ANALYSIS OF BRAF AND RAS GENETIC ALTERATIONS IN THYROID CANCER IN THE GREEK POPULATION

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OBJECTIVES

Thyroid cancer is one of the most common malignancies of the endocrine system and displays a variety of histological patterns. The understanding of the molecular pathogenesis and the identification of molecular markers which will be used for diagnosis and prognosis is of high clinical significance. The most common molecular alterations include *BRAF* and *RAS* point mutations and *RET/PTC* and *PAX8/PPARγ* rearrangements. The present study investigated the association of *BRAF* and *RAS* mutations with thyroid cancer in a representative sample of the Greek population.

METHODS

The study included 65 patients: 54 with Papillary Thyroid Cancer (PTC), 7 with Follicular, 3 with Medullary and 1 with Low Differentiation Thyroid Cancer. Following the isolation of genomic DNA from tissue biopsies a) real-time Polymerase Chain Reaction (PCR) and b) PCR and sequencing were used for the identification of mutations in codon 600 of the BRAF gene and in codons 12, 13 and 61 of the *HRAS, KRAS* and *NRAS* genes.

Graphs and tables

Primer sequences used for the screening of the specific genetic mutations.

Gene	Primer sequence (5'→3')	Mutation site	Product size (bp)
BRAF	F:CATAATGCTTGCTCTGATAGGAA R:AGTAACTCAGCAGCATCTCAG	Codon 600 (GTG)	244
HRAS	F: CAGGAGACCCTGTAGGAG R: TATCCTGGCTGTGTCCTG	codons 12 - 13 (GGC-GGT)	225
	F: TGTCCTCCTGCAGGATTC R: GTACTGGTGGATGTCCTC	codon 61 (CAG)	189
NRAS	F: AAAGTACTGTAGATGTGGCTC R: GTGAGAGACAGGATCAGG	codons 12 - 13 (GGT-GGT)	224
	F: GATTCTTACAGAAAACAAGTG R: ATGACTTGCTATTATTGATGG	codon 61 (CAA)	157
KRAS	F: AACCTTATGTGTGACATGTTC R: TCCTGCACCAGTAATATGC	codons 12 - 13 (GGT-GGC)	216
	F: AATCCAGACTGTGTTTCTCC R: TTAAACCCACCTATAATGGTG	codon 61 (CAA)	217

RESULTS

BRAF mutations were identified in 8 PTC samples, half of which were of follicular subtype. All mutations include a 1799T→A conversion and a valine to glutamic acid substitution at codon 600. A PTC of follicular subtype was identified harboring a mutation in the *NRAS* gene (181C→A, resulting in a glutamine to lysine change in codon 61). Both mutations result in the activation of the MAP kinase signaling pathway. No mutations were identified in the specific codons of *KRAS* and *HRAS* genes.

CONCLUSIONS

Although the sample number is relatively small, the significantly low percentages of *BRAF* and *RAS* mutations point to the conclusion that the molecular alterations leading to thyroid cancer in the Greek Population may differ compared to those previously reported, and this consideration should be taken into account regarding the pathogenesis, progression and treatment of thyroid cancer.

References

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