*Acta Med. Nagasaki* 51: 144

# Gene Rearrangements in Post-Chernobyl Thyroid Tumours

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The Chernobyl accident in 1986 offered the unique opportunity to study molecular genetic mechanisms of radiation-induced thyroid carcinomas. In these tumours we have investigated gene rearrangements along the MAP kinase pathway. In particular, we have analysed rearrangements of the RET proto-oncogene (RET/PTC) by RT-PCR and interphase fluorescence in situ hybridisation (FISH) and gene fusion of BRAF by interphase FISH on paraffin-embedded tissue sections. For RET/PTC analysis we have compared tumours that occurred after a longer period of time (9 to 12 years after the accident) with tumours developed after 4 to 8 years after the accident. A significant clustering of aberrant cells could be detected in the long-latency subgroup, whereas the cells were more homogeneously distributed among the short-latency tumours. BRAF, another component of the MAPK pathway, has been investigated for gene fusion with the AKAP9 gene. Similar to RET/PTC the tumours were composed of a mixture of cells with and without BRAF/AKAP9 fusion on FISH.

These findings suggest that oligoclonal tumour development occurs in post-Chernobyl papillary thyroid carcinomas. Based on these findings we have further analysed these tumours for additional gene alterations using array CGH which allows a whole genome screening for amplified and deleted genes. The analysis of RET/PTC-positive and RET/PTC-negative revealed distinct differences in gene aberration patterns as well as further candidate genes that are likely to be involved in radiation-induced tumour genesis of the thyroid gland.

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