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SHORT COMMUNICATION

Maternal Serum Prostate-specific Antigen and Down Syndrome in the First and Second Trimesters of Pregnancy

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It has been suggested that high levels of maternal serum prostate-specific (PSA) may be associated with fetal Down syndrome. We retrieved stored blood samples from 102 singleton Down syndrome pregnancies at 8–14 weeks' gestation and 99 at 15–22 weeks' gestation, together with samples from five unaffected singleton control pregnanceis matched for gestational age. PSA was measured using an ultrasensitive assay. Contrary to earlier reports, PSA levels were similar in affected and unaffected pregnancies in both the first and second trimester of pregnancy; 1.1 and 0.9 multiple of the normal median, respectively, in affected pregnancies. There was no indication that PSA would be a useful screening marker. Copyright © 1999 John Wiley & Sons, Ltd.

KEY WORDS: Down syndrome; pregnancy; prostate-specific antigen; screening

INTRODUCTION

Preliminary results have suggested that the second-trimester amniotic fluid levels of prostate-specific antigen (PSA) are low and maternal serum levels of PSA are elevated in pregnancies with Down syndrome (Melegos *et al*., 1996; Lambert-Messerlian *et al*., 1998). Using an ultrasensitive assay, the median maternal serum PSA level in 19 affected pregnancies was, on average, 2.28-times higher than that in 95 unaffected pregnancies matched for gestational age and duration of serum sample storage ($p=0.02$). These preliminary results prompted us to examine the reported association further, using a larger series of stored serum from affected and unaffected pregnancies in the first and second trimester of pregnancy.

METHODS

We studied 102 Down syndrome pregnancies from 8–14 weeks of pregnancy, each matched with five controls for gestational age and duration of sample storage (510 controls). These data were collected as part of the Collaborative FiTSS study (Wald *et al*., 1996). In additon, 99 Down syndrome pregnancies from 15–22 weeks of pregnancy (gestational age was estimated using an ultrasound scan examination) were retrieved with about five matched controls for each case (492 controls); the samples were collected as part of the routine screening programme conducted at St Bartholomew's Hospital. All samples were assayed for PSA in the Department of Pathology and Laboratory Medicine, Mount Sinai Hospital, Toronto, without knowledge of whether they were from cases or controls using an ultrasensitive assay (Ferguson *et al*., 1996).

RESULTS

PSA concentrations in unaffected pregnancies did not change materially with gestational age in either the first or second trimester. The median levels at each completed week were about 10 ng/l. Fig. 1 shows the Down syndrome pregnancies according to gestation and indicates the median value for unaffected pregnancies. There was no indication to suggest that concentrations tended to be either higher or lower in affected pregnancies. Because PSA concentrations did not change with gestational age, they were converted into multiples of the median for unaffected pregnancies (MOMs) using the overall median for unaffected

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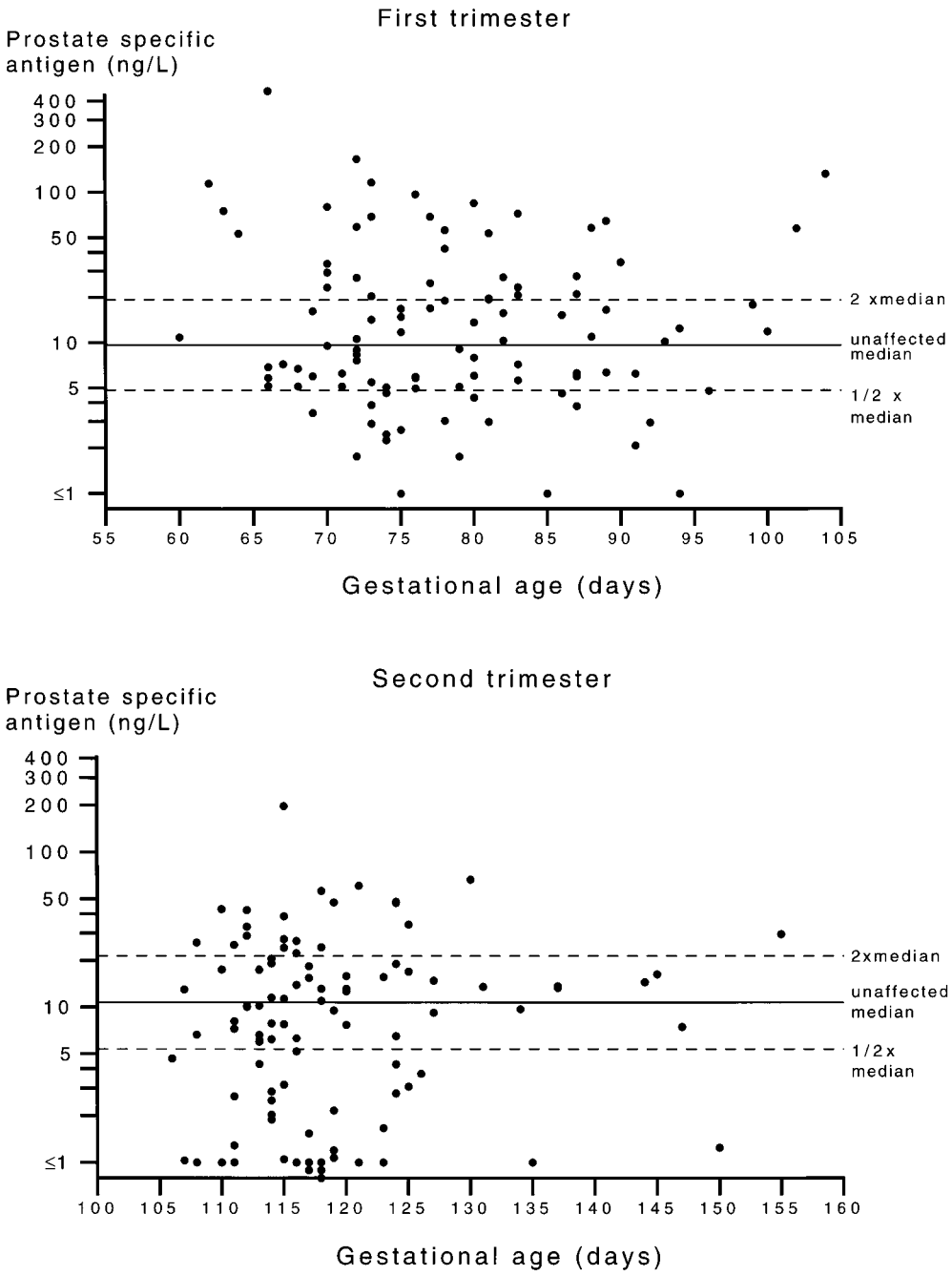

Fig. 1—PSA concentrations in Down syndrome pregnancies (102 in the first trimester and 99 in the second trimester). The horizontal lines indicate the median concentration for unaffected pregnancies (with two-times and half the median value)

pregnancies. Table 1 shows the median MOM and standard deviations. The standard deviations were estimated over the centile range for which the distributions of PSA (log MOM) were Gaussian (as specified in the footnote to Table 1). There was no significant difference in the median MOM between Down syndrome and unaffected pregnancies in either the first or the second trimester of pregnancy; the MOM values in affected pregnancies were 1.11 and 0.90, respectively. The results do not support the preliminary findings reported by Lambert-Messerlian *et al.* (1998).

CONCLUSION

These results, based on a relatively large data set, show that PSA is unlikely to be a useful marker for Down syndrome screening either in the first or second trimester of pregnancy. Spencer and Carpenter (1998), in the study based on 43 pregnancies with Down syndrome, reached the same conclusions.

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Table 1—Median MOM and standard deviation of PSA in Down syndrome and unaffected pregnancies

	Down syndrome	Unaffected
First trimester		
Number of pregnancies	102	510
Median MOM	1.11	1.00
Standard deviation ($\log_{10}$)	0.6238[a]	0.5810[b]
Second trimester		
Number of pregnancies	99	492
Median MOM	0.90	1.00
Standard deviation ($\log_{10}$)	0.4863[c]	0.5769[a]

[a]Using 30th–80th centile.
[b]Using 30th–90th centile.
[c]Using 35th–90th centile.

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