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# Should we always consider the 10th percentile as a sonographic "fingerprint" of a small fetus?

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Low birth weight is one of the most important predictors of perinatal mortality and morbidity [1], and additionally it is linked by some authors with a development delay [2].

This problem applies to both single and multiple pregnancies. All over the world scientists try to assess which method of fetal weight assessment is best — Shepard, Hadlock, *etc.* [3]. How often, and which weeks are the best for ultrasonographic estimation? [4, 5]. The disappointing conclusion of Nicolaides' research is that screening for SGA neonates by EFW at 35 + 0 to 36 + 6 weeks' gestation and use of the 10th percentile as the cut-off predicts 63% of affected neonates. Prediction of 90% of Small for Gestational Age (SGA) neonates necessitates classification of about 35% of the population as being screen positive. The predictive performance of EFW is not improved by addition of estimated growth velocity between the second and third trimesters of pregnancy [5]. The results were consistent with the others in the literature. In previous studies they have shown that predictive performance for a SGA neonate of EFW at 35 + 0 to 36 + 6 weeks' gestation was improved by the addition of maternal demographic characteristics and medical history; addition of maternal risk factors (listed below) improved the prediction of a SGA neonate with birth weight < 10th percentile born at any stage after screening from 63% to 67%. They have reported previously that the risk of delivering a SGA neonate increases with maternal age, decreases with maternal weight and height, is higher in women of black, South Asian, East Asian and mixed racial origins. More so than in white women, cigarette smokers, those with chronic hypertension and those with diabetes mellitus Type 2 and in parous women with history of SGA. The risk is lower in parous women without history of SGA and in those with diabetes mellitus Type 1 [6]. This improvement of the results is not surprising. Further works on serial fetal biometry or addition of biomarkers of impaired placentation did not improve these numbers either. Analyzing current literature, we may conclude that the popular pyramid of pregnancy care, proposed by Nicolaides [7] does not work properly. If the best clinicians face challenges, what should all of us to do while supervising pregnant women and looking for that deeply hidden 10th percentile?

Maybe the problem is in the tools we use? By comparing different human populations and using the same tools, we are not able to work out a common consensus. It is like a Tower of Babel. Comparing fetal birth masses between countries, differences can reach even 20 % in some weeks. Therefore, is it possible for obstetricians to make key decisions in case of fetuses with SGA or macrosomia, without knowing what the correct fetal mass is for a given population? As an example, in data from the Global Survey it is shown that mean birth weight at 40 completed weeks of gestation varied between 2790 g in India and 3511 g in Algeria. All foreign, available databases contain an image of very mixed racial population. Poland, despite the changes in the political and migration situation in recent years, remains very racially homogenous nation. It therefore seems necessary to base our daily clinical activities on our own population.

Last years in the Department of the Perinatology and Gynecology of the Poznan University of Medical Sciences we assessed the fetal growth curves in single and twin pregnancies, comparing them to existing ones [8–10]. Our study was intended to be based on the group of potentially healthy neonates in the Polish population, regardless the mode and cause of delivery. Apgar score at least 7 and not deteriorating in consecutive measurements (in twins — both twins); no major congenital anomalies; extreme outliers were rejected. A pair of twins with birth weight discordance

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greater than 18% was excluded. After applying all criteria, 2769 out of 42,182 records were excluded. The final sample had 39,413 cases (18,562 girls and 20,851 boys) in singletons and 2634 babies (out of 3816) in twins.

We originally showed that the fetal birth weight and created growth curves for singletons differ significantly from the previously used data in Poland, created about 30 years ago. The difference between girls and boys seems important as well. However, the most significant differences were found in the distinct growth curves for twin fetuses. As compared the bigger and smaller baby, after the exclusion of any twin pairs who had a weight discordance greater than 18% and neonates with even a slightly poor prognosis, the ratio for 50$^{th}$ centiles for smaller-bigger twins was found to be approximately 0.92. When comparing 50$^{th}$ percentiles for the same gestational period between bigger and smaller twins, the split was always close to 240 grams. The biggest split of the growth curves appears between weeks 31–35. The minimum weight gain for both twins was shown to be similar with ≥ 120 g at weeks 27–34, and ≥ 140 at weeks 34–37. As compared, the medium fetal mass for summarized 50$^{th}$ centiles for the bigger vs. smaller neonates were 2019.5 g vs 1858.8 g. Searching for small fetuses in twins, we found that within the 20–25 percentiles of the smaller twin curves are equal or similar to the 10$^{th}$ percentile of the general twin population. Additionally, within the 10$^{th}$ percentile of the general twin population, the twin curve is close to the 5$^{th}$ percentile of the smaller twin, respectively. This observation is extremely important for clinical practice. Without the correct assessment of the growth of the fetus based on accurate, customized curves, the smaller twin may be erroneously diagnosed ill and iatrogenically premature. Using singleton fetus growth curves instead of twin growth curves exacerbates this risk. Twin growth curves, especially for the bigger and smaller baby should be mandatory for daily clinical use. The calculated outcome-dependent fetal growth curves for both singletons and twins may help in the accurate diagnosis of small or large twin fetuses for their gestational age in polish population. We are deeply convinced that creating a national survey and creating an appropriate tool is a needed. Moreover, these data should be available in the ultrasound devices used in Poland, allowing determining the right percentile for our fetuses.

### *Conflict of interest*

All authors declare no conflict of interest.

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