Artificial intelligence (AI) weights the importance of clinical and sonographic factors predicting malignancy in unilocular-solid cysts before surgery

Valentina Chiappa¹, Giorgio Bogani¹, Robert Fruscio³, Dorella Franchi², Ailyn M. Vidal Urbinati², Daniela Giuliani³, Martina Delle Marchette³, Federica Brunetti³, Giulia Murrú¹, Francesco Raspagliesi¹. ¹Gynecologic Oncology, National cancer Institute of Milan, Milan, Italy; ²European Institute of Oncology, Milano, Italy; ³Gynecology and Obstetrics, San Gerardo Hospital, Monza, Italy.

Objectives:
To determine whether artificial intelligence might be useful in weighting the importance of clinical and US variables predicting the risk of malignancy (ROM) in women with unilocular-solid cysts before surgery.

Methods:
This is a retrospective analysis on 191 patients who underwent surgery for a unilocular-solid cyst in a gynaecologic oncology unit of three referral centres in Italy. Clinical and US (according to IOTA Terms) data have been collected and the importance of variables used in predicting ROM has been evaluated using artificial neuronal network (ANN) analysis. ANN simulates a biological neuronal system and similarly to neurons, ANN acquires knowledge through a learning-phase process allowing weighting the importance of covariates, thus establishing how much a variable influences a multifactorial phenomenon.

Results:
Overall, 42% (81/191) of patients had malignant masses detected at surgery. Using ANN we observed that the three main US factors predicting ROM included: acoustic shadows (importance: 0.230), color score (importance: 0.160) and the presence of crescent sign (importance: 0.148). Looking at connections between clinical/personal factors and ROM, we observed that postmenopausal status (importance 0.136), a family history positive for breast cancer (importance: 0.087) and a personal history positive for breast cancer (importance: 0.076) were the most important variables predicting ROM.

Conclusions:
According to our results, acoustic shadows and color score should be considered the most important factors predicting ROM. Moreover, clinical and anamnestic features might have a role in predicting ROM.