Webinar

Watch the webinar on this topic by scanning the QR Code.



Speaker

Cihan Ay, M.D.

Professor of haematology

Medical University of Vienna
Department of Medicine I,
Division of Haematology and Haemostaseology
Waehringer Guertel 18-20 - 1090 Vienna, Austria
Email: cihan.ay@meduniwien.ac.at

Dr. Ay is currently a professor of haematology at the Medical University of Vienna. His research and clinical work focuses on venous thromboembolism (VTE), anticoagulation and bleeding disorders.

Having contributed to over 220 peer-reviewed publications, he was particular successful in contributing to a better understanding of the etiology of VTE in cancer by identifying biomarkers and clinical risk factors for cancer-associated VTE.

He served as Co-Chair of the Scientific and Standardization Committee (SSC) Subcommittee of the International Society on Thrombosis and Haemostasis (ISTH) on Haemostasis and Malignancy until 2019 and is currently member of the steering committee of World Thrombosis Day (WTD).

Dr. Ay is a passionate clinician and researcher, supervisor of diploma and PhD-students and maintains regular teaching activities for students and healthcare professionals to foster education in the field of thrombosis, haemostasis and anticoagulation.

References

1. Raskob GE, Angchaisuksiri P, Blanco AN, et al. Thrombosis: A major contributor to global disease burden. *Arterioscler Thromb Vasc Biol.* 2014;34(11):2363-2371. doi:10.1111/jth.12698
2. Ay C, Pabinger I, Cohen AT. Cancer-associated venous thromboembolism: Burden, mechanisms, and management. 2017:219-230.
3. Mulder FI, Horváth-Puhó E, van Es N, et al. Venous thromboembolism in cancer patients: a population-based cohort study. *Blood.* 2021;137(14):1959-1969. doi:10.1182/blood.2020007338
4. Moik F, Ay C, Pabinger I. Risk prediction for cancer-associated thrombosis in ambulatory patients with cancer: past, present and future. *Thromb Res.* 2020;191(December 2019):S3-S11. doi:10.1016/S0049-3848(20)30389-3
5. Moik F, Englisch C, Pabinger I, Ay C. Risk assessment models of cancer-associated thrombosis - Potentials and perspectives. *Thromb Updat.* 2021;5:100075. doi:10.1016/j.tru.2021.100075
6. Khorana A, Kuderer NM, Culakova E, Lyman GH, Francis CW. Development and validation of a predictive model for chemotherapy-associated thrombosis. *Blood.* 2008;111(10):4902-4907. doi:10.1182/blood-2007-10-116327
7. Pabinger I, van Es N, Heinze G, et al. A clinical prediction model for cancer-associated venous thromboembolism: a development and validation study in two independent prospective cohorts. *Lancet Haematol.* 2018;5(7):e289-e298. doi:10.1016/S2352-3026(18)30063-2
8. Kumar V, Shaw JR, Key NS, et al. D-Dimer Enhances Risk-Targeted Thromboprophylaxis in Ambulatory Patients with Cancer. *Oncologist.* 2020;25(12):1075-1083. doi:10.1002/onco.13540

werfen.com

For more information, contact your local Werfen representative.

©2022 Instrumentation Laboratory. All rights reserved.

p/n 000VTE_CANCPG - Rev.0 - 06/22

werfen

Hemostasis Innovation is Here.

Risk assesments of VTE in cancer

What is VTE?

Venous thromboembolism (VTE)

VTE is the 3rd most common cardiovascular disease and one of the leading causes of death and disability worldwide. It is a condition that usually consists of blood clot forming in the deep veins of the leg, groin, or arm (known as deep vein thrombosis, DVT) which can migrate through the circulation, lodging in the lungs (known as pulmonary embolism, PE).

A comprehensive scientific review by the World Thrombosis Day (WTD) steering committee revealed that 10 million cases of VTE occur annually.[1]
One of 5 VTE events are associated with cancer, which is a strong risk factor for VTE.[2]

werfen

Incidence
of VTE in patients with cancer

Endothelial injury, circulatory stasis, and abnormalities in blood clotting components, which are summarized as the Virchow Triad, define the pathophysiological conditions that lead to thrombosis.

CAT represents a sub-entity of thrombosis with specificities that distinguish it from VTE in the general population.

In a recent **Danish population based cohort study, which included close to half a million patients with a first-time diagnosis of cancer between 1997 and 2017 and a cohort of one and a half million individuals without cancer** from the general population, changes in risk of VTE in patients with cancer compared to those without cancer were investigated[3].

The main findings were:

- **8 times higher cumulative incidence of venous thromboembolism** 12 months after the cancer diagnosis in the cancer cohort (2.3%) versus the comparison cohort (0.35%)[3]
- **3-fold increase in VTE risk in patients with cancer over two decades** (12-month incidence of VTE increased from 1.0% in 1997 to 3.4% in 2017)[3]
- Important risk factors for VTE in cancer patients[3]:
  - prior venous thromboembolism
  - distant metastasis
  - use of chemotherapy
  - use of protein kinase inhibitors,
  - use of anti-angiogenic therapy
  - use of immunotherapy

How to perform risk assessments of VTE in Cancer Patients

Evaluating the risk of VTE in ambulatory cancer patients is of significant value for the purpose of patient information and education and of appropriate thromboprophylaxis. Risk assessments help identify the patients who can benefit the most from anticoagulation to prevent thrombosis and avoid the risk of bleeding associated with these treatments for patient who do not benefit. Several risk assessment scores have been developed and incorporate parameters such as cancer type, comorbidities, treatments and laboratory values (biomarkers)[4,5]. The first was published in 2008, the Khorana Score[6].

Khorana Score

Scoring based on Khorana includes the following:

- Tumor site risk category
  - very high risk: pancreatic and gastric cancer (score of 2)
  - high risk: lung, lymphoma, gynecologic, bladder, testicular (score of 1)
  - low risk: other cancers (score of 0)
- Laboratory parameters (each scored 1, if present)
  - Hemoglobin <10 g/dl or use of erythropoiesis stimulating agents up to the 2nd cycle of chemotherapy
  - leukocyte count > 11 $x10^9$/L
  - platelet count ≥ 350 $x10^9$/L
- Body mass index ≥ 35 kg/m^2 (score of 1)

These criteria allow to classify patients into 3 categories, low risk category with a total score of 0, intermediate risk category with a total score of 1-2, and high-risk category with a total score of ≥3[6]. The Khorana score, while having some limitations, remains the most established risk assessment model. Since the Khorana score was introduced, several other risk prediction models were designed with some modifications, like including additional biomarkers or cancer treatments to improve the prediction capabilities.

CAT Score

In 2018, a simplified prediction model was proposed by Pabinger et al. including two variables, the tumor site risk category similar to the one used in the Khorana score and continuous levels of D-Dimer[7].

This new score system allows the prediction of a personalized risk estimate of 6-month VTE probability using a nomogram, which subsequently enables individualized risk-benefit evaluations[7].

Points for D-Dimer concentration and tumor-site risk category can be obtained by calibrating with the point caliper, and then combined to obtain a total score that can be calibrated with the cumulative 6-month incidence scale[7].

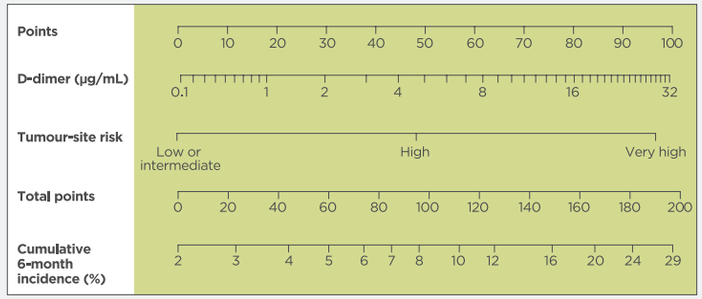


Figure: Nomogram for predicting the 6-month risk of venous thromboembolism[7].

The web implementation of the clinical prediction model for cancer associated VTE provides a quick and easy alternative to the nomogram calculation.

The model was derived in the prospective Vienna Cancer and Thrombosis Study (CATS), a prospective observational cohort study including patients with newly diagnosed or recurrent cancer (n = 1423), and externally validated in a multinational, prospective MICA cohort study (n = 832)[7]. In a post-hoc analysis of the AVERT trial, patients with a Khorana score of ≥ 2 were randomized to receive apixaban thromboprophylaxis or placebo[8]. Assessing the CAT score for the patients, when looking at patients with a predicted 6-months VTE risk of ≥ 8%, the thromboprophylaxis group had a markedly decreased 6-month VTE risk (8.4% with apixaban vs. 26.3% with placebo)[8]. By comparison, patients with a predicted VTE-risk < 8% seem to have no benefit from thromboprophylaxis when it comes to 6-month VTE rates (3.9% with apixaban vs 4.5% with placebo)[8].

Calculate a CAT Score online.