MiR-203a-3p, miR-204-3p, miR-222-3p as useful diagnostic and prognostic tool for thyroid neoplasia spectrum

Abstract

Purpose: The challenge in the diagnosis and treatment of thyroid carcinoma is to correctly classify neoplasias with overlapping features and to identify the high-risk patients among those with a less aggressive form, in order to personalize the treatment of thyroid carcinoma patients accordingly.

Methods: MiR-203a-3p, miR-204-3p, and miR-222-3p levels were determined in 99 cases of thyroid neoplasias (77 papillary thyroid carcinomas (PTC) of diverse variants, 12 follicular thyroid adenomas (FTA) and 10 nodular goiters (NG)) along with 99 adjacent non-malignant thyroid tissues using quantitative RT-PCR. The results were evaluated in comparison with the clinicopathological features of the patients and available TCGA data.

Results: Down-regulated miR-203a-3p indicates the presence of thyroid tumor (PTC or FTA) with high sensitivity (75%) and specificity (73%), while its up-regulation indicates NG. If miR-203a-3p is down-regulated, up-regulated miR-204-3p with high sensitivity (83.3%) and specificity (74.4%) indicates FTA presence, while up-regulated miR-222-3p, with high sensitivity (76.6%) and specificity (75.0%), points to PTC. The expression of miR-204-3p and miR-222-3p depends on the PTC subtype ($P < 0.05$). While the deregulated expression of tested miRs is associated with a long-range of unfavorable clinicopathological parameters of PTC, only abundant expression of miR-222-3p may be used as an independent predictive factor for the presence of extrathyroid invasion and advanced pTNM stage of PTC ($P < 0.05$).

Conclusion: Successive evaluation of miR-203a-3p, miR-204-3p, and miR-222-3p expression can help in the differential diagnosis of thyroid neoplasias. A high relative value of miR-222-3p expression is an independent predictive factor for the presence of extrathyroid invasion and advanced pTNM stage of PTC. The panel consisting of miR-203a-3p, miR-204-3p, and miR-222-3p could be used as a diagnostic and prognostic tool for personalizing the treatment of thyroid cancer patients.