# Prevalence of KRAS p.G12C mutation in patients with metastatic non-small cell lung cancer in Argentina

BIOMAKERS® MOLECULAR PATHOLOGY & RESEARCH

**Abstract #E21155**

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## Background

*KRAS* is mutated in ~30% of non-small-cell lung cancer (NSCLC). Most of the mutations involve codon 12 of exon 2, with G12C mutation being the most frequent (~12%). Differences in mutational frequency have been demonstrated in patients of different ethnicities and smoking status. However, the effects of ancestry and environmental factors have not been exhaustively described for the Argentine population.

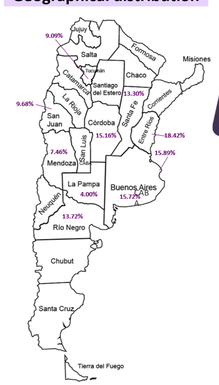
## Methods

- ✓ An **observational study** was conducted in a cohort of 1810 patients: 1510 retrospective tissue samples and 300 prospective tissue samples
- ✓ Samples were analyzed by quantitative real time PCR (qPCR) using AmoyDX KRAS Mutation Detection Kit.
- ✓ A validation was also performed on 181 tissue samples by digital droplet PCR (ddPCR) with the commercial kit PrimePCR™ ddPCR™ Mutation Detection Assay Kit: KRAS p.G12C (Biorad).
- ✓ Statistical analyses were performed to address the association of KRAS p.G12C across demographics characteristics such as smoker-ex smoker / no smoker condition, sex, age, geographical distribution, histological subtype, metastasis or primary tumor and organ site of metastasis.
- ✓ The statistical analyzes have been carried out applying: the Chi-square test for the association between KRAS G12C and each of the other variables, and the multiple logistic regression adjusted by sex for the Forest Plot, Bar Plot and Oncoprint. All analyzes have been carried out in R.

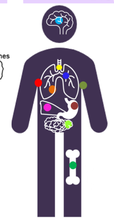
## Results

**1) Cohort description: 1810 samples were analyzed by qPCR.**

**Geographical distribution**




**Biopsy site**



| | |
|---|---|
| Lung | 42,54% |
| Pleura | 11,82% |
| Regional node | 9,89% |
| Bronchus | 9,23% |
| Brain | 5,8% |
| Soft parts | 4,97% |
| Non-regional node | 4,86% |
| Bone | 4,14% |
| Liver | 2,82% |
| Mediastinum | 2,27% |
| Others | 1,66% |

**Smoking condition**

Smokers: **40%**

Ex smokers: **33%**

No smokers: **20%**

**Tumor stage**

Stage III: **12%**

Stage IV: **88%**

**Sex**

Male: **56%** Female: **44%**

**Histologic subtype**

Adenocarcinoma: **81%**

Squamous: **4%**

NSCLC: **15%**

**Tumor type**

Primary: **64%**

Metastatic: **36%**

## CONCLUSIONS

- ❖ It is possible to genotype KRAS p.G12C with a significant success rate by qPCR in Argentine patients with NSCLC.
- ❖ A prevalence of 14.48% in KRAS p.G12C was observed coincides with that reported in the bibliography
- ❖ A significant association was observed between clinical variables and KRAS p.G12C prevalence:

-The proportion of KRAS p.G12C is increased in stage IV samples compared to stage III (p= 0.01).

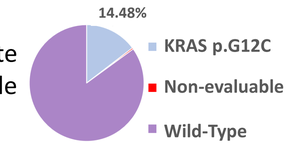
-The proportion of KRAS p.G12C is increased in active smokers/ex-smokers compared to non-smokers (p<0.0001).

-The proportion of KRAS p.G12C decreases in samples from the pleura as a biopsy site.

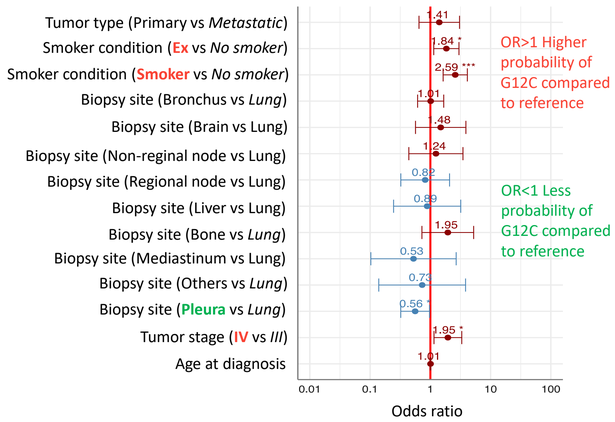
-Our results suggest that there is a 92.05% concordance between qPCR KRAS p.G12C kit and ddPCR.

## Results

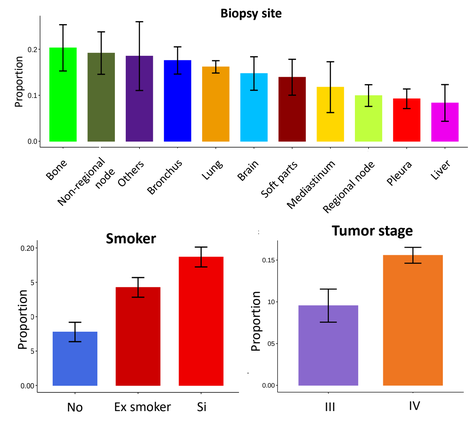
**2) KRAS p.G12C genotyping in solid biopsies by qPCR:** It is possible to evaluate KRAS p.G12C with qPCR since only 0.38% of the samples had a non-evaluable result. A prevalence of 14.48% is evidenced in the Argentine population.



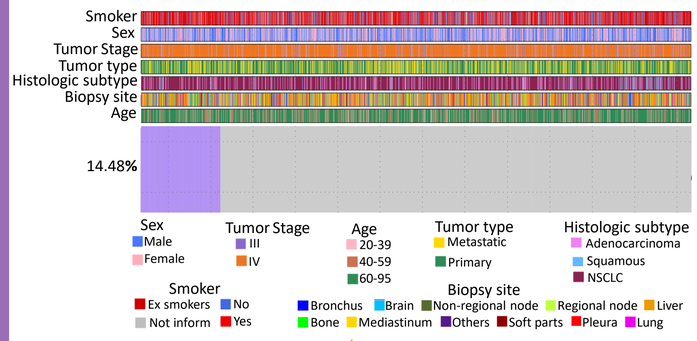

**3A) Forest Plot:**




**3B) Bar Plot:**




**4) Oncoprint:** Graphical representation of KRAS p.G12C alteration and its association with variables such as: tumor stage, smoker condition, age, sex, tumor type, histologic subtype and tumor biopsy site.




**5) Validation between qPCR and ddPCR:** Validation parameters values

| KRAS p.G12C | | | Predicted | |
|---|---|---|---|---|
| | | | ddPCR (Biorad) | |
| | | | Positive | Negative |
| Reference | qPCR (AmoyDx) | Positive | 25 | 6 |
| | | Negative | 8 | 137 |

- Concordance between qPCR and ddPCR: 92.05%
- Sensitivity: 80.65%
- Specificity: 94.48%
- False positives: 5.52%
- False negatives: 19.35%

## Future Directions for Research

This study represents a deep understanding of KRAS p.G12C mutational landscape in the Argentine population and its association with demographic and clinical characteristics and demonstrates that qPCR is a feasible methodology for routine testing.