Method for the diagnosis of thyroid cancer based on epigenetic biomarkers

CSIC and FINBA have developed a low-cost method with high effectiveness for the diagnosis and prognosis of thyroid cancer that are difficult to resolve during preoperative evaluation. This methodology provides a malignancy score measuring the methylation level of various CpG sites determined by a machine learning-based classification system.

Industrial partners from the health industry are being sought to collaborate through a patent licence agreement.

*An offer for Patent Licensing*

A solution that might prevent surgery in up to 60% of the cases

Thyroid nodules are commonly seen in clinical practice and ~15 % of them are classified as indeterminate under typical techniques, 65-75% of these being benign after surgery and final histologic evaluation. Thus, an alternative methodology is necessary to improve preoperative diagnostic evaluation.

Researchers from CSIC and FINBA, have studied the correlation between methylation level of various CpG sites and the malignancy of a large group of thyroid nodules, selecting the best predictors provided by machine learning calculations.

The resulting method provides a malignancy score based on a minimum classification system of three CpG sites with an accuracy of 0.91, sensitivity of 0.97 and specificity of 0.88 when they are simultaneously implemented using a cross-validation approach.

DNA methylation status

Machine learning-based classification

Malignancy score
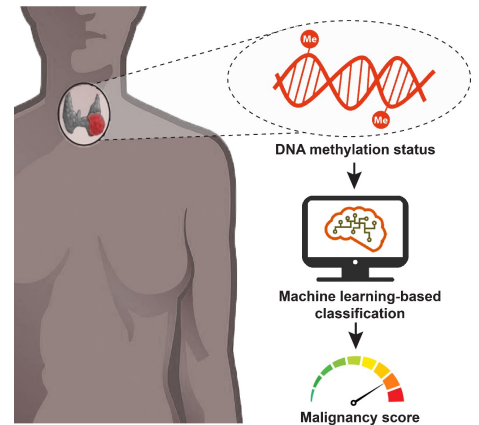
Representative scheme of the diagnostic method

Main innovations and advantages

- It is a proven solution for improving preoperative diagnostic evaluation potentially preventing most of the surgeries in difficult-to-diagnose cases.

- The methylation probes have been reduced with a minimal classification system constituted by three CpG probes. The significant discrimination between benign and malign nodules is obtained using any one of the individual CpG sites.

- The method is cost-effective and presents high accuracy, sensitivity and specificity.

Patent Status

Priority patent application filed suitable for international extension

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