

# Active thrombin and its value: New approach to diagnosis of thrombosis?



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## INTRODUCTION

Evaluation of D-dimers is one of the most used diagnostic tools for assessment of thrombogenic state. Measurable amount of active thrombin bound to circulating D-dimers has been shown<sup>1</sup> to be a stratification factor for determination of thrombogenic state of the patients.

## AIM

Aim of this study was to search for the presence of active thrombin bound to D-dimers in various pathological condition.

## METHOD

- Patients samples were obtained in accordance with The Ethic committees of participating institutions (IHBT, Prague and MUH, Prague). Qualifying criterions were elevated D-dimers and consent to the study. From 98 patients, medical history and treatment protocols were acquired in 83 cases (Table I).
- For D-dimer isolation we used a kit with specific antibody against D-dimer (CEA506Hu, USCN) (Fig. 1).
- Thrombin specific substrate SN-59 (Haematologic Technologies, Inc.) was used.

Cohort of patients	
Age, median (interval)	67.2 (25-93)
D-dimers range	
< 1mg/l (F/M)	20 (8/12)
1-5 mg/l (F/M)	55 (25/30)
> 5 mg/l (F/M)	8 (4/4)

Table I Cohort of patients.

## CONTACT INFORMATION

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## RESULTS

- Detection of thrombin in patients' groups according to the D-dimer concentration is presented in Table II. There is no evidence of dependency between concentration of D-dimers and the detection of bound thrombin.
- The presence of active thrombin has far greater prevalence among group of patients with thrombotic cause of admission to hospital (Table III; Fig. 1).
- The presence of active thrombin in patients with non-thrombotic diagnosis was linked with complications or death (Fig. 2).
- Limitation of the study is small number of patients with similar diagnosis (the most frequent diagnoses are noted in Table IV).

Presence of thrombin	
< 1mg/l (+/-)	20 (11/9)
1-5 mg/l (+/-)	55 (23/32)
> 5 mg/l (+/-)	8 (4/4)

Table II Detection of thrombin activity related to D-dimers concentration. thrombin was detected (+); thrombin was not detected (-)

Presence of thrombin	
Thrombotic diagnosis (+/-)	27 (17/10)
Non-thrombotic diagnosis (+/-)	56 (21/35)

Table III Detection of thrombin activity related to diagnosis. thrombin was detected (+); thrombin was not detected (-)

Diagnosis	
Pulmonary embolism	14
Sepsis	11
Onco-hematology	10
Myocardial infarction	9
Pancreatitis	6
Pneumonia	5

Table IV The most frequent diagnoses (with numbers of patients).

## CONCLUSIONS

The determination of active thrombin seems to be an additional independent value in the D-dimers assay.

The presence of active thrombin bound to circulating D-dimers may help to differentiate between thrombogenic state and other pathological conditions linked with elevated D-dimers.

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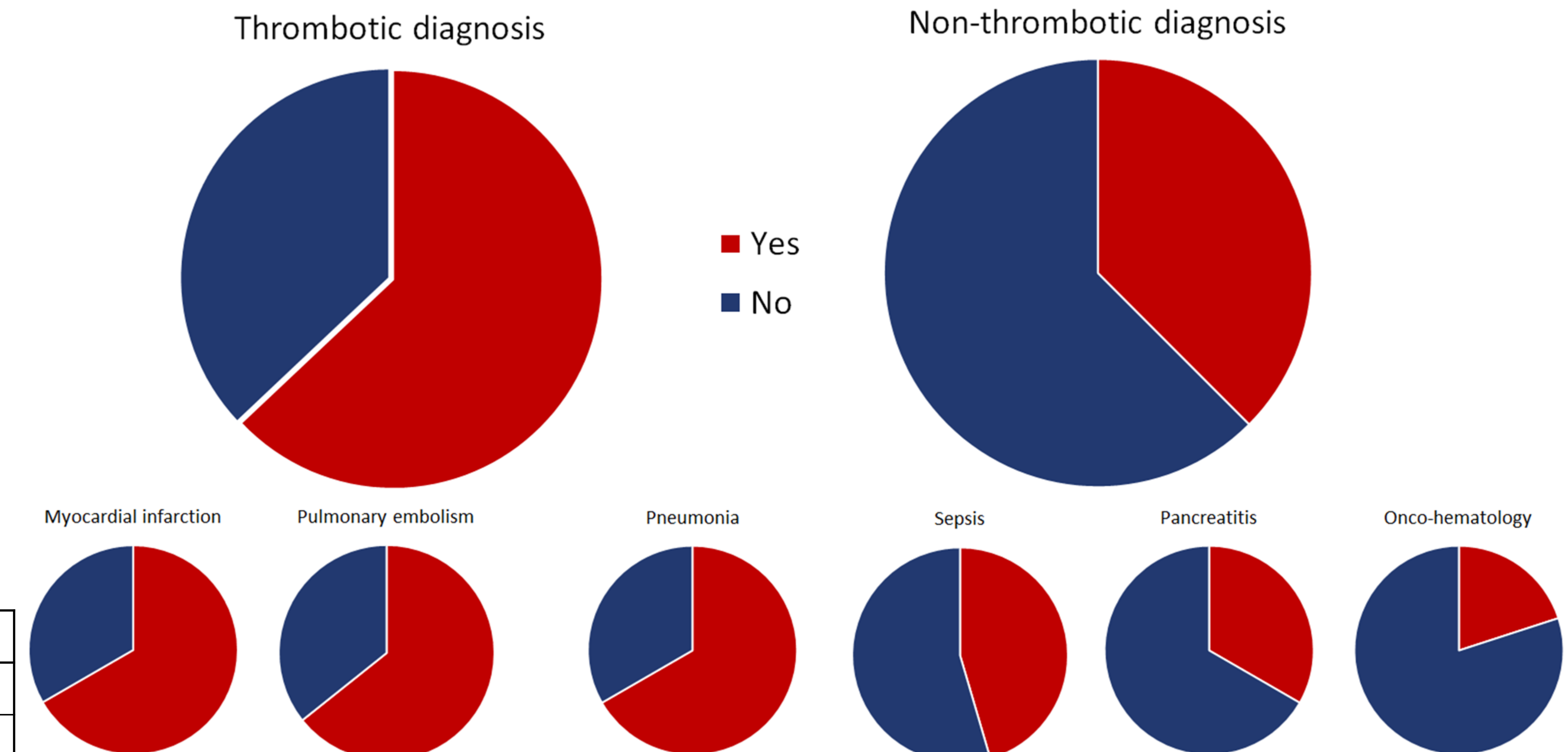


Figure 1 The presence of active thrombin bound to D-dimers in various pathological conditions. Thrombin was presented in more than 60 % of samples from patients with thrombotic diagnosis. On the other hand, none thrombin activity was detected in more than 60% of samples from patients without thrombotic diagnoses. Presence of thrombin - Yes; none thrombin detected - No.

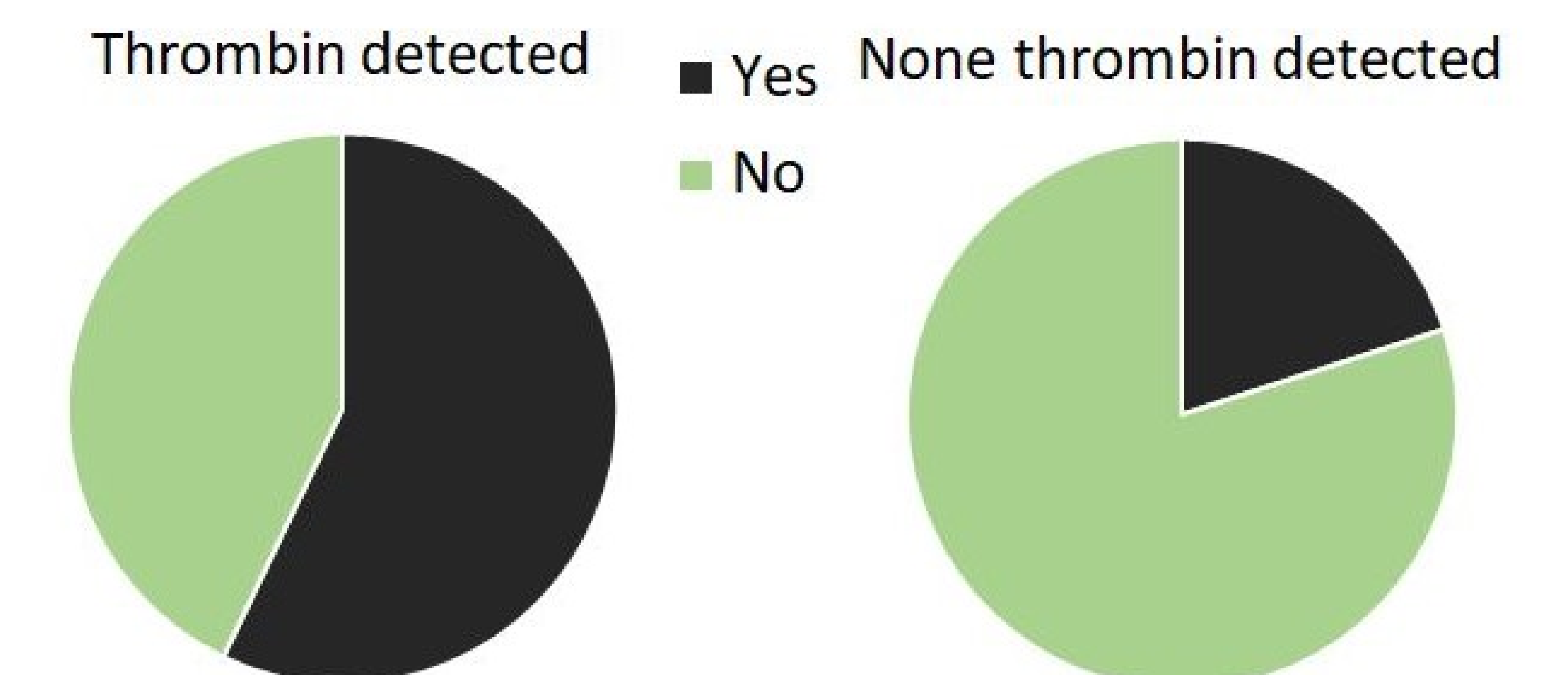


Figure 2 The presence of complications in the group of patients without thrombotic diagnosis. Complications presented - Yes; no major complications - No.

## REFERENCES

DYR, JE et al. Measurable amount of active thrombin is bound to circulating D-dimers: is there any impact on diagnosis and pathophysiology of thrombosis? *Blood*. 2016, vol. 128, no. 22, art. no. 2570. ISSN 0006-4971