Letters to the Editor

Real-time processable three-dimensional fetal ultrasound

SIR—Three-dimensional ultrasound (3DUS) provides three-dimensional fetal images.[1,2] However, it has found only limited use because many fetal abnormalities can be diagnosed by two-dimensional ultrasonography and the procedure is complex and time consuming. If the ultrasound beam is regarded as a projection ray in volume rendering,[3,4] and ray tracing is conducted in real time, the procedure would not be as complex and images could be obtained immediately.[5]

66 normal fetuses (12–40 weeks gestation) were scanned with an experimental 3DUS machine (Aloka Co Ltd, Tokyo, Japan) consisting of an ultrasound scanner SSD-1700 (Aloka Co Ltd) specially designed for ray tracing and a transabdominal 3D probe. The 3D probe scans an area of 7×7 cm, with a 60º angle of divergence in 5·5 s. Informed consent was obtained in all cases.

A 5·5 s scan immediately produced a 3D fetal image (figure). Images of overlying maternal abdominal wall and anterior uterine wall were removed by setting a depth for ray tracing greater than either. The most appropriate gestational age range was from 28 to 35 weeks, within which 3D surface-image quality of upper and lower limbs was satisfactory in 25 of 26 (96%), and 3D facial images sufficiently clear in 13 of 26 cases (50%). After 35 weeks' gestation, the images became increasingly less satisfactory owing to decrease in amniotic fluid relative to fetal size. From 12 to 27 weeks' gestation, fetal 3D images were less satisfactory than from 28 to 35 weeks' gestation. At less than 24 weeks, no facial images were satisfactory.

Scan repetition was possible every 8 s, providing a sequence of 3D fetal images. Rapid fetal movement during the 5·5 s period of scanning led to 3D image distortion, but slow yawn-like openings of the mouth and opening and shutting the hands appeared quite clearly in the sequence of images. This is not possible by conventional 3DUS when images are generally analysed from 3D data sets obtained in a steady state.

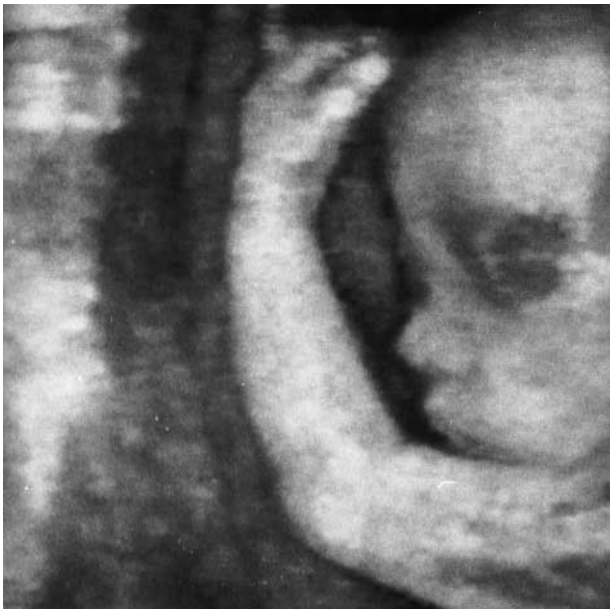

Figure: **Three-dimensional surface image of a normal fetal face and arm at 29 weeks**

The new 3DUS would not be applicable to all fetuses mainly on account of limited viewing direction, but it is possible to obtain fetal 3D images by procedures far simpler than conventional 3DUS.

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Discrepant analysis and screening for *Chlamydia trachomatis*

SIR—Hadgu (Aug 31, p 592)[1] points out that discrepant analysis as a method for determining the specificity and sensitivity of a screening or diagnostic test leads to biased and misleading estimates. These biases have a profound significance for medicine. If we use the estimates in table 2 of Hadgu's paper (sensitivity 94·4%, specificity 99·9%), the predictive value positive of the *Chlamydia trachomatis* test used in a family planning clinic where the true prevalence is 2% is calculated as over 95%. If, however, the true sensitivity and specificity were 91% and 97%, the predictive value positive decreases to 38%. In the first scenario, a health provider might treat a patient on the basis of the positive result, but in the second providers would want to follow up the screening test with another test or decide that this test should not be used at all.

The use of estimates of sensitivity and specificity that are always biased upward will overestimate incidence and prevalence, perhaps several-fold; subgroups of the population (eg, teenagers and young adults) especially would have inflated rates of *C trachomatis* infection; and trends of disease, or the relations between infection and complications (eg, pelvic inflammatory disease, infertility, and ectopic pregnancy), will be difficult if not impossible to interpret. Efforts to determine risk factors for disease and to measure the effect of different prevention and intervention efforts (eg, finding and treating partners of infected patients) will be confounded too.

We do need better, cheaper, and more rapid screening tests for *C trachomatis*. However, the use of discrepant