Objectives: To determine the additive diagnostic value of the novel HE4 tumor marker to the IOTA simple ultrasonographic (US) morphologic scoring system in the management of ovarian masses.

Methods: Imaging properties of ovarian masses were evaluated preoperatively using the IOTA M and B rules. According to the US findings and the IOTA simple rules three groups were made: 1. B group: only B rules were applicable, 2. M group: only M rules were applicable, 3. E group: both M and B rules were applicable, expert's opinion and pattern recognition needed. The US results then were matched with the preoperative CA125 and HE4 tumor marker levels and the histological findings.

Results: Overall 210 patients with ovarian masses were involved in the analysis (average: 42.10yrs, range: 13-83yrs). In the B group we had 107 cases (50.95%, range: 13-78yrs, average: 38.39yrs), two of them turned to be malignant (1.87%). HE4 was elevated in 8, CA125 in 66 while both of them in 3 cases. 74 patients fulfilled the requirements for M-rules (35.24%, range: 15-83yrs, average: 49.43yrs), 42 of them proved to be malignant (56.76%). HE4 level was increased in 34 while CA125 in 55 cases, both of them in 31 cases. E group was formed by 29 cases (13.81%, range: 16-81yrs, average: 37.10yrs) of which 5 showed malignancy (17.24%). In the whole patient population in the prediction of malignancy using CA125 alone had a sensitivity of 87.76% and a specificity of 40.37%, while using the HE4 alone had a sensitivity of 63.27% and a specificity of 90.68%. Where the IOTA simple rules were applied US alone had a sensitivity of 48.84% and a specificity of 76.64% which increased to 93.40% adding HE4 evaluation to the diagnostic algorithm. PPV also increased from 0.56 to 0.79 in those cases where HE4 was used together with US. Pattern recognition showed a NPV of 0.92 and a PPV of 0.26 which was raised to 1.0 as HE4 was used additionally. Specificity of combining pattern recognition and HE4 evaluation proved to be 100% in this study.

Conclusion: IOTA simple rules can be used effectively to discriminate between benign and malignant ovarian masses in more than 85% of the cases. Masses with complex morphology often need pattern recognition which can call for other methods increasing both the predictive values and specificity of the method. HE4 can be used effectively in order to increase the specificity of the diagnostic ability of US.