

## Editorial



# Changes in the Epidemiology and Treatment Strategy of Venous Thromboembolism

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### Conflict of Interest

The authors have no financial conflicts of interest.

### Author Contributions

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► See the article “Epidemiology of Venous Thromboembolism and Treatment Pattern of Oral Anticoagulation in Korea, 2009–2016: a Nationwide Study Based on the National Health Insurance Service Database” in volume 29 on page 265.

The reported incidence rates of venous thromboembolism (VTE) clinically presenting as deep vein thrombosis and pulmonary embolism vary depending on patient race and country. Indeed, several previous epidemiological studies reported that the incidence of VTE is higher in African Americans, lower in Asians,<sup>1)</sup> and intermediate in Native Americans and Europeans.<sup>2-4)</sup> Although not yet elucidated, the causes of these differences are suggested to be due to obesity,<sup>4)</sup> imbalanced coagulation system<sup>2)5)</sup> and genetic background, including polymorphisms and mutations associated with thrombosis.<sup>2)4)</sup>

The study by Kim et al.<sup>6)</sup> demonstrated that the mean age-standardized annual incidence of VTE in Koreans is lower (0.028%; ranging from 0.024% in 2009 to 0.034% in 2016) than that in Western countries (0.1% - 0.2%), but it increased almost two-fold from 2009 to 2016. Not estimated as a risk in their study, obesity might be a possible cause for the increased incidence of VTE, at least in young- and middle-aged Koreans. Obesity is a growing public health issue in many Asian countries as diet and lifestyle have become westernized. The commercialization of direct oral anticoagulants (DOACs) as new therapeutic agents might also lead to an increase in the diagnosis of VTE in Korea as this demographic statistical data was based on the Korean National Health Insurance Service (NHIS) system.

Old age is one of the strongest risk factors for VTE. The incidence of VTE is approximately eight times higher in patients aged  $\geq 80$  years than those in their fifth decade.<sup>7)8)</sup> Similarly, in the study by Kim et al.,<sup>6)</sup> the occurrence of VTE was markedly increased in elderly patients aged  $\geq 60$  years than in younger generation and middle-aged group during 7 years. Easily accessible medical services for elderly patients who have more comorbidities and are more vulnerable to VTE in specific conditions, including immobilization and surgery, may account for this difference.

Several previous studies focusing on the treatment of VTE<sup>9)10)</sup> reported that DOACs have a lower bleeding risk and a similar efficacy for the recurrence of VTE and mortality compared to vitamin K antagonists (VKAs). Thus, recent recommendations<sup>8)11)</sup> favor DOACs over VKAs in the absence of contraindications, including renal insufficiency (creatinine clearance  $< 30$  mL/min), liver disease classified as higher than moderate grade, and antiphospholipid syndrome. Furthermore, even in patients with right ventricular dysfunction, DOACs alone

over thrombolytic therapy are recommended in hemodynamically stable patients. On the other hand, doctors are reluctant to administer VKAs in outpatient clinics since VKAs have many interactions with other drugs and foods, and the therapeutic range of VKAs has a narrow international normalized ratio of 2–3. The usual implementation of DOACs might make it possible for VTE patients with a low risk of complications to be offered home treatment rather than hospital treatment.<sup>11)</sup>

As mentioned in the study by Kim et al.,<sup>6)</sup> insurance reimbursement for DOACs would lead to a remarkable increase in their use in Korea. This might also have contributed to reducing unnecessary aspirin use (24.6% in 2009 vs. 16.8% in 2016). Unfortunately, relevant data are insufficient to demonstrate whether the efficacy and bleeding risk of DOACs are superior to VKAs in the Korean population, as demonstrated in several previous studies.<sup>9)10)</sup> Further studies are required in this direction. In addition, ethnic/racial-specific predictive models for VTE, including risk factors and mortality, need to be developed.

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