Sonographic cervical length and biochemical markers in spontaneous preterm birth up to 14 days from sampling
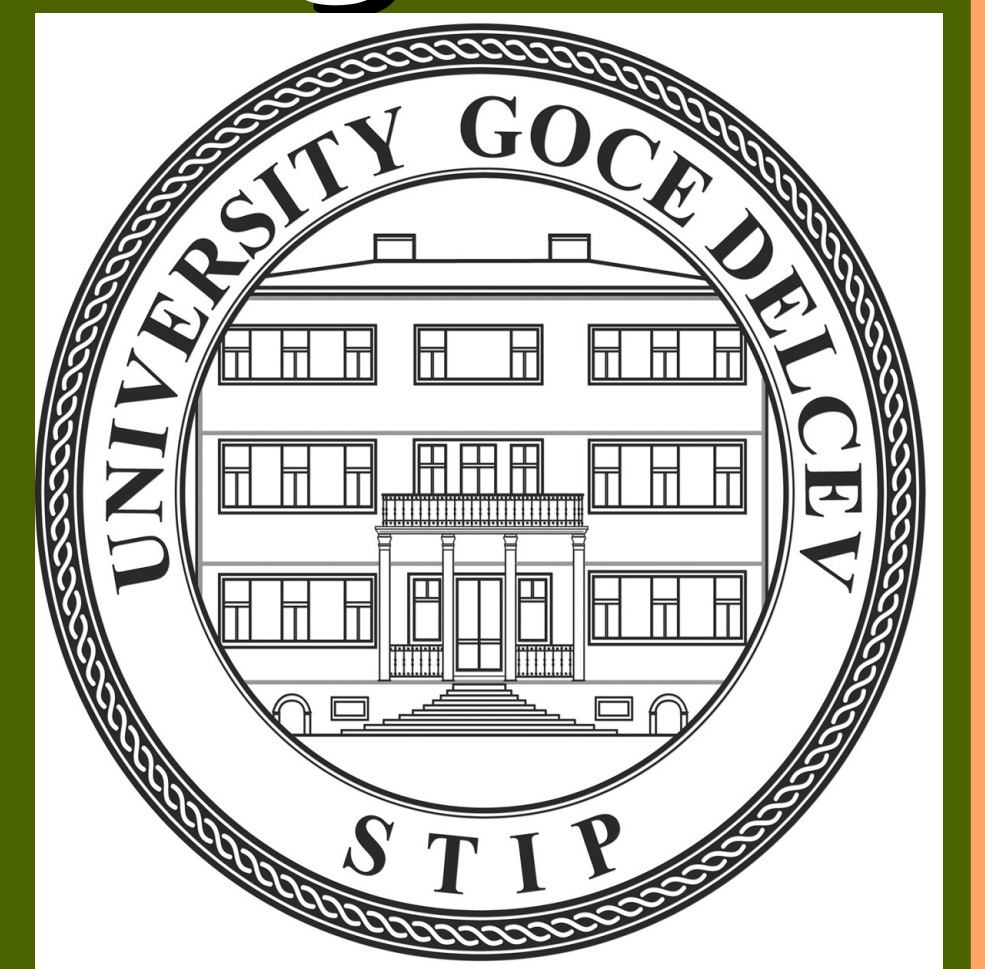
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Abstract

Objective

Preterm delivery (PTD) before completed 37 gestational weeks, remains one of the most important clinical problems in obstetrics throughout the world, as it is the leading cause of neonatal mortality and morbidity. Preterm delivery exerts numerous negative long-term effects on the neonate, which is especially true for extremely preterm neonates delivered before 28 gestational weeks. But, despite numerous studies, the detailed mechanisms and biological pathways that lead to PTD still remain elusive. The aim of our study was to determine the relationship between sonographic cervical length (CL), fetal fibronectin (fFN), phosphorylated insulin-like growth factor binding protein-1 (phIGFBP-1, Actim partus test), cytokines, such as interleukine-6 (IL-6), interleukine-2R (IL-2R) as well as tumor necrosis factor-alpha (TNF-alpha), and spontaneous preterm birth(SPTB) up to 14 days from sampling.

Methods
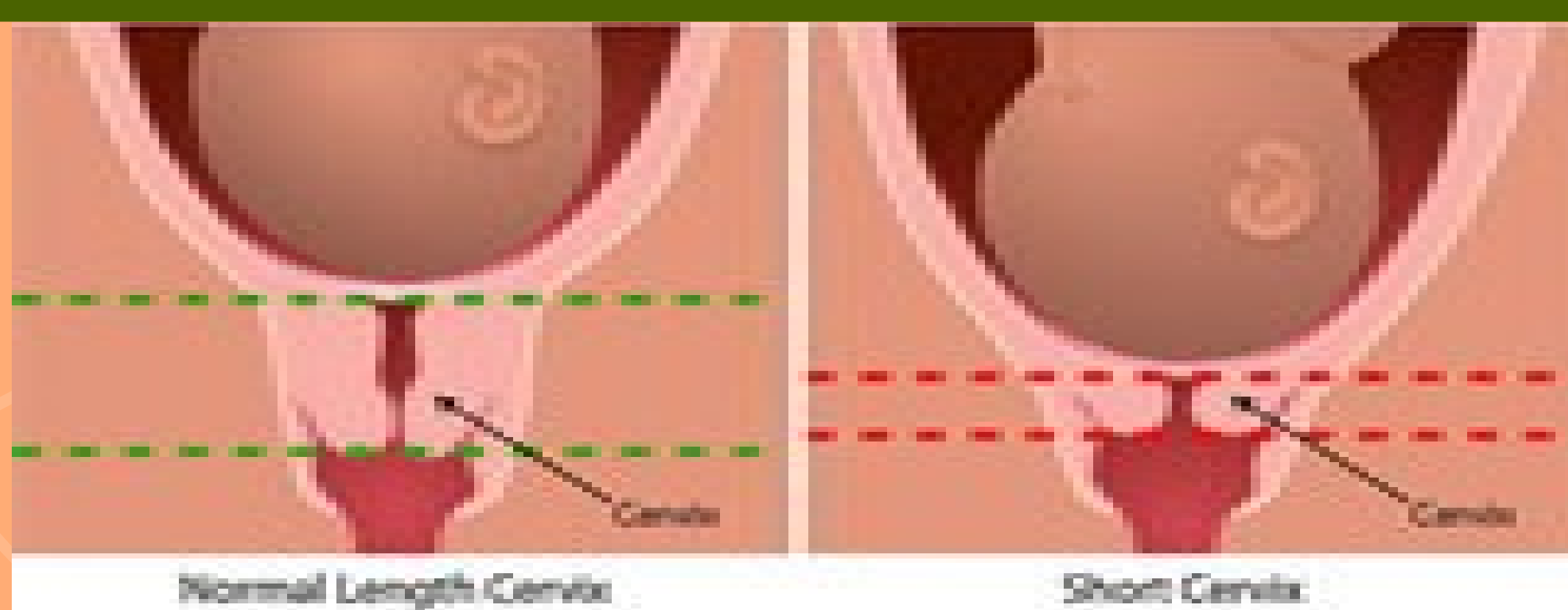
58 patients were recruited in a period of 6 months (September 2013-March 2014) with symptoms or complaints suggestive of preterm labor. Consenting women were treated according to usual hospital protocol, with addition of vaginal swabs taken for fetal fibronectin, phIGFBP-1 (Actim partus test) and cervical IL-6, IL-2R and TNF-alpha. The outcome variable was occurrence of preterm delivery within 14 days from the day of hospital admission.

Results

36 patients (62.07%) were delivered within 14 days from admission. The fetal fibronectin test is a significant predictor of preterm delivery. Patients with a positive fetal fibronectin test have an OR of 6.429 (95%CI 1.991-20.758) to deliver prematurely. The patients that gave birth within 14 days of admission were also statistically more likely to have a positive phIGFBP-1 test (p=0.02). All but one pregnant women that remained pregnant after 14 days of admission had a serum level of IL-2R below 500 U/mL and the difference in concentrations between the two groups is statistically significant (p=0.044). The patients that were delivered within 14 days of admission in our study group had an average cervical length of 18.78±5.8mm, which is significantly lower than the average cervical length (23.87±6.36) of patients that remained pregnant after 14 days (p=0.0028). Our results indicated that the cervical length significantly correlates with the concentration of IL-6 in the CVF (Spearman's coefficient R = -0.382, p<0.05), i.e. there is a negative indirect correlation between the two parameters, which means that increased IL-6 concentrations in the CVF mean shortening of the cervix and vice-versa. Cervical length also correlated with a positive phIGFBP-1 test i.e. patients with positive test had an average CL=18.5±4.63mm, which is significantly lower than patients with a negative test – 23.43±7.39mm (p=0.003).

Table. Individual test diagnostic performance in the prediction of PTD within 14 days of admission

Test*	PPV	NPV	LR+	LR-	AUC-area under the curve (ROC)	OR odds ratio (PTD)
Cervical length-CL	75%	54%	2.54	0.42	0.711	3.5
fFN	79%	62.5%	2.36	0.37	0.716	6.43
phIGFBP-1	75%	54%	1.83	0.52	0.652	3.5
IL-6	78.1%	57.69%	2.18	0.45	0.759	3.87
IL-2R	78.12%	57.7%	2.18	0.45	0.688	4.87

*Data for TNF-alpha concentrations-intentionally omitted due to lack of statistical significance

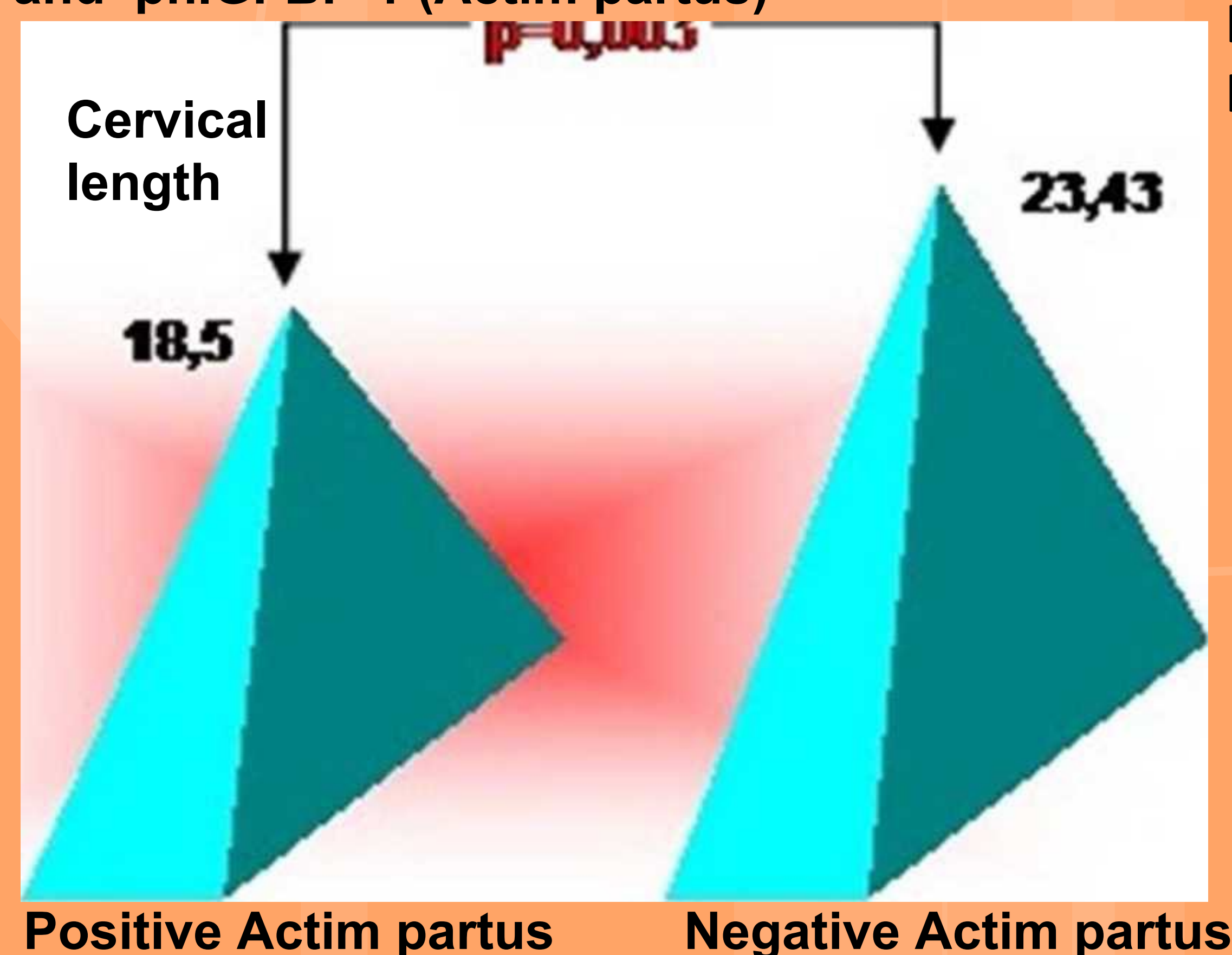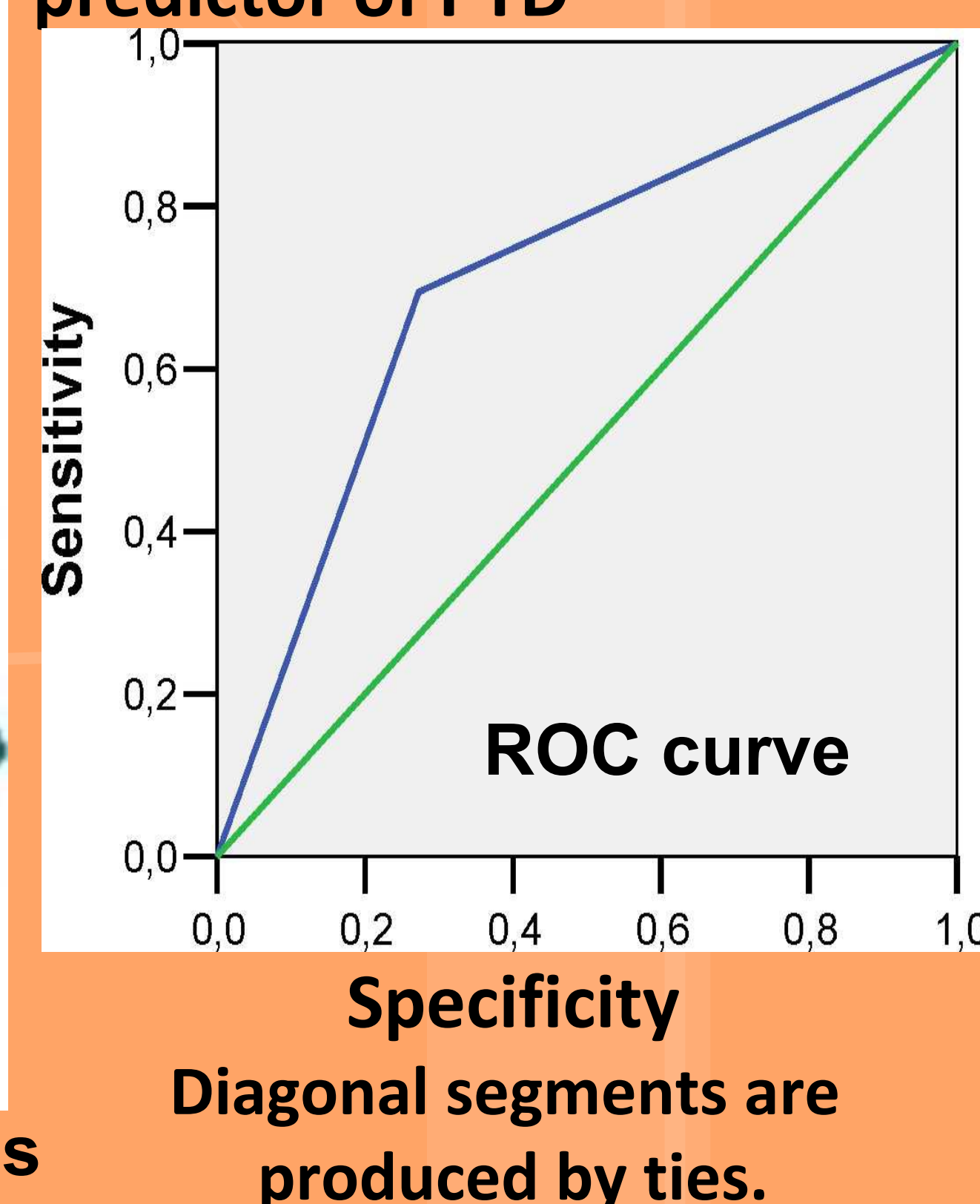**Figure1. Correlation between cervical length and phIGFBP-1 (Actim partus)**

p=0,003

Cervical length

18,5

23,43

Positive Actim partus   Negative Actim partus

Figure2. ROC curve for the performance of CL as predictor of PTD

Sensitivity (y-axis: 0,0 – 1,0)
Specificity (x-axis: 0,0 0,2 0,4 0,6 0,8 1,0)
ROC curve
Diagonal segments are produced by ties.

Conclusion

The studied biochemical markers in our study were only moderately successful in the prediction of preterm delivery. Further research is required in terms of the evaluation of cost-benefit of using such test to prevent subsequent unnecessary interventions in the low-risk group, as well as to achieve the benefits from such intervention in the high-risk groups of patients.

References

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