Following the Consensus on PCOS diagnosis held in Rotterdam in the 2003, ultrasound criteria have been justifiably included in the definition of the syndrome (Balen 2003). An increased echodensity of the stroma corresponds to histological findings of prominent theca and fibrotic thickening of the albuginea described by Stein and Leventhal in 1935 (Stein 1935). Nevertheless, both qualitative and quantitative stromal evaluation had previously been viewed as merely subjective and thus excluded from the consensus definition of PCOS. In order to verify the feasibility of this determination in routine use and to confirm the efficacy of S/A in predicting hyperandrogenism in PCOS, a multicentric study, supported by the Società Italiana della Riproduzione (SIR) was performed in association with 5 different Italian PCOS study groups.

Materials and Methods: Subjects of fertile age presenting oligomenorrhea or secondary amenorrhea, enlarged ovaries measuring >10 cm³ and/or more than 12 follicles measuring 2-9 mm in diameter took part in the study. Clinical, US and hormonal evaluations were performed in the early follicular phase or on random days in amenorrheic subjects. US assessment included ovarian volume, follicle number, ovarian and stroma area in median section. The hormonal study included a baseline plasma determination of LH, FSH, Estradiol, Androstenedione, Testosterone, Dehydroepiandrosteronesulphate, 17hydroxyprogesterone, and Sex-hormone-binding globulin. Correlations and receiver operator curves (ROC) were used in statistical analysis of data.

Results: Stroma area, OV, ovarian areas and S/A are significantly related to both A and T, although the strongest correlations have been demonstrated for T and A and S/A ratio. In order to ascertain significant cut-off values in relation to A and T levels Youden indexes were calculated and indicated 0.33 as the best cut-off for the S/A ratio. Moreover US parameters evaluated separately in hyperandrogenic (A and/or T levels exceeding normal values) and normoandrogenic subjects demonstrate that hyperandrogenic subjects displayed significantly higher values of stroma area (p < 0.0005) and S/A ratio (p< 1.9 x 10^-6), whilst no differences were demonstrated for OV and OA.

S/A ratio is confirmed as the best indicator of hyperandrogenism respect to other US indicators.

Discussion: Following the Consensus on PCOS diagnosis held in 2003, ultrasound criteria have been justifiably included in the definition of the syndrome. The present paper attempts to demonstrate how the method could also be applied in a large patient group and provide significant results from a large number of operators. For this purpose we persuaded the Italian Society for Reproduction (Società Italiana della Riproduzione (SIR) to propose a multicentric study aimed at evaluating S/A ratio in patients affected by oligomenorrhea or secondary amenorrhea with US finding of PCO, thus classifiable, in line with Rotterdam criteria, as affected by PCOS. 418 valuable cases were thus obtained and attempts were made to confirm the results previously reported. In this new series of patients we provided confirmation that US findings, S/A, as well as stroma area and ovarian volume are positively related to androgen levels and demonstrated significant AUCs in ROC analysis. However, S/A would seem to be characterised by the most efficient diagnostic performance for hyperandrogenism. Furthermore these data indicated 0.33 as the upper limit value of S/A for both androgens confirming the cut-off indicated by our preliminary results. It should be underlined that our study is not concerned with the diagnosis of PCOS, but rather faces the possibility of detecting elevated androgen levels. Indeed in our study only subjects having more than 12 follicles and oligo-amenorrhea, thereby PCOS to all effects as per indications provided by the Consensus, were investigated. Data from this multicentric study demonstrated that the method proposed by our group is easy to use and reproducible. In fact several operators from five different centres obtained similar results without any specific training. Nevertheless we have proposed this method for use only in transvaginal US. The predictive value of sonographic characteristics for endocrine
abnormalities frequently associated with PCOS (elevated LH, A and/or T levels) is hard to find in literature. In our paper we clearly demonstrate the presence of significant correlations between US and Hormonal findings: the number of studied subjects, the reproducibility of scanning technique and the statistical approach applied all add further support to our findings. In conclusion we propose the introduction of S/A ratio as marker of hyperandrogenism in patients affected by menstrual irregularities and multicystic or enlarged ovary at US.

References