MicroRNAs as novel biomarkers for the differentiation of malignant versus benign thyroid lesions: a meta-analysis

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ABSTRACT. The aim of this meta-analysis was to systematically evaluate the diagnostic accuracy of microRNAs (miRNAs) in distinguishing malignant thyroid lesions from benign ones and to determine the potential of miRNAs as diagnostic biomarkers for thyroid cancer. The random-effect model was used to summarize the pooled estimates of diagnostic accuracy, including sensitivity, specificity, positive likelihood ratio (PLR), negative likelihood ratio (NLR), and diagnostic odds ratio (DOR). The summary receiver-operating characteristic curve (SROC) and area under the SROC curve (AUC) were used to further evaluate the overall diagnostic value. Overall, 20 studies from 7 articles, including 266 thyroid cancer patients and 277 controls with benign thyroid disease, were available for analysis. The pooled sensitivity, specificity, PLR, NLR, and DOR were: 0.78 (95%CI = 0.74-0.81), 0.73 (95%CI = 0.69-0.77), 3.17 (95%CI = 2.28-4.40), 0.30 (95%CI = 0.23-0.39), and 12.6 (95%CI = 8.26-19.4), respectively, and the AUC value was 0.85. The multiple miRNA assay yielded better diagnostic performance than the single miRNA assay, with sensitivity of 0.90 versus 0.75, specificity of 0.86 versus 0.71, PLR of 6.14 versus 2.71, NLR of 0.13 versus 0.36, DOR of 44.5 versus 8.81, and AUC of

0.95 versus 0.82, suggesting that the multiple miRNA assay is a more credible method for thyroid cancer detection. In summary, miRNA assays, especially multiple miRNA assays, may play an important role as a second-line diagnostic tool to improve the diagnostic accuracy of fine needle aspiration biopsy in indeterminate lesions. However, further studies are warranted to confirm our findings.

Key words: MicroRNAs; Thyroid cancer; Meta-analysis; Diagnosis