# Platelet Counts and Plateletcrit are Associated with an Increased Risk of Venous Thrombosis in Females. Results from the RETROVE Study

Vázquez–Santiago, Miquel[a,b]; Vilalta, Noelia[a]; Ziyatdinov, Andrey[b]; Cuevas, Biel[a]; Macho, Raquel[a]; Pujol–Moix, Núria[a,c]; Carrasco, Marina[a]; Mateo, José[a]; Fontcuberta, Jordi[a]; Soria, José Manuel[b]; Souto, Juan Carlos[a]

[a] Unitat d'Hemostàsia i Trombosi, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain.
[b] Unit of Genomics of Complex Diseases, Sant Pau Institute of Biomedical Research (IIB-Sant Pau), Barcelona, Spain.
[c] Departament de Medicina. Universitat Autònoma de Barcelona (UAB), Barcelona, Spain.

## Introduction

Platelets play a role in the pathophysiology of arterial and venous thrombosis (VTE). Several studies have associated the risk of venous thromboembolism (VTE) with elevated platelet counts [1,2]. An elevated platelet count over $350{\cdot}10^9$/L as an independent risk of VTE with an odd ratio (OR) of 2.5 and 95% confidence interval (CI) of 1.3–4.8 [1]. However, elevated platelet count was not associated with increased risk of VTE in other studies [3,4].

The aim of our study was to evaluate the thrombotic risk in patients with VTE related to elevated platelet counts (PLT, PLTOP) and elevated plateletcrit (PCT) values.

## Material and Methods

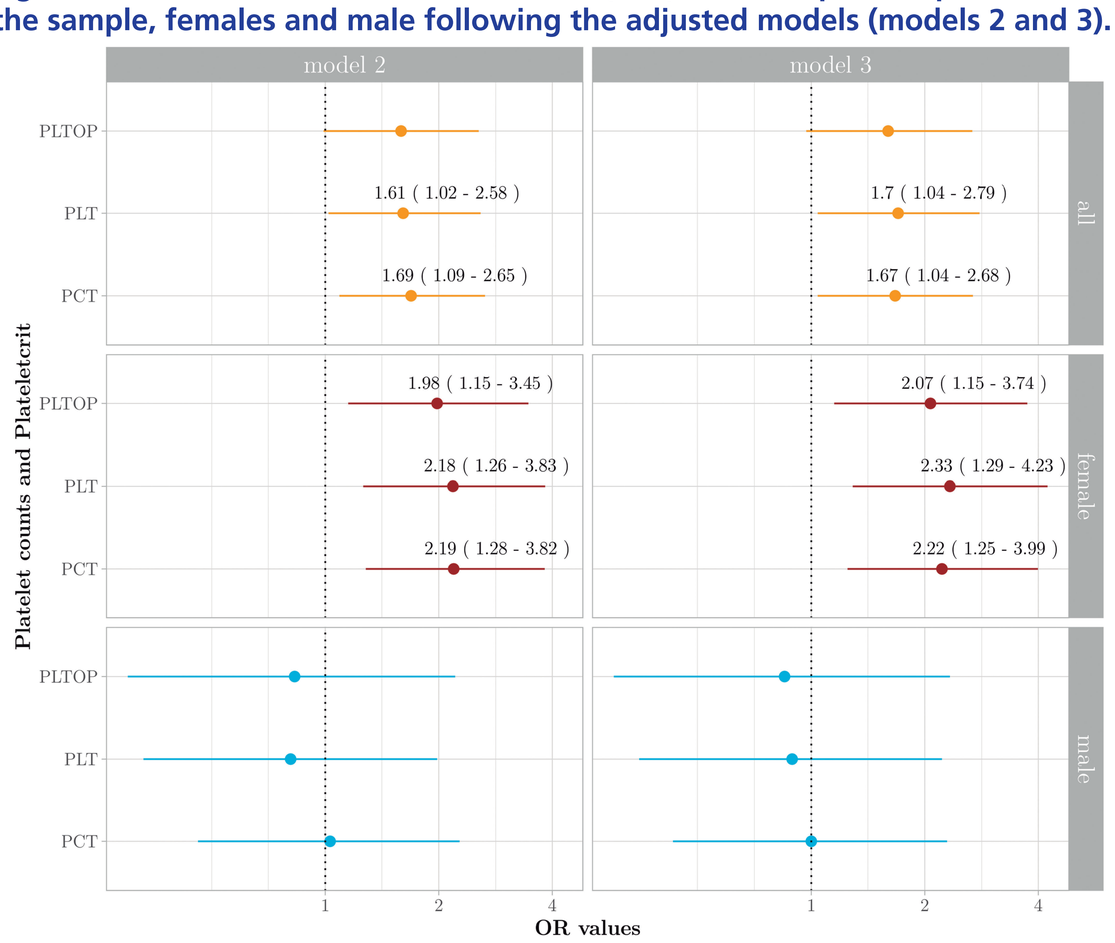
RETROVE (Riesgo de Enfermedad TROmboembólica VEnosa) is a Spanish case–control study which include 400 adult patients (over 18 years old) with VTE and 400 healthy volunteers. The platelet parameters were determined with Sysmex XE–2100® (Roche Diagnostics). The Mann–Whitney and Chi–square tests were used to evaluate differences. The platelet values over the 90th percentile were considered risk factors. To evaluate the odds ratio (OR) and 95% confidence interval (CI) for the risk of VTE, we used an unconditional logistic regression analysis for the platelet parameters (over 90th percentile). We analysed three OR models: not adjusted (Model 1); adjusted by age and gender (Model 2) and; adjusted by age, gender, BMI, hypertension and the risk factor VIII and von Willebrand factor (over 215.6% and 183%) levels, as well as ABO blood system group (Model 3).

**Table 1: Odds ratios of venous thromboembolism (VTE) for the three platelet parameters.**

| | Interval* | p* | c* | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | OR (95% CI) | p–val# | OR (95% CI) | p–val# | OR (95% CI) | p–val# |
| **Total (800)** | | | | | | | | | |
| PLT ($\times10^9$/L) | [302–657) | 54 | 41 | 1.35 (0.88–2.09) | NS | 1.61 (1.02–2.58) | 0.043 | 1.70 (1.04–2.79) | 0.034 |
| PLTOP ($\times10^9$/L) | [313–725) | 53 | 40 | 1.37 (0.89–2.13) | NS | 1.59 (0.99–2.55) | NS | 1.6 (0.97–2.67) | NS |
| PCT (%) | [0.32–0.64) | 61 | 44 | 1.44 (0.95–2.19) | NS | 1.69 (1.09–2.65) | 0.020 | 1.67 (1.04–2.68) | 0.034 |
| **Females (410)** | | | | | | | | | |
| PLT ($\times10^9$/L) | [312–480) | 44 | 29 | 1.67 (1.00–2.82) | NS | 2.18 (1.26–3.83) | 0.006 | 2.33 (1.29–4.23) | 0.005 |
| PLTOP ($\times10^9$/L) | [317–474) | 45 | 30 | 1.67 (1.00–2.80) | NS | 1.98 (1.15–3.45) | 0.015 | 2.07 (1.15–3.74) | 0.015 |
| PCT (%) | [0.33–0.47) | 47 | 30 | 1.75 (1.06–2.92) | 0.031 | 2.19 (1.28–3.82) | 0.005 | 2.22 (1.25–3.99) | 0.007 |
| **Males (390)** | | | | | | | | | |
| PLT ($\times10^9$/L) | [282–657) | 10 | 12 | 0.80 (0.33–1.90) | NS | 0.81 (0.33–1.98) | NS | 0.89 (0.35–2.22) | NS |
| PLTOP ($\times10^9$/L) | [288–725) | 8 | 10 | 0.78 (0.29–2.02) | NS | 0.83 (0.30–2.21) | NS | 0.85 (0.30–2.33) | NS |
| PCT (%) | [0.30–0.64) | 14 | 14 | 0.97 (0.45–2.11) | NS | 1.03 (0.46–2.27) | NS | 1.00 (0.43–2.29) | NS |

(*) Number of individuals analysed over the 90th percentile sorted by (p) patients and (c) controls.
(#) The statistical significances are fixed in a *p–value* < 0.05. The non–significance is shown as NS.

**Figure 1: Risk of venous thromboembolism (VTE) for three platelet parameters in the sample, females and male following the adjusted models (models 2 and 3).**




## Results

We did not find any significant difference between patients and controls for the platelet parameters. However, in females, the PLT over $312{\cdot}10^9$/L showed an OR of 2.33 (95% CI, 1.29–4.23). PCT over 0.33% showed an OR of 2.22 (95% CI, 1.25–3.99). Notably, no risk of VTE was found for elevated the platelet counts in males (Table 1 and Figure 1).

## Conclusions

**We believe that our results provide a firm foundation for additional studies which might confirm our observation that high platelet counts, even within the reference clinical range, are predictors of VTE risk in females.**

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M. Vázquez-Santiago: *mvazquezs@santpau.cat.*

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