Fetal movements in the third trimester –
Important information about wellbeing of the unborn baby

Ingela Rådestad, professor Sophiahemmet University, Sweden,

As a support group leader for the Swedish Infant Fund, a member organisation of the International Stillbirth Alliance, supporting those who have lost a baby, I meet many parents who have experienced loss. The purpose of the support groups is for parents to meet others with similar experiences and to give them an opportunity to talk about their stillborn baby and their grief. In each group, there are always a few couples' stories that raise questions as to whether their baby's death might have been avoidable. It is painful to face their grief, knowing that if someone had reacted a little more quickly or if someone had taken greater control of their pregnancy and childbirth their daughter or son would probably have survived. In the last group, a mother said that she sensed that her baby was unwell and that she had had the feeling that her baby was moving less than usual. Her midwife had told her not to worry and had said that it was common for mothers to feel anxiety. The mother was also told that fetal movements normally decrease in late pregnancy and that there was no need for any further investigation other than listening to the sounds of the fetal heart. One week later the fetal sounds had disappeared and the child had died in utero.

Shortly after I had listened to the mother's story, my doctoral student presented to me the preliminary analysis of the results of an interview study of 26 mothers who had lost their babies before birth. The mothers had felt that they had lost contact with their baby but had attempted to normalize the absence of movements. The mothers believed that it was normal for the fetus to move less often at the end of the pregnancy and, when they felt no movement at all, thought that the fetus was sleeping. Most of them had waited 24 to 48 hours before contacting a healthcare professional. Some of them who contacted their midwives were given reassurance and were told that they should wait and see and, for the time being, simply rest (1). We thus have no data from the study on whether the mothers normalize the complete absence of movement; it is likely that they also normalized a decrease in the frequency of movements during the days before they completely lost contact with the fetus. The results of the interview study, together with stories from the support groups, made me think about how we respond to women's intuition and concern in the care we provide. I also started to look for scientific evidence for the opinion that fetal movements decrease in frequency towards the end of pregnancy. Having now read a hundred scientific publications on fetal movements, I am aware that I

have merely scratched the surface, but I would still like to convey some thoughts.

A mother-to-be usually feels the first fetal movements during weeks 17 to 20 of pregnancy. Between weeks 20 and 30 of pregnancy the movements begin to be organized and the fetus displays sleeping and alerting cycles with periods of inactivity lasting up to one hour (2). The movements of the fetus and the mother's preparation for observing the movements are affected by several factors, such as the mother's position, since the greatest numbers of movements are experienced when she is lying down, fewer when sitting up, and least of all when standing (3). The degree to which the mother is active (4), the position of the placenta (5), tobacco use (6), blood sugar level (7), volume of amniotic fluid (8), stress (9) and coffee consumption (10) also affect fetal movement and the mother's preparation for observing the movements. Over a 24-hour period it appears that it is during the evening hours that most women feel the greatest number of movements (11).

Evaluating the mother's sensation of fetal movements is the oldest method of judging the baby's wellbeing before birth (12). A decrease in the number of movements may indicate that the fetus is at risk of being born premature, being underweight, or even dying before birth (13-14). There is a range of opinions among midwives and obstetricians concerning what are to be regarded as a decrease in the occurrence of fetal movement (15), and the practice followed by caregivers when the pregnant woman expresses concern about the way that the fetus is moving varies widely (16). Signs of lowered frequency of fetal movement are normalized by both the mothers themselves and by caregivers (1).

Fetal movement in the third trimester

Available data are somewhat contradictory concerning what is to be regarded as the normal occurrence of fetal movement and whether the frequency of movement decreases in the third trimester. Those studies that demonstrate that the frequency decreases are those that have employed measurement times during fixed periods of time: the periods of inactivity displayed by the fetus increase during the third trimester. If the mother counts the movements during a pre-determined time, then the probability that the time assigned for counting will occur during a sleep period increases, which can result in a misleading count of movements in the third trimester. Also, studies that demonstrate that frequency decreases in the third trimester often employ longer measurement times, and longer periods probably lower the tendency for the mother to count fetal movements, which may result in misleading count of movements (17).

Valentin and co-workers (18) studied fetal movement during the third trimester by simultaneously measuring the number of movements with four piezo-electric crystals attached to the mother's abdomen and from the mother's own report of the movements she has experienced during periods of 45 minutes (cross-sectional study, 180 mothers) and 30 minutes (longitudinal study, 6 mothers). The median value for the number of fetal movements during a 45 minute period as measured by the four piezo-electric crystals was 85 (2.5 percentile 14; 97.5 percentile 232). The median value for the number of fetal movements that the mothers simultaneously reported was 41 (2.5 percentile 10; 97.5 percentile 135). The number of fetal movements did not change during the progression of the pregnancy. In another study by Valentin and co-workers (19), 417 randomly chosen women with low-risk pregnancies measured the time that it took until they had felt 10 fetal movements every morning and also the number of movements they felt during a period of 15 minutes in the evening. The measurements were carried out from week 34 of pregnancy to birth. No differences were measured in the number of movements or in the time it took to experience 10 movements as the time of birth came closer. Manning and co-authors (20) used a real-time B-scan method on 50 women in the third trimester; 195 20-minute observations were made. No statistically significant variation in the number of fetal movements was observed the longer the pregnancy advanced. Roberts and co-authors (21) studied 100 women with normal pregnancies with regard to fetal movements from week 28 to birth. A 30-minute observation using real-time ultrasound scanning was made of every woman between 9 am and 5 pm. The mean number of fetal movements per 30-minute period was 29 (14-44). The number of fetal movements per unit of time was constant over the entire period.

Pearson and Weaver (2) studied 61 women who counted fetal movements for 12 hours per day on a daily basis from pregnancy week 32 up to birth. The median value for fetal movements decreased from 90 in a 12 hour period during week 32 to 50 movements in the same time period during week 40. In a Swedish study, 1720 measurements were obtained from 122 women with low-risk pregnancies who recorded the number of fetal movements during periods ranging between three to 16 hours a day in weeks 32 to 42 of pregnancy (22). A measure of the frequency of fetal movements was produced by recalculating fetal movements observed to a common base of 12 hours per day (DFMC). The median value of fetal movements was 86 DFMC during week 24 pregnancy, and the frequency rose to a maximum of 132 during week 32 and decreased thereafter to 107 during week 40. Sadovsky (23) reported that 127 women with normal pregnancies and outcomes had on average 200 DFMR (a measure of the number of movements during a 12-hour period) during week 20 of pregnancy, which then

increased to a maximum of 575 during week 32 and thereafter gradually decreased up to the time of birth to a mean value of 282. The variation in the total set of measurements was between 50 and 956 DFMR. Sörensen (24) recruited 148 pregnant women who were instructed to count fetal movements for 30 minutes three times a day between 9 am and 7 pm, in the morning, the middle of the day and in the early evening, once a week starting in week 25 of pregnancy. The data were presented for 96 women with complication-free pregnancies and outcomes. The mean value of the number of fetal movements during a period of 12 hours was approximately 550 in week 30 and 380 in week 40.

Definitions of decrease in the number of fetal movements

Among all pregnant women, between four and 16 percent contact their midwife or physician because of a decrease in the frequency of fetal movement during the third trimester (1). Often there are no guidelines concerning what is to be done when women with a complication-free pregnancy have observed such a decrease. Where guidelines are available, they usually offer limited guidance concerning the continuation of monitoring (25). In a national study in which all the obstetric clinics in Norway were asked to provide definitions of decrease in number of fetal movements, replies ranged from three kicks per hour to the complete absence of any kicks during a period of at least 24 hours (26). There was also wide variation in the interpretation of what is to be regarded as the normal range of variation in fetal movement from 25 kicks per hour to three per 24 hours. There is no consensus concerning what is to be regarded as a decrease in fetal movement frequency (27). There can be wide variation from one fetus to another in how often the fetus moves, and it is therefore difficult to specify quantitatively the numerical value of the lowest number of movements that should trigger alarm (28). Heazell and Froen have argued that there is no evidence that a specific limit on what is to be viewed as decreased fetal movement frequency is any better than the belief on the part of the mother-to-be that a decrease in fetal movement frequency has occurred with regard to recognition of risk of intrauterine death (29).

Information for pregnant women about fetal movement

In the most recent edition of the (Swedish) Instruction Book for Midwives, which is required course literature for anyone who is a student in the program for midwives, we can read on page 226: "Many women react to a pattern of fetal movement at the end of pregnancy. Normally fetal movement decreases from week 32 onward due to the decrease in space available in the uterus. Women should be informed about this." (30). The reference to this statement is a Cochrane review (31). In the review concerning fetal movement counting for

assessment of fetal wellbeing, we can read "Fetal movements are maximal between 28 and 34 weeks and they usually decrease in late pregnancy." The reference given in the Cochrane review is a textbook from 1996 (32) where no scientific evidence can be found for the frequency of fetal movements during the third trimester.

My conclusion after attempting to understand the scientific literature in the area of fetal movement is that there is no evidence for saying that the frequency of fetal movements decreases in the third trimester. Further, giving misleading information about decreased frequencies of fetal movements poses a threat to the unborn baby's life. A substantial percentage of mothers waited more than 24 hours without feeling any fetal movement at all before they contacted the hospital (33). Uniform information on fetal activity provided to pregnant women, including information that their subjective assessment of a decrease in fetal activity is the most important marker of decreased fetal movement, was associated with a reduction in the number of primiparous women reporting decreased fetal movements and a reduction in stillbirth rates for primiparous women reporting decreased fetal movements (34).
There is a potential for the proportion of intrauterine deaths to be reduced by employing evidence-based information concerning normal variation in fetal movement, self-determined control, and more rapid investigation of reported decreases in fetal movement. More research in this field is needed. Until we have scientific knowledge we need to stop giving misleading information where we have no idea how pregnant women will interpret the information.

This article was published in 2010
Rådestad I. Fetal movements in the third trimester - important information about wellbeing of the fetus. *Sexual & Reproductive HealthCare* 2010;1:119-121.

References

1. Malm M-C, Lindgren H, Rådestad I. Losing contact with one's unborn baby. Mothers' experiences prior to receiving news that their baby has died in utero (manuscript).
2. Rayburn WF. Fetal body movement monitoring. Obstet Gynecol Clin North Am 1990;17:95-110.
3. Cito G Luisi et al. Maternal position during non-stress test and fetal heart rate patterns. Acta Obst Gynecol Scand 2005;84:335-338.
4. Manders Mam, Sonder GJB, Mulder EJH, Visser GHA. The effect of maternal exercise on fetal heart rate and movement patterns. Early human development 1997;48:237-247.
5. Tuffnell DJ, Cartmill RS, Lilford R. Fetal movements; factors affecting their perception. Eur J of Obstet Gynecology Reproductive Biology 1991;39:165-167.

6. Coppens M, Vindla S, James DK, Sahota DS. Computerized analysis of acute and chronic changes in fetal heart rate variation and fetal activity in associations with maternal smoking. Am J of Obstet & Gynecol 2001;185:421-426.
7. Eller DP, Stramm SL, Newman RB. The effect of maternal intravenous glucose administration on fetal activity Am J Obstet Gynecol 1992;167:1071-1074.
8. Sherer DM, Spong CY, Minioe VK, Salafia CM. Decreased amniotic fluid volume at < 32 weeks of gestation is associated with decreased fetal movements. Am J Perinatol 1996;13:479-482.
9. DiPietro JA, Costigan KA, Gurewitsch ED. Fetal response to induced maternal stress. Early human Develop 2003;74:125-138.
10. Devoe LD, Murray C, Youssif A Arnaud M. Maternal caffeine consumption and fetal behaviour in normal 3rd-trimester pregnancy. Am J Obstet Gynecol 1993;168:1105-1112.
11. Ehrström C. Circadian rhythm of fetal movements. Acta Obstet Gynecol Scand 1984;63:539-541.
12. Froen JF. A kick from within – fetal movement counting and the cancelled progress in antenatal care. J Perinat Med 2004;32:13-24.
13. Pearson J, Weaver J. Fetal activity and fetal wellbeing: an evaluation. Br Med J 1976;1:1305-1307.
14. Valentin L, Marsal K, Wahlgren L. Subjective recording of fetal movements III Screening of a pregnant population; the clinical significance of decreased fetal movement counts. Acta Obstet Gynecol Scand 1986;65:753-758.
15. Heazell A, Green M, Wright C, Flenady V, Froen JF. Midwives and obstetrician's knowledge and management of women presenting with decrease fetal movement. Acta Obstet Gynecol Scand 2008;87(3):331-339.
16.Froen JF, Saastad E, Tveit JV, Bordahl PE, Stray-Pedersen B. Clinical practice variation in reduce fetal movements. Tidskr Nor Laegeforen 2005;125:2631-2634.
17. Wood C, Walters WAW, Trigg P. Methods of recording fetal movement. Br J Obstet Gynecol 1977;84:561-567.
18. Valentin L, Marsal K. Fetal movement in the third trimester of normal pregnancy. Early Human Develop 1986;14:295-306
19. Valentine L, Löfgren O, Marsal K, Gullberg B. Subjective recording of fetal movements I. limits and acceptability in normal pregnancies. Acta Obstet Gynecol Scand 1984;63:223-228.
20. Manning F, Platt L, Sipos L. Fetal movement in human pregnancies in the third trimester. Obstet Gynecol 1979;54:699-702.
21. Roberts AB, Griffin D, Mooney R, Cooper DJ, Campbell S. Fetal activity in 100 normal third trimester pregnancies. Br J Obstet and Gyaecol 1980;87:480-484.

22. Ehrström C. Fetal movements and high-risk pregnancy. Läkartidningen 1979;76:853-857.
23. Sadovsky E. Fetal movements and fetal health. Seminars in perinatology. 1981;5:131-143.
24. Sörensen T, Hansen K, Ladehoff D, Olsen S. Fetal movements in uncomplicated pregnancies. Ugeskr Laeg 1980; 142:627.
25. Froen JF, Tveit JV, Saastad E, Bordal P, Stray-Pedersen B, Heazell AE, Flenady V, Fretts R. Management of decreased fetal movements. Seminars in Perinatology 2008;32:307-311.
26. Saastad E, Ahlborg T, Froen F. Low maternal awareness of fetal movement is associated with small for gestational age infants. Journal of Midwifery & Womens Health 2008;53:345-352.
27. Olesen AG, Svare JA. Decreased fetal movements: background, assessment, and clinical management. Acta Obstet Gynecol Scand 2004;83:818-826.
28. Froen JF, Heazell AE, Tveit JV, Saastad E, Fretts R, Flenady V. Fetal movement Assessment. Seminars in Perinatology 2008;32:243-246.
29. Heazell AE, Froen F. Methods of fetal movement counting and detection of fetal compromise. J Obstet Gynaecol 2008;28(2):147-154.
30. Kaplan mfl (red). Lärobok för barnmorskor. 2009. Studentlitteratur, Lund, Sverige.
31. Mangesi L, Hofmeyr GJ: Fetal movement counting for assessment of fetal wellbeing. Cochrane Database Syst Rev 2007(1):CD004909.
32. Cronje HS, grobler CJF, Visser AA. Obstetrics in Soutern Africa. Pretoria: J.A. van Schaik Publishers, 1996.
33. Froen Fl. Clinical practice in variation in reduced fetal movements. Tidskr Nor Laegefor 2005;125:2631-2634.
34. Saastad E, Holm Tveit, JV, Flenady V, Stray-Pedersen B, Fretts R, Bordahl P, Froen JF. Impementation of uniform information on fetal movement in a Norweigian population reduced delayed reporting of decreased fetal movement and stillbirths in primiparous women – a clinical quality improvement. BMC research notes 2010;3:2 http://www.biomedcentral.com/1756-0500/3/2