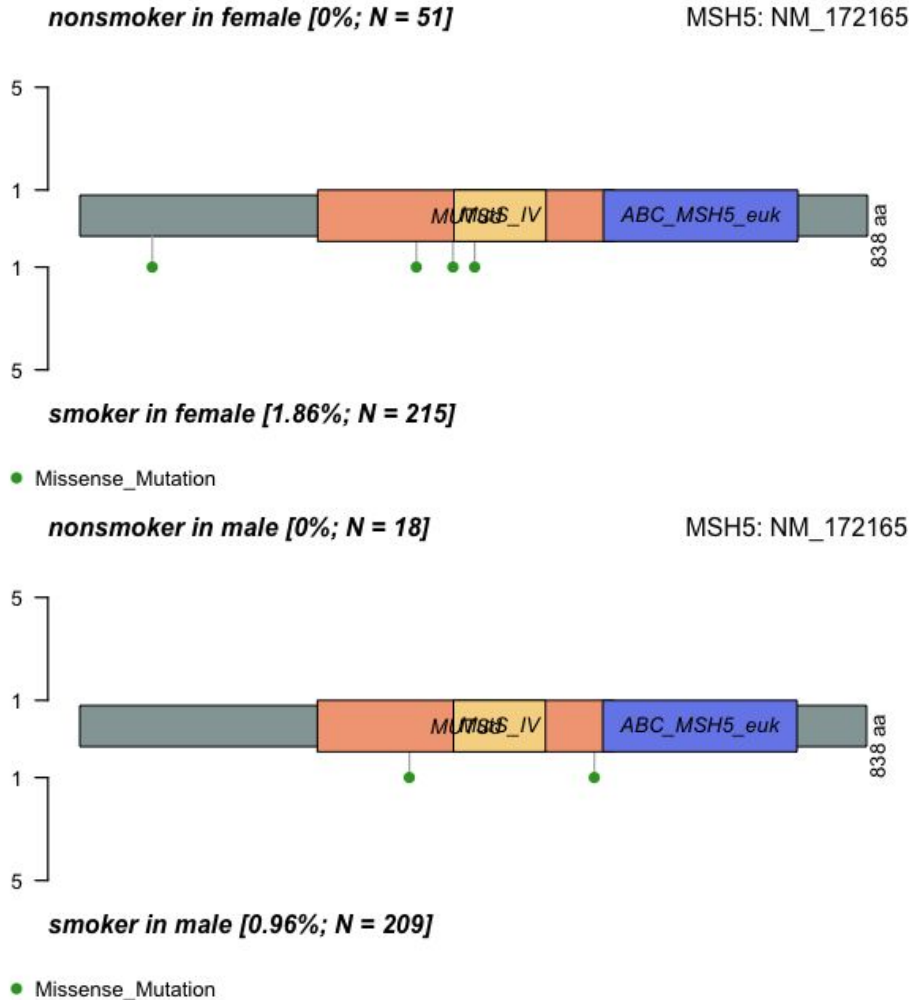
- + Biological_Sex=FEMALE
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Mutations in GATA3 Occur in Smoker Group from Lollipop Plot



Less Frequent Mutations in MSH5 and TERT



Discussion



Does smoking affect gene expression/mutation rates and can that difference be discerned between biological sex?



Smoking affects the gene expression and mutations rates

- lollipop plot of GATA3, KLF6, MSH5, and TERT gene shows mutations only occur in smokers which could POTENTIALLY mean that they are smoking-related gene

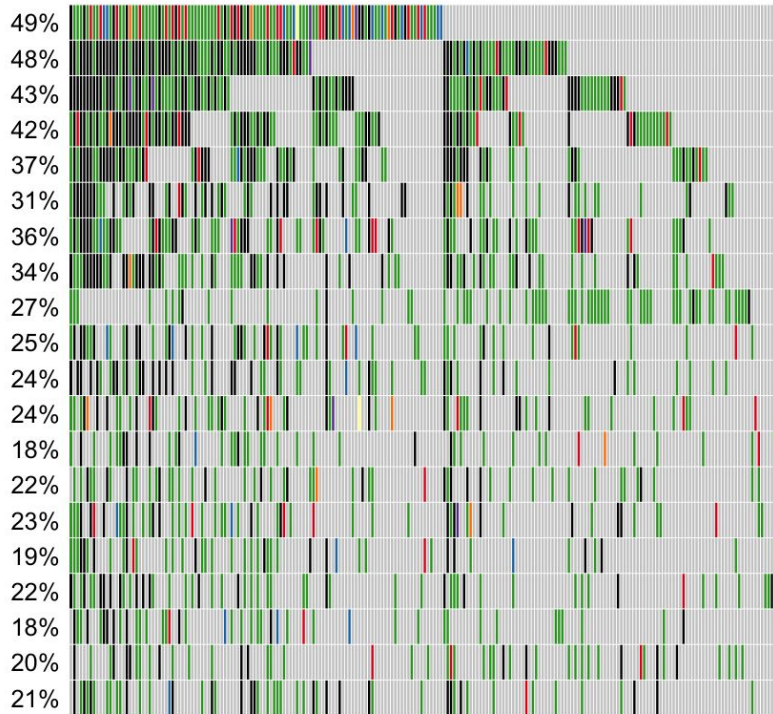
correlation exists between one single factor (sex or smoking) and lung cancer but hard to find the combination of factors that plays a role in lung cancer

- Kaplan-Meier Plots Show No Significant Difference in Survival Between Sex of Different Tobacco Smoking History

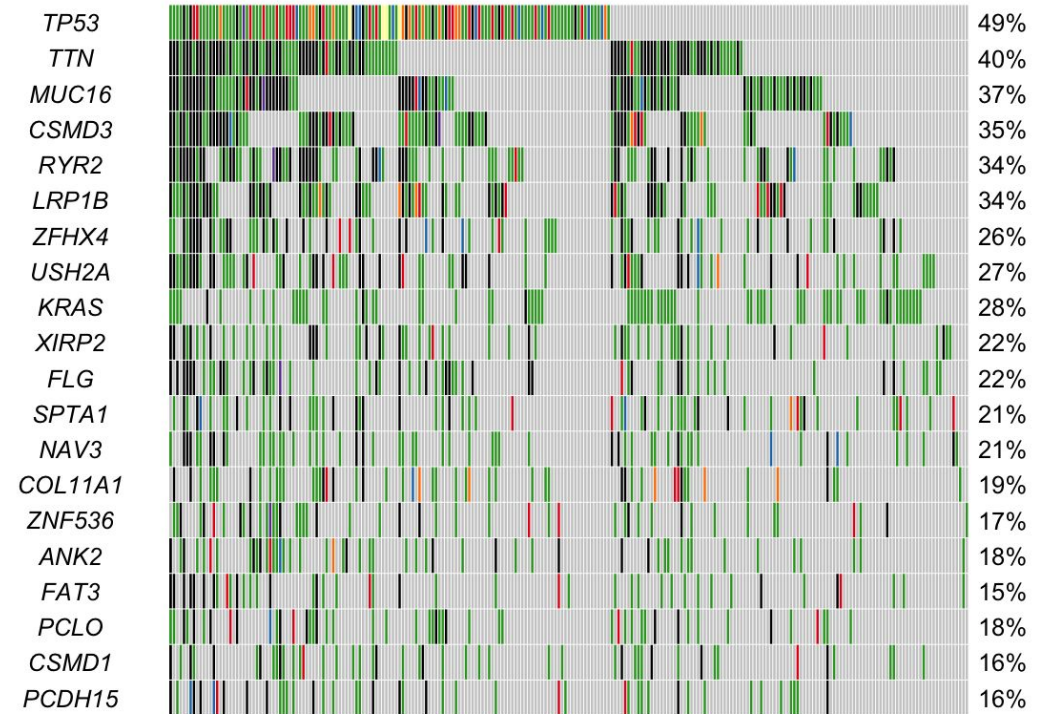
Oncoplot of Top 20 Frequently Mutated Genes



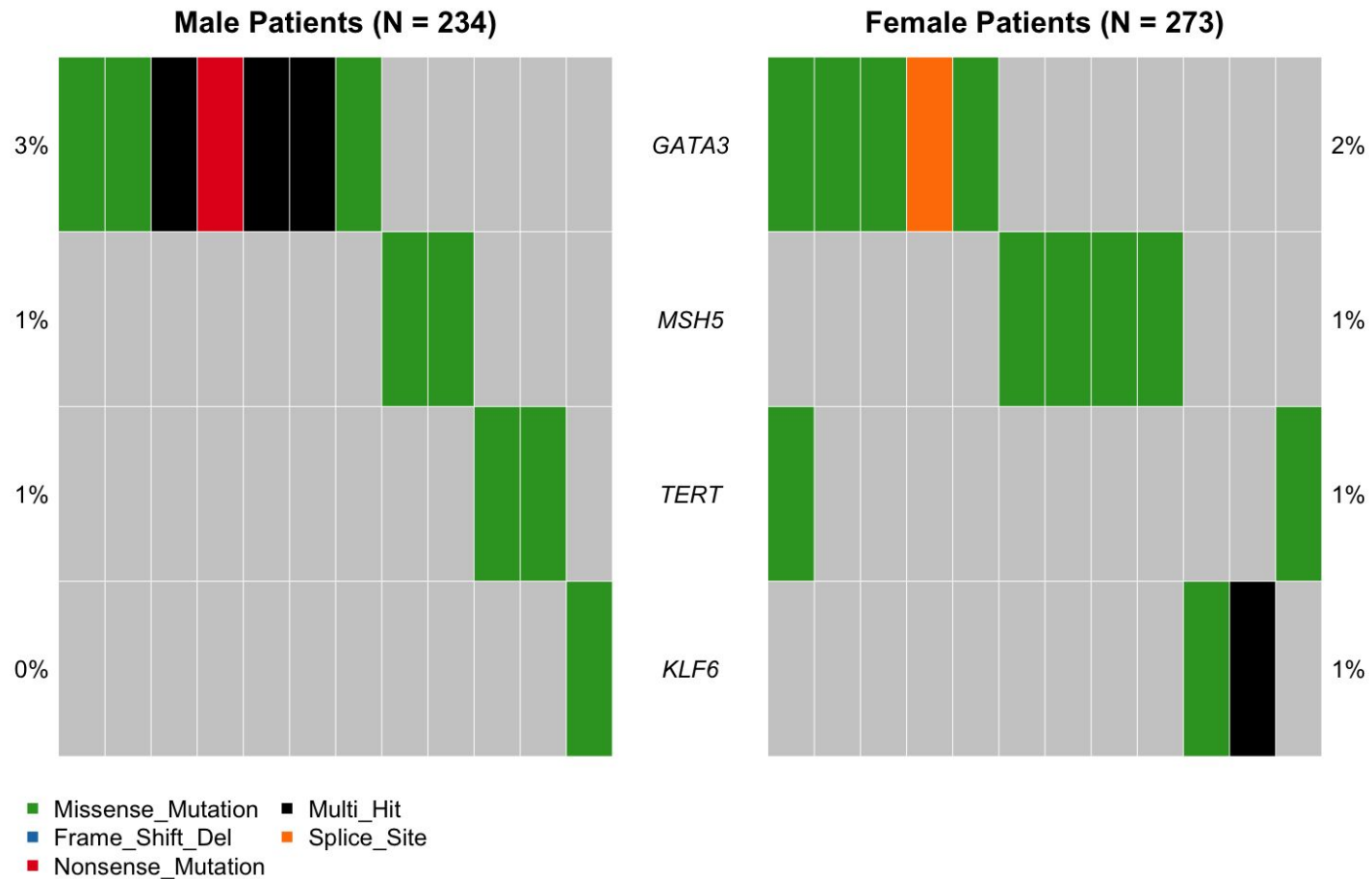
Male Patients (N = 234)



Female Patients (N = 273)



Oncoplot of Top 20 Frequently Mutated Genes



Acknowledgements



Ellison Institute

- Dr. Jerry Lee

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Reference





Thanks for listening!

Questions?