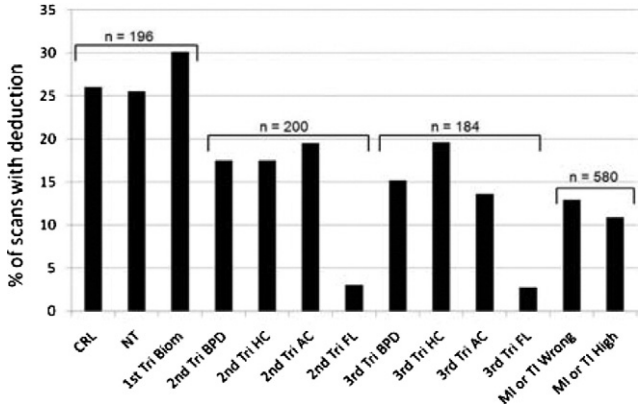
tative interpretation. 1st trimester scans were scored out of 18 possible points; 2nd and 3rd trimester scans were scored out of 27 possible points. Scans achieving a score >80% were considered passing; scans scoring <80% were considered failing and required submission of a supplemental scan.

RESULTS: A total of 36 sonographers participated from 14 centers. Median sonographer experience performing obstetric ultrasounds was 12 years (range 3-30). Overall, 580 scans were submitted, of which 77.8% passed. More than 90% (20/22) of sonographers were required to submit >1 supplemental scan. Pass rates were significantly lower for initial submissions (74.7%; 349/467) than supplemental scans (90.3%; 102/113) ($p<0.0005$). Pass rates were similar for the three trimesters (1st: 80.6% [158/196]; 2nd: 77.5% [155/200]; 3rd: 75% [138/184]) (p 0.419). Figure 1 demonstrates the percentage of scans in which a deduction was made for select parameters. Of those sonographers who achieved credentialing in all trimesters (22/36; 61%), median time to full credentialing was 5.0 months (range 3-10).

CONCLUSION: Intensive training and image review can be used to credential sonographers to perform standardized 2D ultrasounds of fetal biometry. Despite extensive prior experience, sonographers were often required to submit supplemental scans to demonstrate proper image acquisition and caliper placement.



24 Inter-rater agreement of qualitative grading for fetal echocardiographic findings in twin-twin transfusion syndrome (TTTS)

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OBJECTIVE: Several TTTS staging systems have been described which grade severity of recipient twin (RT) cardiomyopathy by echocardiography, but require either quantitation of Doppler myocardial performance index (MPI), or are relatively complex. We sought to determine if qualitative assessment utilizing only the 4 chamber cardiac view could discriminate severity of RT cardiomyopathy in TTTS.

STUDY DESIGN: The Cincinnati Staging system assesses severity of cardiac dysfunction by grading ventricular hypertrophy, AV (atrioventricular) valve regurgitation, cardiomegaly, systolic dysfunction and MPI. We retrospectively reviewed 100 fetal echocardiograms divided into 4 equal cohorts by Cincinnati stage (none, IIIA, IIIb, IIIc). Six fetal care providers (2 surgeons, 3 MFMs, 1 radiologist) blinded to Cincinnati Stage scored each of the above variables–except MPI–in addition to scoring overall impression of cardiomyopathy severity. Each variable was scored as normal, mild or moderate/severe based on the standard 4 chamber view with color flow Doppler imaging. Inter-rater agreement was evaluated by Kappa statistic for individual echocardiographic variables and overall cardiomyopathy grade. Agreement between raters overall impression and Cincinnati stage was also evaluated.

RESULTS: Inter-rater agreement was low for individual echocardiographic variables as well as overall impression of RT cardiomyopathy severity (Table 1). A version of the Kappa statistic assessing agreement of the raters as a group indicated that the degree of agreement between qualitative cardiomyopathy grade and Cincinnati Stage was modest (0.35 0.10), although individual agreement was heterogenous (range, 0.05 - 0.44).

CONCLUSION: Inter-rater agreement for qualitative grading of cardiomyopathy findings is suboptimal using a simplified 4 chamber cardiac assessment. These data suggest that more precise, quantitative cardiac staging systems may be needed to reliably grade RT cardiomyopathy in TTTS. Further study may identify factors that reduce heterogeneity of qualitative assessment in TTTS cardiomyopathy.

Echocardiographic variable	Kappa coefficient (+/- standard error)
Hypertrophy	0.16 +/- 0.02
AV valve regurgitation	0.11 +/- 0.02
Cardiomegaly	0.13 +/- 0.02
Systolic dysfunction	0.03 +/- 0.02
Overall cardiomyopathy grade	0.18 +/- 0.18

Table 1. Inter-rater agreement of qualitative echocardiographic findings

25 Performance of an automatic quantitative ultrasound analysis (AQUA) texture extractor to predict fetal lung maturity assessed by TDx-FLM in amniotic fluid

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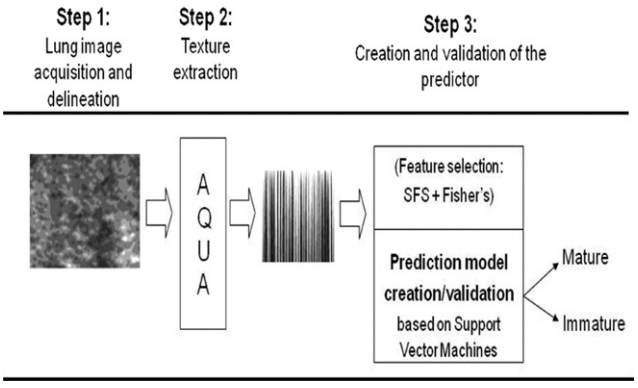
OBJECTIVE: To evaluate the performance of a non-invasive Automatic Quantitative Ultrasound Analysis (AQUA software) texture extractor to predict fetal lung maturity in amniotic fluid as assessed by TDx-FLM.

STUDY DESIGN: 69 women with singleton pregnancies at 24.6-40.2 weeks' gestational age and undergoing amniocentesis to assess fetal lung maturity (TDx-FLM method) status. TDx-FLM result was categorized as mature or immature using standard normative values. An axial four-chamber fetal thorax image was acquired by ultrasound, and a fixed-box was placed in the fetal lung area. AQUA analyzed the pixels in the box and transformed them into a set of texture descriptors (>15,000). A Sequential Forward Selection technique with a Fishers objective function was applied to extract the most relevant imaging biomarkers, which were then input to a Support Vector Machines model able to learn from them and ultimately distinguish between a mature or immature status of the amniotic fluid by TDx-FLM. A leave one out method was employed in order to attain unbiased and realistic results.

RESULTS: Mean (SD) of gestational age was 31.8 (4.7) weeks. According to TDx-FLM results, 22 samples of amniotic fluid demonstrated lung maturity and 47 did not. The imaging biomarker based on AQUA evaluation presented a sensitivity of 86%, a specificity of 98%, and an overall accuracy of 94% in detecting mature or immature status of the amniotic fluid by TDx-FLM.
CONCLUSION: Fetal lung image textures extracted by AQUA provided robust features to predict amniotic fluid TDx-FLM results. These results should be confirmed in larger sample sizes, which would allow much better predictive algorithms. This supports further research on quantitative imaging biomarkers of fetal lung maturity, which might avoid the need for amniocentesis in clinical settings.



26 Prenatal array comparative genomic hybridization: when is it indicated and what sample is best? Our experience in over 1000 prenatal cases

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OBJECTIVE: Targeted aCGH is most frequently considered in prenatal cases with abnormal ultrasound (US) findings and a normal karyotype. The indications for testing of all abnormal cases were reviewed to determine if this approach yields the most informative results. Furthermore, turn around time (TAT) for direct vs cultured samples and the failure rate were reviewed to determine the optimal sample type.
STUDY DESIGN: aCGH analysis using a targeted array was performed on 1114 clinical prenatal samples: direct AF (557), direct CVS (181), cultured AF and CVS (370), cystic hygroma fluid (1) and fetal blood (1). Four samples were received as extracted DNA.
RESULTS: Copy number changes (CNCs) were detected in 233 (21%) cases. Of these, 140 (12.6%) were interpreted as likely benign while 3 weeks old. The most recent TAT data shows 7 days for direct samples and 18 days for cultured samples.
CONCLUSION: While aCGH was most useful in clarifying abnormal chromosome/FISH results, it contributed to a diagnosis in 10% of cases presenting with abnormal US findings. Potentially 1/3 of the diagnoses in abnormal US cases would be unnecessarily delayed if array studies are initiated after obtaining normal chromosome results. Although fewer abnormalities were identified among the AMA and abnormal serum screen patients, 40% of the abnormalities were unanticipated and would not have been identified by chromosome analysis alone suggesting that these indications may also benefit from aCGH. Our results indicate a significant advantage for a timely diagnosis by utilizing direct samples. Cultures <3 weeks of age should be used for testing to avoid the risk of having an unreportable result.