

Accuracy of Sonographic Estimated Fetal Weight: Is there Still Room for Improvement?

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Fetal weight estimation is a major component of routine antenatal care. It is important mainly at the extreme fetal weights with detection of either fetal growth restriction (under the 10th percentile for gestational age) or macrosomia, defined as fetal weight above 4000 grams. Fetal weight estimation is achieved clinically or sonographically. Sonographic estimated fetal weight (EFW) has a reported overall standard deviation of error of more than 7%. Its accuracy decreases at weights smaller than the 10th percentile or above 4000 grams [1-3]. Numerous factors were previously suggested to influence the precision of the EFW, including parameters such as time interval between sonographic estimation and delivery, experience of examiners, choice of formula, fetal gender, gestational age at estimation, fetal weight, maternal body mass index, amniotic fluid index, fetal presentation, and placental location. Heer et al. [4] found that the only determinant that had a negative influence on fetal weight prediction accuracy was time interval of more than 7 days between estimation and delivery. Gabbay-Benziv and colleagues [5-10] showed that there is a considerable variability in accuracy of various formulas of EFW for prediction of macrosomia at birth, large for gestational age and small for gestational age in different cohorts. In most studies, the

formula proposed by Hadlock [11] utilizing abdominal circumference, bi-parietal diameter, and femur length was the most accurate for neonatal birth weight prediction. Hoopmann and co-authors [12] compared the accuracy of 36 commonly used weight estimation formulas in macrosomic fetuses and found that, although some formulas showed advantages as far as mean and absolute percentage errors were concerned, none reached a sufficient detection rate and false positive rate for fetuses equal to or larger than 4500 grams that could lead to a clinical recommendation.

In the current issue of the *Israel Medical Association Journal*, Rottenstreich and colleagues [13] examined whether the accuracy of EFW was dependent on the examiner. They compared the accuracy of EFW between ultrasound-certified physicians and registered diagnostic medical sonographer technicians. The study was performed at a tertiary medical center with more than 10,000 deliveries per year. The large cohort included only estimations that were made up to 2 days before delivery at all gestational ages. Accuracy was calculated for the entire cohort as well as for the extreme weights of less than 2500 grams and above 4000 grams. The main conclusion was that medical sonographer technicians performed better than physicians in estimating fetal weight.

This result is not surprising since most EFWs are performed by technicians, especially when dealing with low-risk populations either in outpatient clinics or in hospitals. The authors argued that the need for a physician's examination following one

made by a technician is unnecessary and supported decision making based only on on EFW performed by a technician. This finding can contribute to cost-effectiveness and may apply also to under-resourced areas, where physician specialists are not readily available.

Less unequivocal results were found at the estimation of extreme weights (below 2500 grams and above 4000 grams) where lower sensitivity and higher specificity was found in the estimate performed by technicians compared to the physicians. Since decision making in these extremes might carry more significant clinical implications, more data is necessary regarding these populations and who should examine them.

These results should be carefully assessed due to some inherent limitations of the study. The study cohort was not limited to any gestational age, and extreme weights were evaluated as absolutes. While this testing may not be of clinical importance for macrosomia, where risk is determined by absolute weight, it is very important for the underweight fetus. In the case of underweight fetuses, the risk of adverse outcome should be determined not on absolute weight but according to percentile relatively to gestational age, especially when the cohort is not limited to term gestation. Moreover, due to the retrospective nature of the study, it is reasonable to assume that physicians were not blinded to other maternal and perinatal characteristics such as maternal age, nulliparity, or the presence of diabetes and pre-eclampsia, which could interfere with their perception and clinical judgment when determining EFW.

We have investigated possible clinical and sonographic features associated with sonographic accuracy of prediction of small-for-gestational-age and macrosomia at birth (unpublished data). Our cohort included 5425 women with EFW within 3 days before delivery with known maternal and perinatal characteristics and outcome. We found that the accuracy of EFW was affected by clinical and sonographic pregnancy characteristics such as maternal age, parity, placental location, amniotic fluid volume, and fetal gender. These characteristics would probably affect the physicians' estimation more than the technician's estimations.

It seems that the complexity of sonographic prediction of fetal weight requires further research that should focus on ways to improve EFW, especially at the fetal weight extremes. While research is conducted to find ways to improve EFW estimations, it is important to mention that fetal weight is not the primary aim but only a surrogate marker to adverse perinatal outcome. Although it has advantages, lack of accuracy is not its only drawback. Indeed, the majority of suspected growth-restricted fetuses are born healthy and most women with macrosomic fetuses

will deliver successfully. The medical and maternal psychological impact of judging a pregnancy as at-risk based solely on weight determination should always be considered prior to deciding on clinical intervention. Further research should be performed on other modalities to determine weight as well as ways to combine maternal characteristics, angiogenic factors, and sonographic weight estimation to prevent adverse perinatal outcome as well as to perform unnecessary medical interventions.

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Capsule

Polyclonal and convergent antibody response to Ebola virus vaccine rVSV-ZEBOV

Recombinant vesicular stomatitis virus-Zaire Ebola virus (rVSV-ZEBOV) is the most advanced Ebola virus vaccine candidate and is currently being used to combat the outbreak of Ebola virus disease (EVD) in the Democratic Republic of the Congo (DRC). Ehrhardt et al. examined the humoral immune response in a subset of human volunteers enrolled in a phase 1 rVSV-ZEBOV vaccination trial by performing comprehensive single B cell and electron microscopy structure analyses. Four studied vaccinees show polyclonal, yet reproducible and convergent B cell responses with shared sequence characteristics. EBOV-targeting antibodies cross-react with other *Ebolavirus* species, and detailed epitope mapping revealed overlapping

target epitopes with antibodies isolated from EVD survivors. Moreover, in all vaccinees, the authors detected highly potent EBOV-neutralizing antibodies with activities comparable or superior to the monoclonal antibodies currently used in clinical trials. These include antibodies combining the IGHV3-15/IGLV1-40 immunoglobulin gene segments that were identified in all investigated individuals. These findings will help to evaluate and direct current and future vaccination strategies and offer opportunities for novel EVD therapies.

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Eitan Israeli

“Adversity is sometimes hard upon a man; but for one man who can stand prosperity, there are a hundred that will stand adversity”

Elvis Aaron Presley (1935–1977), also known mononymously as Elvis, was an American singer, musician, and actor. Regarded as one of the most significant cultural icons of the 20th century, he is often referred to as the “King of Rock and Roll” or simply “the King”