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We claim:

1. A method for determining a patient-specific probability of malignancy in a thyroid nodule, said method including:
 collecting clinical parameters from a plurality of patients to create a training database, the clinical parameters including fine needle aspiration biopsy results, ultrasound data, lymph node size, and imaging data;
 creating a fully unsupervised Bayesian Belief Network model using data from the training database;

validating the fully unsupervised Bayesian Belief Network model;
 collecting the clinical parameters for an individual patient; receiving the clinical parameters for the individual patient into the fully unsupervised Bayesian Belief Network model;
 outputting the patient-specific probability of malignancy in the thyroid nodule from the fully unsupervised Bayesian Belief Network model to a graphical user interface for use by a clinician; and
 updating the fully unsupervised Bayesian Belief Network model using the clinical parameters for the individual patient and the patient-specific probability of malignancy in the thyroid nodule.

2. The method according to claim 1, wherein the clinical parameters further include functional status of the thyroid nodule, number of cervical lymph nodes, serum thyrotropin level, pre-operative diagnosis, nuclear medicine rating, age, and ethnicity.

3. The method according to claim 1, wherein the fine needle aspiration biopsy results include an inadequate score, indeterminate score, negative score, and positive score; wherein the ultrasound data include a complex cyst score, mixed score, simple cyst score, and solid score; and wherein the lymph node size includes a less than 18 centimeters score, 18-31 centimeters score, and greater than 31 centimeters score.

4. The method according to claim 1, wherein the imaging data includes results from electrical impedance scanning.

5. The method according to claim 4, wherein the results from the electrical impedance scanning include a definitely benign score, probably benign score, suspicious for cancer score, probably cancer score, and definitely cancer score.

6. The method according to claim 1, wherein said creating of the fully unsupervised Bayesian Belief Network model includes creating the fully unsupervised Bayesian Belief Network model without human-developed decision support rules.

7. The method according to claim 1, further including estimating an accuracy of the patient-specific probability of malignancy in the thyroid nodule, the accuracy including at least one of model sensitivity, model specificity, positive and negative predictive values, and overall accuracy.

8. A system for determining a patient-specific probability of malignancy in a thyroid nodule, said system including:

a training database having clinical parameters collected from a plurality of patients, the clinical parameters including fine needle aspiration biopsy results, ultrasound data, lymph node size, and imaging data; and
 a fully unsupervised Bayesian Belief Network model created using data from said training database,

said fully unsupervised Bayesian Belief Network model receiving clinical parameters for an individual patient and outputting the patient-specific probability of malignancy in the thyroid nodule to a graphical user interface, said fully unsupervised Bayesian Belief Network model being updated using the clinical parameters for the individual patient and the patient-specific probability of malignancy in the thyroid nodule.

9. The system according to claim 8, wherein the clinical parameters further include functional status of the thyroid nodule, number of cervical lymph nodes, serum thyrotropin level, pre-operative diagnosis, nuclear medicine rating, age, and ethnicity.