Hybrid Master's Degree

Genomic and Precision Medicine in Hematology: Thrombosis

tech global university

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Genomic and Precision Medicine in Hematology: Thrombosis

Modality: **Hybrid (Online + Clinical Internship)**

Duration: **12 months**

Certificate: **TECH Global University**

60 + 5 créditos ECTS

Website: **www.techtitute.com/us/medicine/hybrid-master-degree/hybrid-master-degree-genomic-precision-medicine-hematology-thrombosis**

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01

Introduction

According to several experts, 1 out of 10 deaths in hospitals is caused by thrombosis. Hematological diseases require early detection in order to apply the appropriate treatments and, therefore, to obtain a prompt recovery. But, above all, it is necessary to expand research in this field, which will make it possible to detect new diagnostic and therapeutic methods. With this program, which combines theory with practical stay, we intend to teach doctors the latest information on Genomic and Precision Medicine in Hematology.

At TECH we offer you the possibility of completing a theoretical and practical Hybrid Master's Degree in Genomic and Precision Medicine in Hematology: Thrombosis, so that you are able to increase your expertise in this field"

Early detection of venous thrombosis is essential to treat the disease and reduce sequelae in patients. For this reason, the superior education of doctors in Genomic and Precision Medicine is of great importance, both to offer the best treatments and to provide preventive measures to avoid harm to patients. Without a doubt, education is of great value in this field, but complementing it with practical education is essential to fix this knowledge and learn in a more didactic way.

Venous Thromboembolism (VTE) occurs when blood clots inside the veins. Although it is a preventable and treatable disease, it still causes a high number of deaths. In fact, it is the third leading cause of cardiovascular death, after acute myocardial infarction and stroke. In this Hybrid Master's Degree, specialists will be trained in Genomic and Precision Medicine in Hematology: Thrombosis to learn about the latest advances in the field and offer more effective treatments.

Therefore, the aim is to establish the bases of genomic and precision medicine in the field, starting from the knowledge of hemostasis and venous thromboembolism, and addressing the key aspects of diagnosis, treatment and prevention. Professionals will also learn about special situations they may encounter in their daily practice, such as thrombosis in oncology patients or in women.

The content of this Hybrid Master's Degree is focused on the detailed updating of medical professionals working in this area, whose functions require high levels of qualification, but also on the initiation of their activity as professionals in the field of research. Only with an appropriate, focused and specialized refresher program can the necessary knowledge and skills be acquired and maintained to meet the needs of these patients.

Given this scenario, TECH presents this program that will allow you to catch up with the most up to date theory of the moment, but also to work with a real patient and in a hospital setting with the latest generation of resources, which will develop your maximum potential and growth in the area of Hematology. In this way, you will work with patients hand in hand with the best specialists, using the latest techniques based on scientific evidence, and achieving results that were previously difficult to achieve.

This **Hybrid Master's Degree in Genomic and Precision Medicine in Hematology: Thrombosis** contains the most complete and up-to-date scientific program on the market. The most important features include:

- Development of more than 100 clinical cases presented by experts in Genomic and Precision Medicine in Hematology: Thrombosis
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- Updated predictive models for detecting thrombus risk in selected patients
- Application of preventive plans for Venous Thromboembolic Disease for oncology patients or pregnant women
- Approach and Address of omics data using the R programming language.
- All of this will be complemented by theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- Content that is accessible from any fixed or portable device with an Internet connection
- In addition, you will be able to complete a clinical internship in one of the best hospitals in the country

Add to your online study the realization of clinical practices in a hospital center that meets the highest standards of quality and technological level"

Take an intensive 3-week internship in Barcelona and acquire all the knowledge you need to grow personally and professionally"

In this Hybrid Master's Degree, of a professionalizing nature and hybrid learning modality, the program is aimed at updating medical professionals specialized in Hematology, and who require a high level of qualification. The contents are based on the latest scientific evidence, and oriented in an educational way to integrate theoretical knowledge in medical practice, and the theoretical-practical elements will facilitate the updating of knowledge and will allow decision making in the patient Address.

Thanks to its multimedia content developed with the latest educational technology, they will allow the professional to learn in a contextual and situated learning environment, which means, a simulated environment that will provide immersive learning programmed to train in real situations. This program is designed around Problem-Based Learning, whereby the physician must try to solve the different professional practice situations that arise during the course. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.

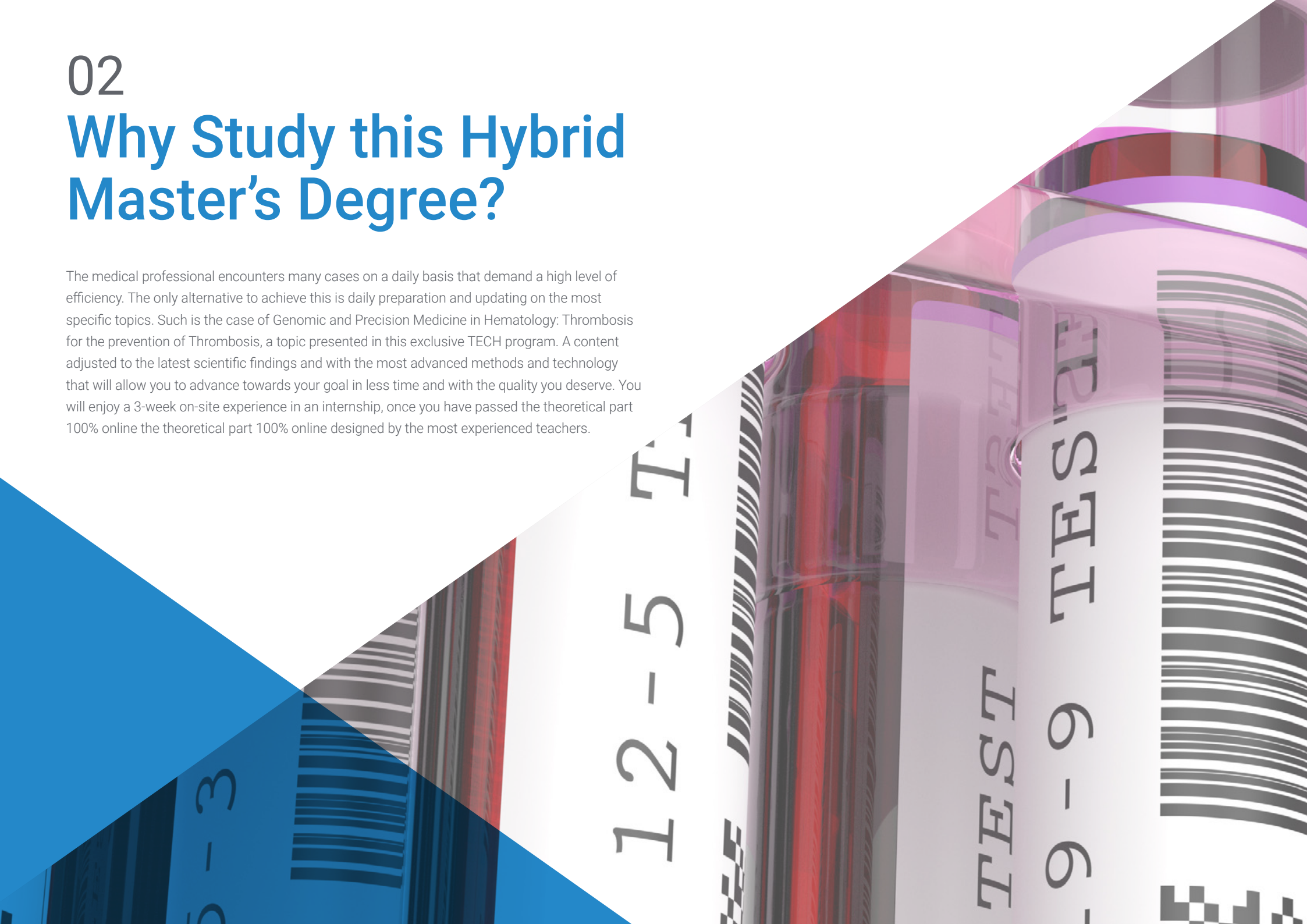
A Hybrid Master's Degree of excellent quality, with the most innovative didactic contents in the market, and that is at your disposal to boost your growth in the field of Genomic Medicine.

TECH's innovative 100% online teaching method and the possibility of doing on-site internships are the perfect combination to improve your career without neglecting your personal and professional duties.

02

Why Study this Hybrid Master's Degree?

The medical professional encounters many cases on a daily basis that demand a high level of efficiency. The only alternative to achieve this is daily preparation and updating on the most specific topics. Such is the case of Genomic and Precision Medicine in Hematology: Thrombosis for the prevention of Thrombosis, a topic presented in this exclusive TECH program. A content adjusted to the latest scientific findings and with the most advanced methods and technology that will allow you to advance towards your goal in less time and with the quality you deserve. You will enjoy a 3-week on-site experience in an internship, once you have passed the theoretical part 100% online the theoretical part 100% online designed by the most experienced teachers.



With TECH you will progress comfortably in this new academic challenge you are facing"

1. Updating from the Latest Technology Available

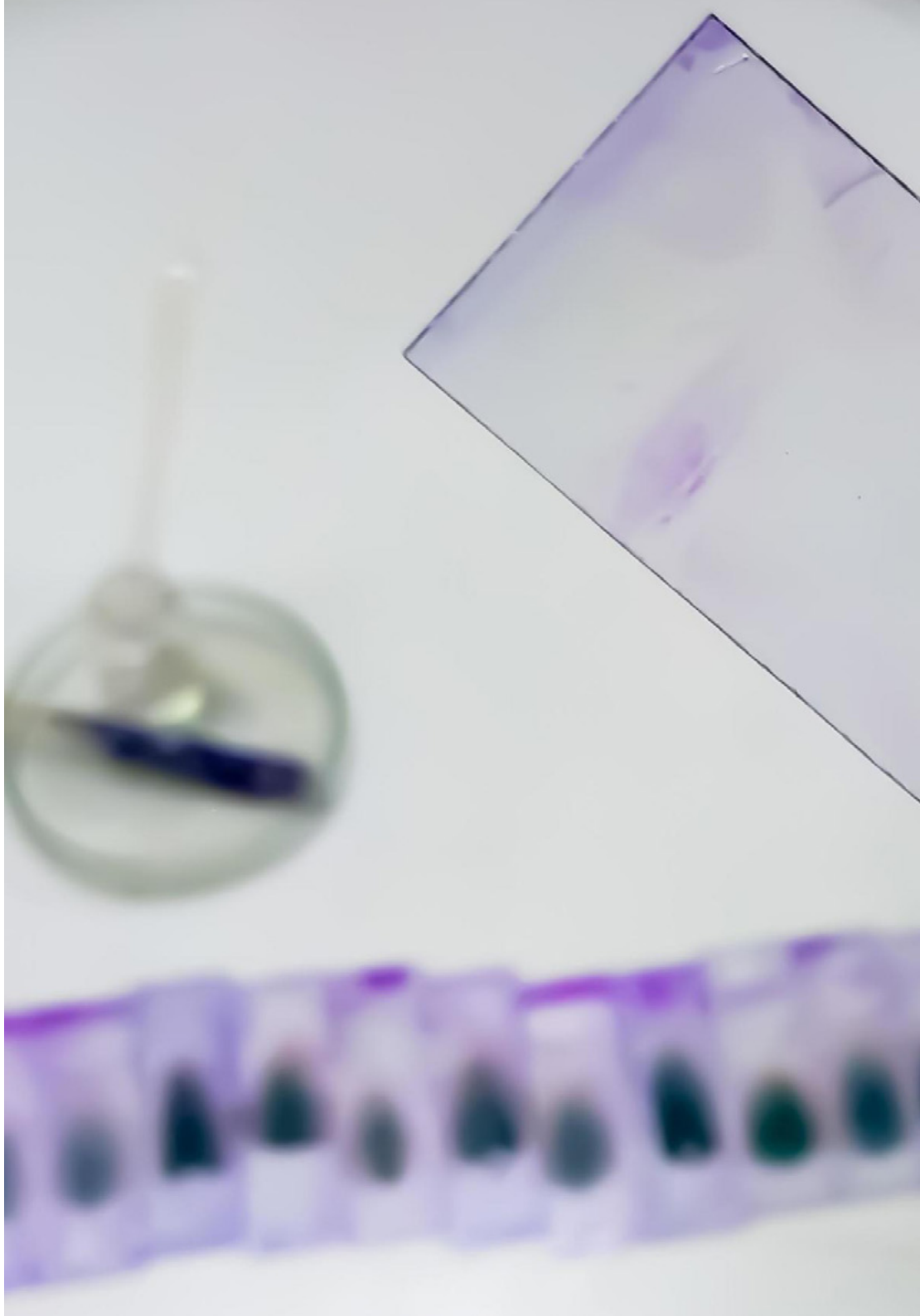
The advances and lines of research in the area of Genomic Medicine are vast. In this program TECH has managed to integrate the latest advances in the field together with the most diverse technological resources. Therefore, the professional will find a program that will provide the maximum update on the approach to patients with high-risk pathologies in the hematological area.

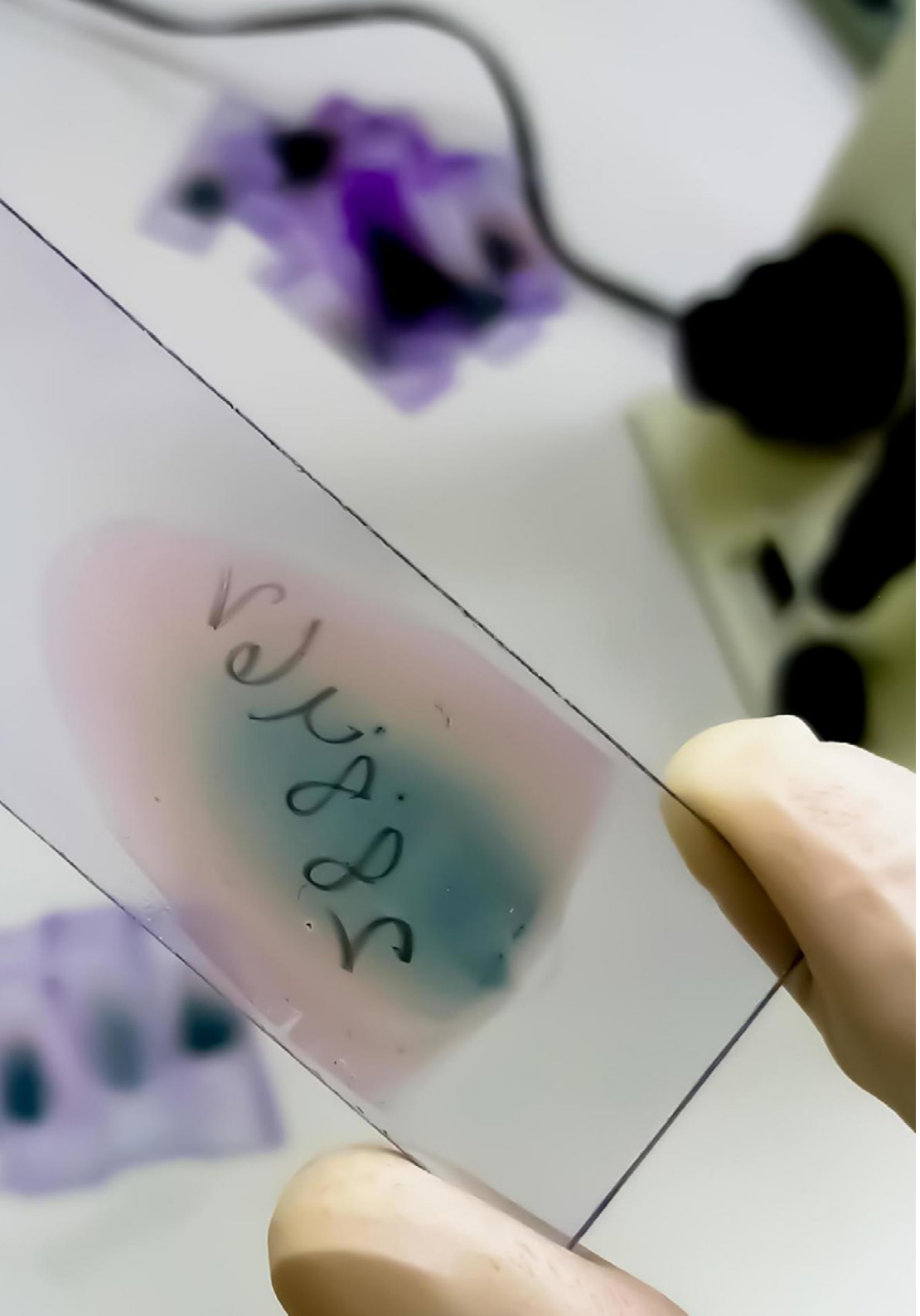
2. Gaining In-depth Knowledge from the Experience of Top Specialists

The large team of professionals that will accompany the specialist throughout the entire practical period is a first-rate guarantee and an unprecedented guarantee of updating. With a specifically designated tutor, the student will be able to see real patients in a modern environment, which will allow the student to incorporate the most effective procedures and approaches in Genomic and Precision Medicine in Hematology into their daily practice: Thrombosis

3. Entering First-Class Clinical Environments

TECH carefully selects all available centers for Internship Programs. Thanks to this, the specialist will have guaranteed access to a prestigious clinical environment in the area of Genomic and Precision Medicine in Hematology: Thrombosis Be able to update your work methods according to the latest theses and scientific postulates.





4. Combining the Best Theory with State-of-the-Art Practice

This program is developed with a new and highly effective teaching model, adjusted to the dynamics of the medical professional who does not have all the time needed for keeping up to date with the most specific and updated topics. You will be able to delve 100% online into the theoretical part and update your current practice in a reference clinical center.

5. Expanding the Boundaries of Knowledge

TECH offers the possibility of doing this Internship Program, not only in national, but also in international centers. This way, the specialist will be able to expand their frontiers and catch up with the best professionals, who practice in first class centers and in different continents. A unique opportunity that only TECH, the largest online university in the world, could offer.

You will have full practical immersion at the center of your choice"

03

Objectives

This Hybrid Master's Degree has been designed for doctors to update and expand their knowledge and skills in the field of Genomic and Precision Medicine in Hematology: Thrombosis, combining excellent theoretical learning with an internship in a prestigious hospital center. Likewise, to ensure efficient learning, TECH has proposed a series of general and specific objectives in this degree program.

The perfect program to achieve your most ambitious and complex objectives through an academic experience adapted to the highest scientific and medical standards"

General Objective

- The general objective of the Hybrid Master's Degree in Genomic and Precision Medicine in Hematology: Thrombosis is to ensure that the professional updates the procedures of the specialty in a theoretical-practical way. In this way, you will acquire the latest diagnostic and therapeutic techniques in this field and then put them into practice in person during a hospital internship with the best experts in the field

You will learn, through this Hybrid Master's Degree, the best strategies to prevent thrombosis in non-pregnant women of childbearing age"

Specific Objectives

Module 1. Introduction to Hemostasis

- Explain the concept of feedback in homeostatic balance and its application
- Correlating coagulation tests with the phases of coagulation to understand which fundamental physiological process is failing in primary or secondary hemostasis

Module 2. Pathophysiology and Epidemiology in Venous Thromboembolism

- Explain the pathological mechanisms by which a thrombus develops in the veins and the short- and long-term consequences it may have
- Analyze the relations of thrombus and recurrence with determinant variables such as age, sex or race
- Analyze how the circumstances associated with the thromboembolic event determine, to a large extent, the risk of recurrence
- Describe the environmental risk factors that are associated with the disease and the genetic basis known at present

Module 3. Diagnosis, Treatment and Prophylaxis in Venous Thromboembolism

- Learn how to diagnose Venous Thromboembolism
- Know the main treatments for this disease
- Learn about venous thrombosis prevention measures

Module 4. Special Situations I: Thrombosis in Oncology

- Know the specific characteristics of patients with thrombosis in the oncologic setting
- Recognize the preventive measures for oncology patients according to their characteristics, whether they are in-patients, surgical patients or patients undergoing systemic therapy in an outpatient setting
- Identify the preventive models in case of thrombosis risk
- Learn the most effective treatments for cancer-associated thrombosis

Module 5. Special Situations II: Thrombosis in Women

- Relate birth control and hormonal methods to venous thrombosis
- Understand preventive strategies for non-pregnant women of childbearing age
- Establish the relationship between venous thrombosis and Address or cesarean section
- Recognize the medication used during pregnancy, puerperium and lactation

Module 6. Omic Data: Introduction to the Programming Language R

- Obtain notions of basic Unix/Linux administration
- File and directory Address using the Unix/Linux command interpreter
- Learn the programming language R and how to manage its packages
- Recognize the different types of data in R and know which to use in each Cases
- Implement your own functions in R to perform specific tasks

Module 7. Thrombosis in the Genomic Era I: Genome-Wide Association Studies (GWAS)

- Provide an overview of genetics, and in particular of genome-wide association studies
- Delve into the current status of the use of genetics in Venous Thromboembolic Disease

Module 8. Thrombosis in the Genomic Era II: Massive Sequencing Studies

- Identify DNA sequencing techniques
- Acquire knowledge of bio-informatic analysis of NGS data
- Interpret NGS results in thrombosis and hemostasis

Module 9. Thrombosis in the Genomic Era III: Regulation of Gene Expression Studies (RNA and miRNA)

- Know the experimental designs and quality control for RNA-seq studies

Module 10. Predictive Models

- Understand and implement the steps involved in preprocessing a new dataset
- Optimize linear regression models with the lowest possible number of variables
- Use different methods for validating the performance of a predictive model
- Adjust support vector machines to clinical data and assess their performance
- Manage various unsupervised learning methods for exploratory data analysis

04

Skills

After passing the evaluations for this Hybrid Master's Degree in Genomic and Precision Medicine in Hematology: Thrombosis, the professional will have acquired updated competencies based on scientific evidence that will allow them to provide quality medical care to their patients.

Learn the necessary skills to develop in your profession with total guarantees of success thanks to this TECH program"

General Skills

- Provide the most accurate treatments for Venous Thromboembolic Disease
- Use of omics data and bioinformatics methods applied to precision medicine
- Apply the most up-to-date diagnostic and therapeutic methods for this disease in daily practice with affected patients.

With this program you will assimilate the most up-to-date therapeutic procedures for oncology patients or patients with characteristics that require special attention from the doctor"

Specific Skills

- Identify the blood coagulation phases and use blood regulatory mechanisms
- Perform blood draws and blood sampling
- Conduct platelet studies
- Know the multiple causative factors associated with venous thrombosis, whether acquired or environmental, genetic or inherited
- Effectively diagnose Venous Thromboembolic Disease
- Apply the most effective treatments for venous thrombosis according to patient characteristics
- Implement the most appropriate venous thrombosis prevention measures for each patient
- Apply preventive measures for oncology patients according to their characteristics, whether in-patients, surgical patients or patients undergoing systemic therapy in an outpatient setting
- Recognize preventive models for thrombosis risk and offer them to patients
- Learn the most effective treatments for cancer-associated thrombosis
- Apply prevention strategies in non-pregnant women of childbearing age
- Use the medication most suitable during pregnancy, puerperium and lactation
- Become fluent in the Unix/Linux command interpreter as a complement to R for file and system Address
- Perform the appropriate statistical analysis depending on the nature of the data and visualize the results in R
- Understand the different etiologies of hematological diseases, and the relevance of the most appropriate genetic study methods for each of them
- Know the genetic tools available to the public, and the most current reference panels
- Discuss genetic results with a critical view, as well as understand the contribution of GWAS studies in clinical genetics
- Relate the genetic basis and molecular study in thrombosis and hemostasis
- Use DNA sequencing techniques
- Interpret NGS results in thrombosis and hemostasis
- Establish experimental designs for RNA-seq studies and further develop the quality control of such studies
- Understand the characteristics, advantages and disadvantages of the different predictive models
- Adjust and confirm the appropriate predictive model based on data characteristics and intentionality

05

Course Management

In order to preserve intact the immense academic level that characterizes TECH programs, this Hybrid Master's Degree is directed and taught by specialized doctors with extensive experience in the field of Hematology. These experts are responsible for the elaboration of all the didactic resources that the student will have access to throughout this program. As a result, all the knowledge you will gain will be fully applicable in your professional life.

The professors who teach the theoretical phase of this Hybrid Master's Degree are active in the field of Hematology Medicine"

International Guest Director

Doctor Anahita Dua is a leading vascular surgeon with a strong international reputation in the field of Vascular Medicine. As such, she has practiced at Massachusetts General Hospital, where she has held several leadership roles, including director of the Vascular Laboratory and co-director of the Center for Peripheral Artery Disease and the Limb Evaluation and Preservation Program (LEAPP). In addition, she has been the Associate Director of the Wound Care Center and the Director of the Lymphedema Center, as well as Director of Clinical Research for the Division of Vascular Surgery.

She has also specialized in advanced Vascular Surgery techniques, both endovascular and traditional, for the treatment of various diseases, including Peripheral Artery Disease, Critical Limb Ischemia, and Aortic and Carotid Disease. She has also encompassed the treatment of complex problems, such as Thoracic Outlet Syndrome and Venous Insufficiency.

Of particular note is her research focus, centered on anticoagulation and predictive biomarkers in patients undergoing revascularization, as well as the development of technological tools to improve mobility and wound healing in patients with Peripheral Vascular Disease. In turn, she has included research based on surgical outcomes using large medical databases to evaluate the quality and cost-effectiveness of treatments. In fact, she has contributed significantly to the field through more than 140 peer-reviewed publications and by editing five textbooks in Vascular Surgery.

In addition to her clinical and research work, Dr. Anahita Dua has been the founder of Healthcare for Action PAC, an organization whose mission is to address threats to democracy and promote policies that benefit public health, reflecting her commitment to social welfare and justice.

Dr. Anahita, Dua

- Co-Director of the Center for Peripheral Artery Disease, Massachusetts General Hospital, United States
- Co-Director of the Limb Evaluation and Preservation Program (LEAPP) at Massachusetts General Hospital, Massachusetts
- Associate Director of the Wound Care Center, Massachusetts General Hospital
- Director, Vascular Laboratory, Massachusetts General Hospital
- Director of the Lymphedema Center at Massachusetts General Hospital
- Director of Clinical Research for the Division of Vascular Surgery at Massachusetts General Hospital
- Vascular Surgeon at Massachusetts General Hospital
- Founder of Healthcare for Action PAC
- Specialist in Vascular Surgery at Stanford University Hospital
- Specialist in General Surgery at the Medical College of Wisconsin
- Master's Degree of Business Administration / Health Management / Health
- Care Management from Western Governors University
- Master of Science in Trauma Sciences, Queen Mary University, London
- Bachelor of Medicine and Surgery from the University of Aberdeen.
- Member of: Society for Vascular Surgery, South Asian-American Vascular Society , American College of Surgeons

Thanks to TECH, you will be able to learn with the best professionals in the world"

Course Management

Dr. Soria, José Manuel

- Director of the Genomics of Complex Diseases Unit at the Research Institute of the Hospital de Santa Creu I Sant Pau. Barcelona
- Cofundador y Director Científico (CSO)
- Coordinator of the Sant Pau Node of the UAB Bioinformatics Platform (Bioninf UAB).
- Coordinator of the ITEMAS Network (Health Technology Innovation Network of the ICIII) Node at the Research Institute of the Hospital de Santa Creu I Sant Pau.
  Institute of the Hospital de Santa Creu I Sant Pau
- Head of the Genomics Area of the Scientific-Technical Platforms at the Research Institute of the Hospital de Santa Creu I Sant Pau.
- Author of 129 scientific publications, 134 articles in scientific journals with IF, and 5 doctoral theses.

Professors

Dr. López del Río, Ángela

- Engineer at B2SLab. Bioinformatics and Biomedical Signals Laboratory
- Researcher at the Center for Biomedical Research at the Polytechnic University of Catalonia
- Biomedical Engineer, Universidad Politécnica de Madrid.
- Professional Master's Degree in Biomedical Engineering from the University of Barcelona and the Polytechnic University of Catalonia
- Participation in the European Bioinformatics Institute (EBI-EMBL) in Cambridge, UK

Dr. Marzo Alonso, Cristina

- Head of the Hemostasis Unit at the Hospital Universitario Arnau de Vilanova. Lleida, Spain
- Assistant Doctor of the Hematology and Hemotherapy Service at the Arnau de Vilanova University Hospital
- Professional Master's Degree in Anticoagulant Treatment with the qualification of "Outstanding by the Catholic University San Antonio of Murcia
- Professional Master's Degree in Congenital and Acquired Coagulopathies from the University of Alcalá, Spain

Dr. Muñoz Martín, Andrés

- Coordinator of the Working Group on Cancer and Thrombosis of the Spanish Society of Medical Oncology (SEOM)
- Vice-Chairman of the Ethics and Clinical Research Committee (CEIC) at the Hospital General Universitario Gregorio Marañón
- Assistant Doctor in the Medical Oncology Service in the Digestive Tumors Unit at the Hospital General Universitario Gregorio Marañón at the Hospital General Universitario Gregorio Marañon
- Head of the Hepatobiliopancreatic, Cancer and Thrombosis Research Program at Hospital General Universitario Gregorio Marañon a
- Collaborating Professor of Practical Teaching in the Department of Medicine, Universidad Complutense de Madrid
- Degree in Medicine and Surgery from the Autonomous University of Madrid.
- PhD in Medicine, Extraordinary Prize from the Complutense University of Madrid.
- Postgraduate Certificate in Biostatistics in Health Sciences from the Autonomous University of Barcelona. of Barcelona

Dr. Llamas Sillero, Pilar

- Director of Hematology at the Fundación Jiménez Díaz University Hospital
- Corporate Head of the Department of Hematology and Hemotherapy of Quirónsalud Madrid Public Hospitals; Hospital Universitario Fundación Jiménez Díaz, Hospital Universitario Rey Juan Carlos, Hospital Universitario Infanta Elena and Hospital Universitario General de Villalba.
- Head of the Thrombosis Department at the Fundación Jiménez Díaz University Hospital
- Phase IV Clinical Trial Supervisor at Hospital Universitario de La Princesa, Madrid
- Professor of the Primary Care Update Program for Physicians at the Official College of Physicians of Madrid (ICOMEM)
- Honorary Professor of the Department of Medicine in Hematology of the Faculty of Medicine and honorary tutor of the Universidad Rey Juan Carlos
- Dr. Cum Laude in Medicine and Surgery from the Universidad Autónoma de Madrid
- Degree in Medicine and Surgery from the University of Cordoba

Dr. Pina Pascual, Elena

- Specialist in Hematology and Hemotherapy
- Assistant Doctor of the Thrombosis and Hemostasis Service at the University Hospital of Bellvitge
- Teacher in training courses on Thrombosis for Physicians.Member of the Working Committee on Thrombosis and Cancer of the Spanish Society of Thrombosis and Hemostasis.

Dr. Ruperez Blanco, Ana Belen

- Specialist in Medical Oncology
- Assistant Doctor of the Medical Oncology Service in the Unit of Digestive Tumors, Sarcomas and Cutaneous Tumors at the Hospital Virgen de la Salud
- Specialist in Medical Oncology at the Hospital General Universitario Gregorio Marañón.
- Degree in Medicine from the Complutense University of Madrid
- Specialist in VTE and Cancer by the Universidad Católica San Antonio de Murcia

Dr. Sabater Lleal, María

- Researcher of the Complex Disease Genomics Group at the Research Institute of the Hospital de Santa Creu I Sant Pau. Research Institute of the Hospital de Santa Creu I Sant Pau
- Senior Research Fellow at Karolinska Institutet
- PhD in Genetics from the University of Barcelona.
- Specialist in Biomedicine
- Bachelor's degree in Biology from the University of Barcelona

Dr. Souto Andrés, Juan Carlos

- Scientific Director of Monitor Medical
- Head of the Section of Diagnostic and Translational Research of Hemostasis Diseases at the Hospital de la Santa Creu i Sant Pau
- Devicare Scientific Advisor
- Member:of the Spanish Society of Thrombosis and Hemostasis (SETH), Spanish Association of Hematology and Hemotherapy (AEHH), International Society on Thrombosis and Haemostasis (ISTH), Academy of Medical Sciences of Catalonia and Balearic Islands (ACMCB), ISMAA
- Doctor in Medicine and Surgery from the Autonomous University of Barcelona. Specialist in Hematology and Hemotherapy.
  Degree in Medicine and Surgery at the University Extension of the UCB in Lleida

Dr. Vidal Pérez, Francisco

- Head of the Laboratory of Congenital Coagulopathies of the Blood and Tissue Bank of Catalonia of Catalonia
- Director of the Diagnostic and Molecular Therapy Group at the Vall d'Hebron Research Institute. Vall d'Hebron
- Researcher in national and European projects
- Co-author of numerous scientific publications
- PhD in Biochemistry and Molecular Biology and Genetics from the University of Barcelona
- Degree in Biology from the University of Barcelona
- Executive Master en Organización Sanitaria por ESADE Business School

06

Educational Plan

The curriculum of this program has been configured as a process of continuous updating of knowledge on diagnostic methods and research techniques in the field of Hepatology. For this purpose, TECH provides multimedia teaching resources, which you can access conveniently, whenever and wherever you want. A syllabus with a theoretical-practical approach, which will be completed with a 3-week on-site internship in a prestigious hospital center.

This Hybrid Master's Degree in Genomic and Precision Medicine in Hematology: Thrombosis contains the most complete and up-to-date scientific program on the market"

Module 1. Introduction to Hemostasis

1.1. Introduction. History and Evolution
- 1.1.1. History
- 1.1.2. Evolution

1.2. Endothelium and Platelets in the Physiology of Hemostasis
- 1.2.1. The Role of Endothelium in Hemostasis
- 1.2.2. Platelets: Platelet Membrane Receptors
- 1.2.3. Platelet Plug Formation: Platelet Adhesion and Aggregation
- 1.2.4. Microparticles
- 1.2.5. Involvement of Other Cellular Elements in the Physiology of Hemostasis

1.3. Plasma Component of Coagulation: Fibrin Clots
- 1.3.1. Coagulation Cascade
- 1.3.2. Coagulation Factors
- 1.3.3. Coagulation System
- 1.3.4. Multicomponent Complexes

1.4. Coagulation Regulatory Mechanisms
- 1.4.1. Inhibitors of Activated Factors
- 1.4.2. Regulators of Cofactors

1.5. Fibrinolysis
- 1.5.1. Fibrinolytic System
- 1.5.2. Fibrinolysis Activation
- 1.5.3. Fibrinolysis Regulation
- 1.5.4. Cellular Receptors in Fibrinolysis

1.6. The Coagulation Laboratory: Pre-Analytical Phase
- 1.6.1. Patients and Sample Extraction
- 1.6.2. Sample Transportation and Processing

1.7. Platelet Study
- 1.7.1. Methods to Measure Platelet Function
- 1.7.2. Closure Time (PFA-100)
- 1.7.3. Flow Cytometry

1.8. Exploring Coagulation Plasma Phase
- 1.8.1. Classical Coagulation Techniques
- 1.8.2. Coagulation Factor Quantification
- 1.8.3. Study of Specific and Non-Specific Inhibitors
- 1.8.4. Fibrinolysis Laboratory Tests
- 1.8.5. Thrombophilia Study
- 1.8.6. Laboratory Tests to Monitor Anticoagulant Medication

1.9. Techniques for the Global Analysis of Hemostasis
- 1.9.1. Definition and Classification
- 1.9.2. Thrombin Generation Test
- 1.9.3. Viscoelastometric Techniques

1.10. Clinical Cases and Exercises
- 1.10.1. Clinical Cases
- 1.10.2. Exercises

Module 2. Pathophysiology and Epidemiology in Venous Thromboembolism

2.1. General Introduction to the Complexity and Clinical Impact of VTE
- 2.1.1. General Introduction to Complexity
- 2.1.2. Clinical Impact of VTE

2.2. Generation of a Pathological Thrombus
- 2.2.1. Hemostasis Balance
- 2.2.2. Break in Balance (Classic Virchow's Triad) and Consequences
- 2.2.3. Normal and Pathological Venous Function
- 2.2.4. The Role of Venous Valve in Pathological Thrombi
- 2.2.5. The Role of the Vascular Endothelium
- 2.2.6. The Role of Platelets and Polyphosphates
- 2.2.7. The Role of Neutrophil Extracellular Traps (NETs)
- 2.2.8. The Role of Circulating Microparticles
- 2.2.9. Local inflammatory processes
- 2.2.10 Paraneoplastic Thrombosis (see Module 4)
- 2.2.11 Mechanism and Site in Thrombus Formation

2.3. Classification and Characteristics of VTE according to Anatomical Site
- 2.3.1. Lower Limbs
- 2.3.2. Upper Limbs
- 2.3.3. Pulmonary Embolism
- 2.3.4. Atypical Sites
  - 2.3.4.1. Visceral
  - 2.3.4.2. Intracranial

2.4. Classification of Thrombosis according to Associated Circumstances
  2.4.1. Spontaneous VTE vs. Secondary
  2.4.2. Environmental Risk Factors (Table a)
  2.4.3. The Role of Race, Age, and Sex
  2.4.4. The Role of Intravascular Devices (Intravenous Catheters)
2.5. VTE Sequalae
  2.5.1. Post-Thrombotic Syndrome and Residual Thrombosis: Relation to Recurrence
  2.5.2. Chronic Pulmonary Hypertension
  2.5.3. Short- and Long-Term Mortality
  2.5.4. On Quality of Life
2.6. Impact of VTE on the Global Burden of Disease
  2.6.1. Contribution to the Global Burden of Disease
  2.6.2. Impact on the Economy
2.7. VTE Epidemiology
  2.7.1. Influencing Variables (Age, Race, Comorbidities, Medication, Seasonal Factors, etc.)
2.8. Risk and Epidemiology of Thrombotic Recurrence
  2.8.1. Differences between the Sexes
  2.8.2. Differences according to the Circumstances associated with the First Episode
2.9. Thrombophilia
  2.9.1. Classical Conception
  2.9.2. Biological Biomarkers of Thrombophilia
    2.9.2.1. Genetic Biomarkers
    2.9.2.2. Plasmatic Biomarkers
    2.9.2.3. Cell Biomarkers
  2.9.3. Thrombophilia Laboratory Study
    2.9.3.1. Debate on its Utility
    2.9.3.2. Classical Abnormalities
    2.9.3.3. Other Biomarkers or Intermediary Phenotypes (Table b)
2.10. Thrombophilia as a Complex and Chronic Pathology Concept
  2.10.1. High Complexity (see 2.1)
  2.10.2. Importance of the Genetic basis: Concept of Heritability
  2.10.3. Known Genetic Risk Factors (Table c): Connection to Modules 7 and 8
  2.10.4. Heritability to Be Discovered
2.11. Individual Risk Profile
  2.11.1. Concept
  2.11.2. Permanent Components (Genetic)
  2.11.3. Changing Circumstances
  2.11.4. New and Powerful Mathematical Models to Jointly Assess All Risk Variables (see Module 9)

Module 3. Diagnosis, Treatment and Prophylaxis in Venous Thromboembolism

3.1. Diagnosis of VTE
  3.1.1. Clinical Presentation and Diagnostic Probability Scales
  3.1.2. Complementary Tests (D-Dimer, Imaging)
  3.1.3. Prognostic Risk Stratification of Patients with Parkinson's Disease
3.2. VTE Treatment
  3.2.1. Antithrombotic Drugs
  3.2.2. Treating the Initial Phase (Acute Phase and up to 3-6 Months)
  3.2.3. Length of Treatment and Long-Term Treatment (> 6 Months)
  3.2.4. Complications in Antithrombotic Treatment
3.3. VTE Prophylaxis
  3.3.1. Medical Patient Prophylaxis
  3.3.2. Surgical Patient Prophylaxis
  3.3.3. Clinical Cases

Module 4. Special Situations I: Thrombosis in Oncology

4.1. Epidemiology and Risk Factors
  4.1.1. Epidemiology
  4.1.2. Patient-Related Risk Factors
  4.1.3. Tumor-Related Risk Factors
  4.1.4. Treatment-Related Risk Factors
4.2. Thromboprophylaxis in Admitted Medical Oncology Patients
  4.2.1. Introduction
  4.2.2. Thromboprophylaxis in Admitted Medical Oncology Patients
4.3. Surgical Patient Prophylaxis
  4.3.1. Introduction
  4.3.2. Surgical Patient Prophylaxis

4.4. Thromboprophylaxis in Oncology Patients Receiving Systemic Therapy in an Outpatient Setting
  4.4.1. Introduction
  4.4.2. Thromboprophylaxis in Oncology Patients Receiving Systemic Therapy in an Outpatient Setting
4.5. Predictive Risk Models for Thrombosis
  4.5.1. Khorana Score
  4.5.2. Others Predictive Risk Models
  4.5.3. Other Potential Applications of Predictive Risk Models
4.6. Initial Treatment of Cancer-Related Thrombosis
  4.6.1. Introduction
  4.6.2. Initial Treatment of Cancer-Related Thrombosis
4.7. Long Term Treatment of Cancer-Related Thrombosis
  4.7.1. Introduction
  4.7.2. Long Term Treatment of Cancer-Related Thrombosis
4.8. Predictive Models for Bleeding and Recurrence: Interactions of Direct Acting Oral Anticoagulants
  4.8.1. Predictive Models for Bleeding and Recurrence
  4.8.2. Interactions of Direct Acting Oral Anticoagulants
4.9. Antitumor Therapy and Risk of Thrombosis
  4.9.1. Chemotherapy
  4.9.2. Hormone Therapy
  4.9.3. Biological Drugs
  4.9.4. Immunotherapy
  4.9.5. Supportive therapy

Module 5. Special Situations II: Thrombosis in Women

5.1. Hemostasis Pathophysiology in the Different Development Stages of Women
  5.1.1. Introduction
  5.1.2. Physiological Risk Factors
  5.1.3. Acquired Risk Factors
5.2. Thrombophilia and Women
  5.2.1. Hereditary Thrombophilia
  5.2.2. Acquired Thrombophilia
  5.2.3. Study Indications
5.3. Contraception and Hormone Therapy and Venous Thromboembolism
  5.3.1. Introduction
  5.3.2. Contraception in Women with Thrombotic Risk Factors
  5.3.3. Contraception in Women after a Thrombotic Event
5.4. Prevention Strategies for Venous Thromboembolism in Non-Pregnant Women in Childbearing Age
  5.4.1. Non-Pregnant Women without a History of Thrombosis
  5.4.2. Non-Pregnant Woman with a History of Thrombosis
5.5. Venous Thromboembolism during Gestation and Puerperium
  5.5.1. Incidence and Epidemiology
  5.5.2. Risk Factors. Risk Assessment Scales
  5.5.3. Clinical Presentation
  5.5.4. Diagnostic Strategy
  5.5.5. Treatment
  5.5.6. Prophylaxis
  5.5.7. Managing Patients with Heart Valves
5.6. Venous Thromboembolism and Cesarean Section
  5.6.1. Incidence and Epidemiology
  5.6.2. Risk Factors. Risk Assessment Scales
  5.6.3. Treatment and Prophylaxis
5.7. Assisted Reproductive Techniques and Venous Thromboembolism
  5.7.1. Incidence and Risk Factors
  5.7.2. Clinical Presentation
  5.7.3. Treatment
  5.7.4. Prophylaxis
5.8. Anticoagulant Medication used during Pregnancy, Postpartum and Lactation
  5.8.1. Unfractionated Heparin
  5.8.2. Low Molecular Weight Heparin
  5.8.3. Vitamin K Antagonists
  5.8.4. Peripartum Anticoagulant Therapy Address
  5.8.5. Complications Arising from Anticoagulant Therapy

5.9. Obstetric Antiphospholipid Syndrome
- 5.9.1. Incidence and Epidemiology
- 5.9.2. Laboratory Diagnosis of Obstetric APS
- 5.9.3. Treatment of Obstetric APS
- 5.9.4. Approach to Women in Childbearing Age with Isolated Antiphospholipid Antibodies

5.10. Climacteric Age, Menopause and Thrombosis
- 5.10.1. Incidence and Epidemiology
- 5.10.2. Cardiovascular Risk
- 5.10.3. Hormone Replacement Therapy

Module 6. Omic Data: Introduction to the Programming Language R

6.1. Basic Introduction to the UNIX/ Linux Operating System
- 6.1.1. History and Philosophy
- 6.1.2. Command Interpreter (Shell)
- 6.1.3. Basic Linux Commands
- 6.1.4. Word Processors

6.2. File Address in UNIX/Linux
- 6.2.1. File System
- 6.2.2. Users and Groups
- 6.2.3. Licences

6.3. System Address in UNIX/Linux
- 6.3.1. Tasks (*Jobs*)
- 6.3.2. Register (*Logs*)
- 6.3.3. Monitoring Tools
- 6.3.4. Networks

6.4. Introduction and Basic Features of R
- 6.4.1. What is R?
- 6.4.2. First Steps
  - 6.4.2.1. Installation and Graphic Interface
  - 6.4.2.2. *Workspace*
- 6.4.3. Extension in R
  - 6.4.3.1. Standard Packages
  - 6.4.3.2. Contributed Packages, CRAN and Bioconductor

6.5. Types of Data in R
- 6.5.1. Vectors
- 6.5.2. Lists
- 6.5.3. *Arrays* and Matrices
- 6.5.4. Factors
- 6.5.5. *Data Frames*
- 6.5.6. Text *Strings*
- 6.5.7. Other Types of Data

6.6. Data Address in R
- 6.6.1. Import and Export Data
- 6.6.2. Data Manipulation
  - 6.6.2.1. Vectors
  - 6.6.2.2. Matrices
  - 6.6.2.3. Text *Strings*
  - 6.6.2.4. Data Sheets

6.7. Control Functions and Loops in R
- 6.7.1. Conditional Run: *if*
- 6.7.2. Cycles: *For, Repeat, While*
- 6.7.3. *Apply* Functions

6.8. Statistical Models in R
- 6.8.1. Univariate Data
- 6.8.2. Multivariate Data
- 6.8.3. Hypothesis Test

6.9. Graphic Representation in R
- 6.9.1. Basic Representations
- 6.9.2. Graphical Parameters and Elements
- 6.9.3. The *ggplot2* Package

6.10. Defining Functions in R
- 6.10.1. Simple Examples
- 6.10.2. Default Arguments and Values
- 6.10.3. Assignments within Functions

Module 7. Thrombosis in the Genomic Era I: Genome-Wide Association Studies (GWAS)

7.1. Introduction to Genetics
- 7.1.1. Introduction and Basic Concepts
  - 7.1.1.1. Genes
  - 7.1.1.2. Polymorphisms, Alleles and *Loci*
  - 7.1.1.3. Haplotypes
  - 7.1.1.4. Concept of Linkage Disequilibrium
  - 7.1.1.5. Genotype
  - 7.1.1.6. Phenotype
- 7.1.2. Genetics to Study Complex Diseases
  - 7.1.2.1. Complex and Rare Diseases
  - 7.1.2.2. Study of Candidate Genes vs. Global Genome Studies
- 7.1.3. Types of Polymorphism, Nomenclature and Genome Versions
- 7.1.4. Genotyping Chips

7.2. Introduction to Global Genome-Wide Analysis Studies (GWAS)
- 7.2.1. What is a GWAS?
- 7.2.2. GWAS Study Design
  - 7.2.2.1. Heritability
  - 7.2.2.2. Case-Control *vs.* Quantitative Trait Analysis
  - 7.2.2.3. Sample Size and Statistical Power
  - 7.2.2.4. Biases by Population Substructure
  - 7.2.2.5. Phenotypes: Standardization and *Outliers*
- 7.2.3. The Genetic Association Test
- 7.2.4. Useful *Software* for GWAS

7.3. Genetic Imputation
- 7.3.1. Concept of Imputation
- 7.3.2. Reference Panels
  - 7.3.1.1. *Hap Map* Project
  - 7.3.1.2. *1000 Genomes* Project
  - 7.3.1.3. *Haplotype Reference Consortium* Project
  - 7.3.1.4. Other Population-Specific Projects

7.4. Quality Control and Filters
- 7.4.1. Pre-Imputation Filters
  - 7.4.1.1. Minor Allele Frequency
  - 7.4.1.2. Hardy-Weinberg Equilibrium
  - 7.4.1.3. Genotyping Errors (*Call Rate*)
  - 7.4.1.4. Excess Heterozygosity
  - 7.4.1.5. Mendelian Errors
  - 7.4.1.6. Sex Errors
  - 7.4.1.7. Chain Direction
  - 7.4.1.8. Family Relationships
- 7.4.2. Post-Imputation Filters
  - 7.4.2.1. Monomorphic Variants, Frequencies
  - 7.4.2.2. Imputation Quality
- 7.4.3. Post GWAS Filters
- 7.4.4. Quality Control *Software*

7.5. Analyzing and Interpreting GWAS Results
- 7.5.1. Manhattan Plot
- 7.5.2. *Multiple Testing* Correction and *Genome-Wide* Significant Results
- 7.5.3. Concept of Genetic Locus

7.6. Meta-Analysis and Replication
- 7.6.1. Common *Workflow* in GWAS Studies
- 7.6.2. Meta-Analysis
  - 7.6.2.1. Meta-Analysis Methods
  - 7.6.2.2. Required Information for Meta-Analyses
  - 7.6.2.3. Meta-Analysis Result
  - 7.6.2.4. Meta-Analysis *Software* Examples
- 7.6.3. The Most Relevant Consortia

7.7. Post GWAS Analysis
- 7.7.1. *Fine-Mapping* and Regional Graphic
- 7.7.2. Conditional Analysis
- 7.7.3. Selecting the Best Gene Candidate (from Locus to Gene)
  - 7.7.3.1. Exploiting Information on Expression
  - 7.7.3.2. *Gene Set Enrichment Analyses*
  - 7.7.3.3. Study of the Potential Functional Effect of Polymorphism

7.8. The Era of GWAS
- 7.8.1. GWAS Data Repositories
- 7.8.2. Taking Stock of the GWAS Era Results

7.9. Use of GWAS Results
- 7.9.1. Risk Estimation Models
- 7.9.2. Mendelian Randomization Studies

7.10. Genetic Analysis of Venous Thromboembolism (VTE)
- 7.10.1. A Bit of History
- 7.10.2. The Most Relevant GWAS Studies on VTE
- 7.10.3. Latest Studies Results
- 7.10.4. Clinical Implications of Genetic Results: The Importance of Coagulation Cascades and New Metabolic Pathways
- 7.10.5. Future Strategies

Module 8. Thrombosis in the Genomic Era II: Massive Sequencing Studies

8.1. Genetic Basis and Molecular Study in Thrombosis and Hemostasis
- 8.1.1. Molecular Epidemiology in Thrombosis and Hemostasis
- 8.1.2. Genetic Study of Congenital Diseases
- 8.1.3. Classical Approach to Molecular Diagnostics
- 8.1.4. Indirect Diagnosis or Genetic Linkage Techniques
- 8.1.5. Direct Diagnostic Techniques
  - 8.1.5.1. Mutation Screening
  - 8.1.5.2. Direct Mutation Identification

8.2. DNA Sequencing Techniques
- 8.2.1. Sanger's Traditional Sequencing
  - 8.2.1.1. Characteristics of the Technique, Limitations and Application in Thrombosis and Hemostasis
- 8.2.2. Next-Generation Sequencing (NGS)
  - 8.2.2.1. NGS Platforms in Molecular Diagnostics
  - 8.2.2.2. General Information on the Technology, Possibilities and Limitations of NGS vs. Traditional Sequencing
- 8.2.3. Third-Generation Sequencing (TGS)

8.3. Different Approaches to Genetic Studies Using NGS
- 8.3.1. Gene Panel Sequencing
- 8.3.2. Whole Exome Sequencing and Whole Genome Sequencing
- 8.3.3. Transcriptomics by RNA-Seq
- 8.3.4. MicroRNA Sequencing
- 8.3.5. Mapping Protein-DNA Interactions with ChIP-Seq
- 8.3.6. Epigenomics Analysis and DNA Methylation Using NGS

8.4. Bioinformatics Analysis of NGS Data
- 8.4.1. The Challenge of Bioinformatics Analysis of Massive NGS Generated Data
- 8.4.2. IT Requirements for NGS Data Address and Analysis
  - 8.4.2.1. NGS Data Storage, Transfer and Sharing
  - 8.4.2.2. Computing Power Required for NGS Data Analysis
  - 8.4.2.3. *Software* Requirements for NGS Data Analysis
  - 8.4.2.4. Bioinformatics Skills Required for NGS Data Analysis
- 8.4.3. *Base Calling*, FASTQ File Format and Base Quality Scoring
- 8.4.4. NGS Data Quality Control and Pre-processing
- 8.4.5. Read Mapping Bioinformatics Required for NGS Data Analysis
- 8.4.6. Variant Calls
- 8.4.7. Tertiary Analysis
- 8.4.8. Structural Variation Analysis by NGS
- 8.4.9. Methods to Estimate Copy Number Variation from NGS Data

8.5. Concept and Types of Mutation Detectable by NGS
- 8.5.1. Molecular Etiology of Thrombotic and Hemorrhagic Disorders
- 8.5.2. Mutation Nomenclature
- 8.5.3. Functional Implication of Identified Variants/Mutations
- 8.5.4. Difference between Mutation and Polymorphism

8.6. Fundamental Molecular Databases in NGS
- 8.6.1. Locus Specific Databases (LSDB)
- 8.6.2. Previous Mutation Descriptions in Databases
- 8.6.3. Databases of Variants Detected in Healthy Population by NGS
- 8.6.4. Molecular Databases with Clinical Annotations

8.7. Analysis and Interpretation of NGS Results on Thrombosis and Hemostasis
- 8.7.1. Mutation Validation
- 8.7.2. Concept of Mutation Pathogenicity
- 8.7.3. Genotype-Phenotype Correlation
  - 8.7.3.1. *In Silico* Studies
  - 8.7.3.2. Expression Studies
  - 8.7.3.3. *In Vitro* Functional Studies

8.8. Role of NGS in Genetic Counseling and Prenatal Diagnosis
- 8.8.1. Genetic Counseling in the NGS Era
- 8.8.2. Ethical Issues Specific to NGS and Whole Genome Sequencing for Genetic Counseling and Clinical Diagnostics
- 8.8.3. Conventional Prenatal Diagnosis and Methods
- 8.8.4. Preimplantational Genetic Diagnosis
- 8.8.5. Non-invasive Prenatal Diagnosis
  - 8.8.5.1. Use of Fetal DNA in Maternal Circulation for Prenatal Diagnosis
  - 8.8.5.2. Sequencing of SNPs from Circulating Fetal DNA
  - 8.8.5.3. Limitations and Challenges of NGS-Based Non-invasive Prenatal Testing
  - 8.8.5.4. Clinical Implementation of Non-Invasive Prenatal Testing for Aneuploidies

8.9. Future Perspectives in NGS Technologies and Data Analysis
- 8.9.1. Technological Development of Sequencing in the Mid-Term
- 8.9.2. Evolution of Bioinformatics Tools for High-Throughput Sequencing Data Analysis
- 8.9.3. Standardization and Rationalization of NGS Analytical Processes
- 8.9.4. Parallel Computing
- 8.9.5. Cloud Computing

Module 9. Thrombosis in the Genomic Era III: Regulation of Gene Expression Studies (RNA and miRNA)

9.1. Introduction to RNA-seq
- 9.1.1. Technique Description
- 9.1.2. Advantages over Expression *Arrays*
- 9.1.3. Limitations

9.2. Experimental Design for RNA-seq Studies
- 9.2.1. Concept of *Randomization* and *Blocking*
- 9.2.2. Biological Replicas vs. Technical Replicas
- 9.2.3. Number of Replicas
- 9.2.4. Sequencing Depth
- 9.2.5. Type of Library

9.3. Quality Control for RNA-seq
- 9.3.1. Quality Metrics for RNA-seq
- 9.3.2. Programs Designed for RNA-seq Quality Control

9.4. RNA Alignment and Quantification
- 9.4.1. Reference Genome (*Genome-based*)
- 9.4.2. Reference Genome (*Transcriptomics-Based*)

9.5. De Novo Assembly and RNA Annotation
- 9.5.1. *Pipeline* without Reference Transcriptome
- 9.5.2. Annotation of Coding and Non-Coding Transcripts

9.6. Differential Expression with RNA-seq
- 9.6.1. Standardization
- 9.6.2. Latent Variable Elimination
- 9.6.3. Programs and Statistics Methods
- 9.6.4. Functional Enrichment

9.7. Other Applications of RNA-seq Technology
- 9.7.1. Alternative *Splicing* Detection
- 9.7.2. Chimera Transcript Detection
- 9.7.3. Mutation Detection
- 9.7.4. *Allele-specific Expression* Detection

9.8. *Small* RNA-seq
- 9.8.1. *Small* RNA-seq Library Building
  - 9.9.8.1. Quality Control for *Small* RNA-seq
- 9.8.2. Alignment and Quantification for *Small* RNA-seq
- 9.8.3. miRNA Annotation
- 9.8.4. miRNA targets

9.9. Gene *Co-expression Networks*
- 9.9.1. Concept of Gene *Co-expression Networks*
- 9.9.2. Differential Co-expression vs. Differential Expression
- 9.9.3. *Weighted* Gene *Co-expression Networks Analysis* (WGCNA)
- 9.9.4. Gene *Co-expression Networks* Visualisation

9.10. Gene Expression Regulation Analysis in Venous Thromboembolism (VTE)
- 9.10.1. A Bit of History
- 9.10.2. Relevant Studies on VTE
- 9.10.3. Latest Studies Results
- 9.10.4. Clinical Implications in the Results
- 9.10.5. Practical Examples and Exercises

Module 10. Predictive Models

10.1. Statistical Learning
- 10.1.1. Estimating f
- 10.1.2. Supervised and Unsupervised Learning
- 10.1.3. Regression and Classification Problems
- 10.1.4. Linear and Non-Linear Models

10.2. Data Pre-Processing
- 10.2.1. Standardization
- 10.2.2. Imputability
- 10.2.3. Atypical Values (*Outliers*)

10.3. Linear Regression
- 10.3.1. Linear Models
- 10.3.2. Variance Analysis (ANOVA)
- 10.3.3. Mixed Effects Models

10.4. Classification
- 10.4.1. Logistic Regression
- 10.4.2. Linear Discriminant Analysis
- 10.4.3. K Nearest Neighbors (KNN)

10.5. Resampling Methods
- 10.5.1. Cross Validation
  - 10.5.1.1. Validation Set or Test
  - 10.5.1.2. *Leave One Out* Cross Validation
  - 10.5.1.3. Cross Validation of k Iterations (*k-Fold*)
- 10.5.2. *Bootstrap*

10.6. Linear Model Selection
- 10.6.1. Nested Model Comparison
- 10.6.2. *Stepwise* Algorithms
- 10.6.3. Linear Model Diagnosis

10.7. Regularization
- 10.7.1. The Curse of Dimensions
- 10.7.2. Principal Component Regression
- 10.7.3. Partial Least Squares Regression
- 10.7.4. *Shrinkage* Methods
  - 10.7.4.1. *Ridge* Regression
  - 10.7.4.2. Lasso

10.8. Methods Based on Decision Trees
- 10.8.1. Introduction to Decision Trees
- 10.8.2. Types of Decision Trees
  - 10.8.2.1. *Bagging*
  - 10.8.2.2. *Random Forests*
  - 10.8.2.3. *Boosting*

10.9. Support Vector Machines
- 10.9.1. Maximum Margin Classifiers
- 10.9.2. Support Vector Machines
- 10.9.3. Hyperparameter Tuning

10.10. Unsupervised Learning
- 10.10.1. Main Component Analysis
- 10.10.2. *Clustering* Methods
  - 10.10.2.1. *K-Means* Clustering
  - 10.10.2.2. Hierarchical Grouping.

07

Clinical Internship

After successfully completing the online theoretical teaching phase, the program includes an internship in a reference clinical center. The student will have at their disposal the support of a tutor who will help them during the whole process, solving their doubts in real time and guaranteeing an adequate learning process.

Complete your clinical internship in one of the best hospitals in the world"

This Hybrid Master's Degree has a practical phase that will take place in a prestigious hospital, lasting 3 weeks from Monday to Friday, with 8 consecutive hours of practical learning with an assistant specialist. This internship will allow the student to observe and work with real patients alongside a team of reference professionals in the area of Genomic and Precision Medicine in Hematology: Thrombosis, applying the most innovative preventive, diagnostic and therapeutic procedures for each case.

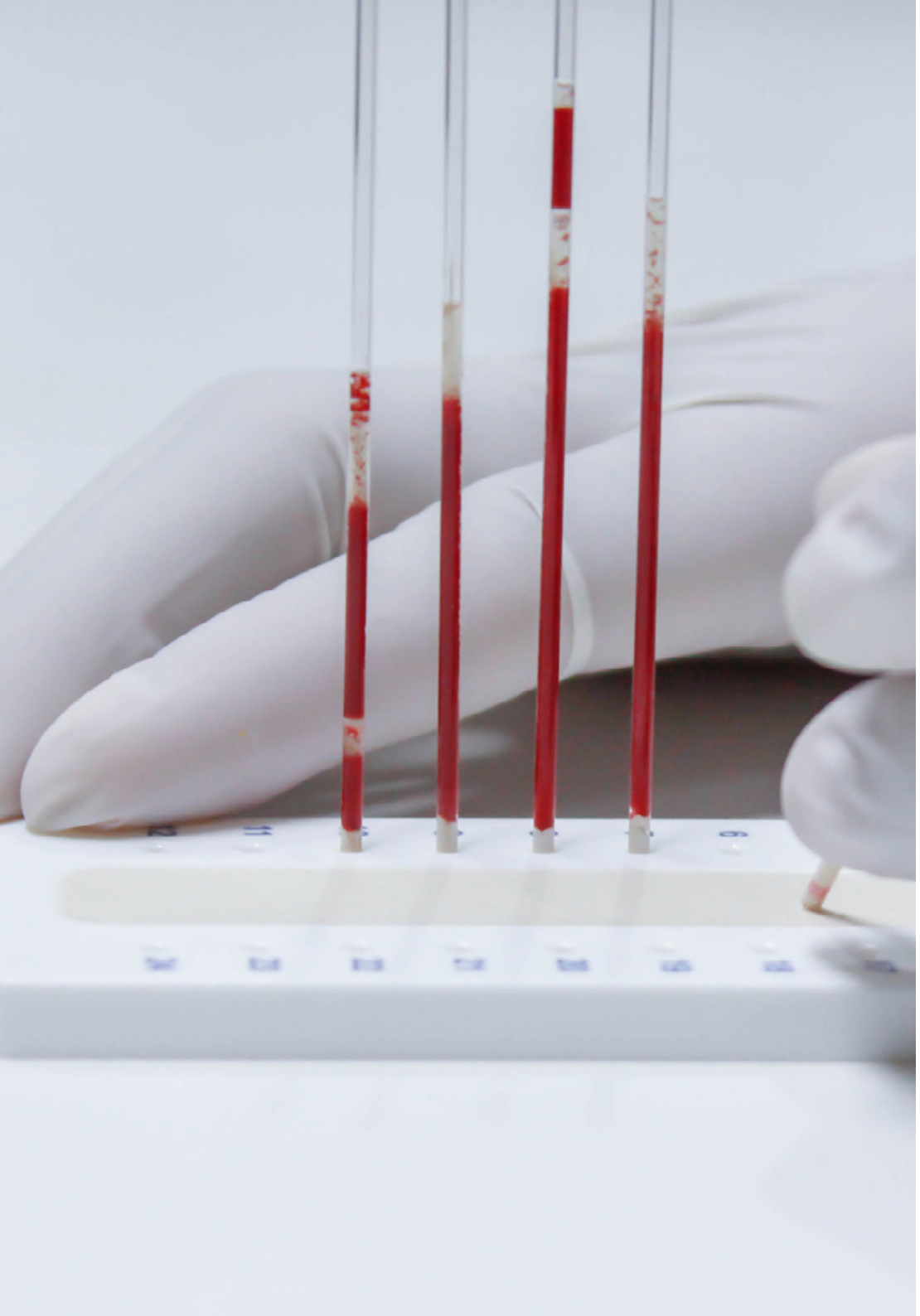
In this completely practical Internship Program, the activities are aimed at developing and perfecting the skills necessary to provide healthcare in areas and conditions that require highly qualified professionals, and are oriented towards specific expertise for practicing the activity, in a safe environment for the patient and with highly professional performance.

It is, without a doubt, an opportunity to learn by working in the innovative hospital of the future, where the use of updated diagnostic techniques and updated treatments for Venous Thromboembolic Diseases are essential to ensure the integrity of patients. This is a new way of understanding and integrating healthcare processes, and makes the hospital the ideal teaching environment for this innovative experience in the improvement of professional healthcare competencies for the 21st century.

The practical teaching will be carried out with the active participation of the student performing the activities and procedures of each area of competence (learning to learn and learning to do), with the accompaniment and guidance of teachers and other training partners that facilitate teamwork and multidisciplinary integration as transversal competencies for medical practice (learning to be and learning to relate).

The procedures described below will form the basis of the practical part of the internship, and their implementation is subject to both the suitability of the patients and the availability of the center and its workload, with the proposed activities being as follows:

Through this program you will be able to do your internship in a hospital of the future, with the best healthcare technology and alongside renowned professors. This program includes the latest advances in Genomic and Precision Medicine in Hematology: Thrombosis to your regular practice"



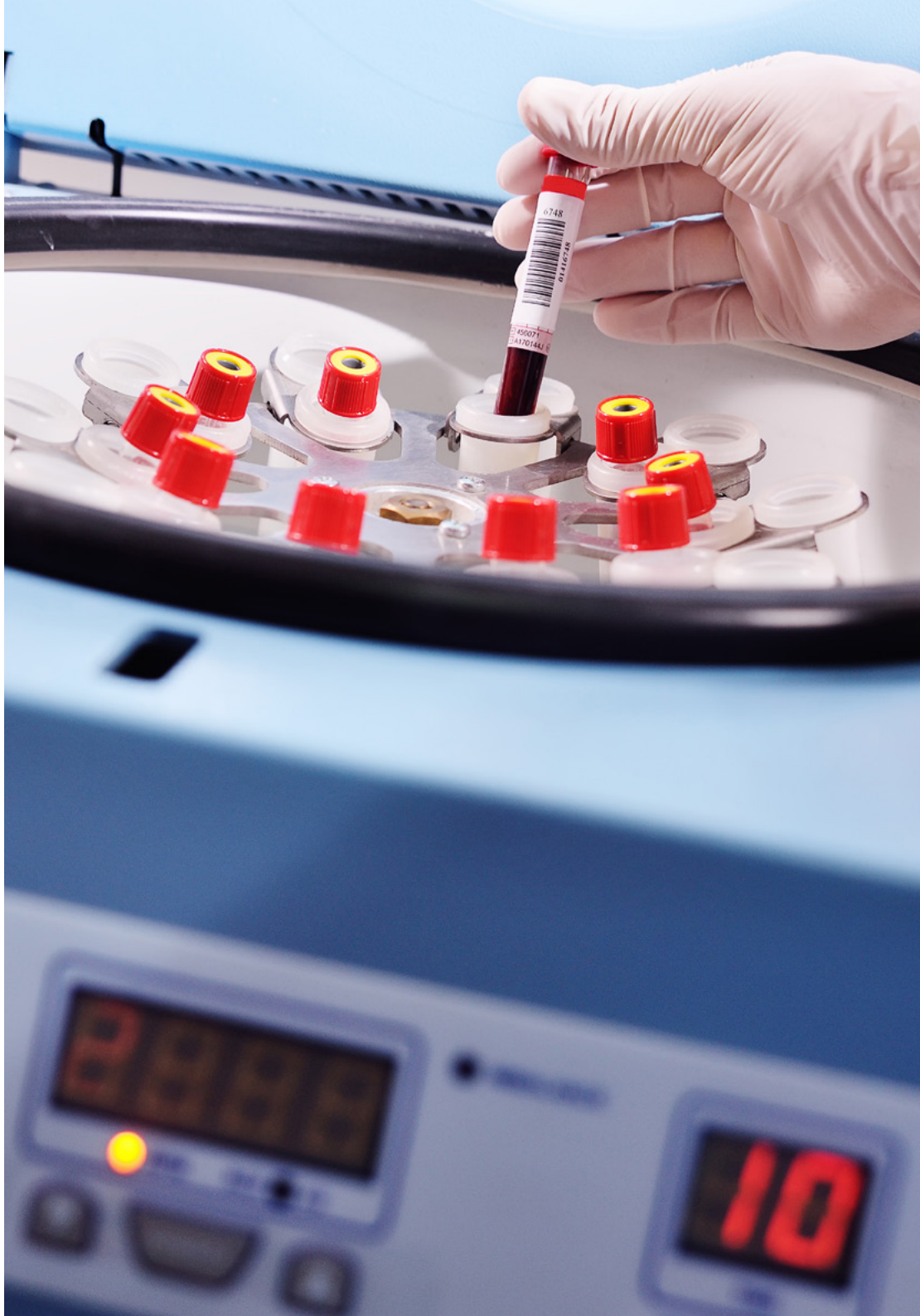
Module	Practical Activity
Diagnosis, Treatment and Prophylaxis in Venous Thromboembolism	Diagnosis of VTE
	Provide VTE treatment according to the needs and extent of each patient's pathology.
	Develop VTE prophylaxis
Special Situations: Thrombosis in women and in the oncological setting	Prevent Venous Thromboembolic Disease in women of childbearing age who are not pregnant through the implementation of various strategies
	Diagnose and treat Venous Thromboembolic Disease during gestation and puerperium and puerperium
	Use predictive models of thrombosis risk to prevent disease in the oncology setting.
Omics Data: Introduction to R programming language	Performing file and system Address on UNIX/Linux
	Manage data using the R programming language.
	Create a graphical representation of the data obtained in R
Thrombosis in the Genomic Age: Global genome and massive sequencing studies	Proper interpretation of the results obtained in the GWAS.
	Perform genetic analysis of Venous Thromboembolic Disease.
	Employ various DNA sequencing techniques to enhance the diagnosis of venous thromboembolic disease of Venous Thromboembolic Disease

Civil Liability Insurance

The university's main concern is to guarantee the safety of the interns, other collaborating professionals involved in the internship process at the center. Among the measures dedicated to achieve this is the response to any incident that may occur during the entire teaching-learning process.

To this end, the university commits to purchasing a civil liability insurance policy to cover any eventuality that may arise during the course of the internship at the center.

This liability policy for interns will have broad coverage and will be taken out prior to the start of the practical training period. That way professionals will not have to worry in case of having to face an unexpected situation and will be covered until the end of the internship program at the center.



General Conditions of the Internship Program

The general terms and conditions of the internship program agreement shall be as follows:

1. TUTOR: During the Hybrid Master's Degree, students will be assigned with two tutors who will accompany them throughout the process, answering any doubts and questions that may arise. On the one hand, there will be a professional tutor belonging to the internship center who will have the purpose of guiding and supporting the student at all times. On the other hand, they will also be assigned with an academic tutor whose mission will be to coordinate and help the students during the whole process, solving doubts and facilitating everything they may need. In this way, the student will be accompanied and will be able to discuss any doubts that may arise, both clinical and academic.

2. DURATION: The internship program will have a duration of three continuous weeks, in 8-hour days, 5 days a week. The days of attendance and the schedule will be the responsibility of the center and the professional will be informed well in advance so that they can make the appropriate arrangements.

3. ABSENCE: If the students does not show up on the start date of the Hybrid Master's Degree, they will lose the right to it, without the possibility of reimbursement or change of dates. Absence for more than two days from the internship, without justification or a medical reason, will result in the professional's withdrawal from the internship, therefore, automatic termination of the internship. Any problems that may arise during the course of the internship must be urgently reported to the academic tutor.

4. CERTIFICATION: Professionals who pass the Hybrid Master's Degree will receive a certificate accrediting their stay at the center.

5. EMPLOYMENT RELATIONSHIP: the Hybrid Master's Degree shall not constitute an employment relationship of any kind.

6. PRIOR EDUCATION: Some centers may require a certificate of prior education for the Hybrid Master's Degree. In these cases, it will be necessary to submit it to the TECH internship department so that the assignment of the chosen center can be confirmed.

7. DOES NOT INCLUDE: The Hybrid Master's Degree will not include any element not described in the present conditions. Therefore, it does not include accommodation, transportation to the city where the internship takes place, visas or any other items not listed

However, students may consult with their academic tutor for any questions or recommendations in this regard. The academic tutor will provide the student with all the necessary information to facilitate the procedures in any case.

08

Where Can I Do the Clinical Internship?

Thanks to TECH's objective of providing its students with an excellent learning experience, they will be able to carry out the practical phase of this Hybrid Master's Degree in various prestigious international centers. During these 3 weeks, they will be integrated in a work team made up of the best experts in Genomic and Precision Medicine in Hematology: Thrombosis, who will provide you with numerous skills that will enhance your professional growth.

Complete your internship in a highly prestigious hospital center and perfect your skills with the best professionals in Genomic and Precision Medicine in Hematology: Thrombosis"

The student will be able to complete the practical part of this Hybrid Master's Degree at the following centers:

Hospital HM Modelo

Country: Spain
City: La Coruña

Address: Rúa Virrey Osorio, 30, 15011, A Coruña

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Anaesthesiology and Resuscitation
- Palliative Care

Hospital HM Rosaleda

Country: Spain
City: La Coruña

Address: Rúa de Santiago León de Caracas, 1, 15701, Santiago de Compostela, A Coruña

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Hair Transplantation
- Orthodontics and Dentofacial Orthopedics

Hospital HM Regla

Country: Spain
City: León

Address: Calle Cardenal Landázuri, 2, 24003, León

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Update on Psychiatric Treatment in Minor Patients

Hospital HM Nou Delfos

Country: Spain
City: Barcelona

Address: Avinguda de Vallcarca, 151, 08023 Barcelona

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Aesthetic Medicine
- Clinical Nutrition in Medicine

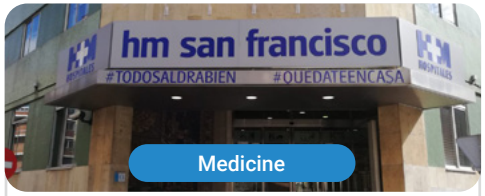
Hospital HM La Esperanza

Country: Spain
City: La Coruña

Address: Av. das Burgas, 2, 15705, Santiago de Compostela, A Coruña

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
Oncology Nursing
- Clinical Ophthalmology



Hospital HM San Francisco

Country: Spain
City: León

Address: C. Marqueses de San Isidro, 11, 24004, León

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Update in Anesthesiology and Resuscitation
- Nursing in the Traumatology Department

Hospital HM Madrid

Country: Spain
City: Madrid

Address: Pl. del Conde del Valle de Súchil, 16, 28015, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Palliative Care
- Anaesthesiology and Resuscitation

Hospital HM Montepríncipe

Country: Spain
City: Madrid

Address: Av. de Montepríncipe, 25, 28660, Boadilla del Monte, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Palliative Care
- Aesthetic Medicine

Hospital HM Torrelodones

Country: Spain
City: Madrid

Address: Av. Castillo Olivares, s/n, 28250, Torrelodones, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Anaesthesiology and Resuscitation
- Palliative Care

Hospital HM Nuevo Belén

Country: Spain
City: Madrid

Address: Calle José Silva, 7, 28043, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- General and Digestive System Surgery
- Clinical Nutrition in Medicine

Hospital HM Puerta del Sur

Country: Spain
City: Madrid

Address: Av. Carlos V, 70, 28938, Móstoles, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Palliative Care
- Clinical Ophthalmology

HM CIOCC - Centro Integral Oncológico Clara Campal

Country: Spain
City: Madrid

Address: Calle de Oña, 10, 28050, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Gynecologic Oncology
- Clinical Ophthalmology

HM CIOCC Barcelona

Country: Spain
City: Barcelona

Address: Avenida de Vallcarca, 151, 08023, Barcelona

Network of private clinics, hospitals and specialized centers distributed throughout the country.
Spanish geography

Related internship programs:
-Advances in Hematology and Hemotherapy
Oncology Nursing

HM CIOCC Galicia

Country: Spain
City: La Coruña

Address: Avenida das Burgas, 2, 15705, Santiago de Compostela

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Gynecologic Oncology
- Clinical Ophthalmology

Policlínico HM Cruz Verde

Country: Spain
City: Madrid

Address: Plaza de la Cruz Verde, 1-3, 28807, Alcalá de Henares, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Advanced Clinical Podiatry
- Optical Technologies and Clinical Optometry

Medicine

Policlínico HM Arapiles

Country: Spain

City: Madrid

Address: C. de Arapiles, 8, 28015, Madrid

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Anaesthesiology and Resuscitation
- Pediatric Dentistry

Medicine

Policlínico HM Rosaleda Lalín

Country: Spain

City: Pontevedra

Address: Av. Buenos Aires, 102, 36500, Lalín, Pontevedra

Network of private clinics, hospitals and specialized centers distributed throughout Spain.

Related internship programs:
- Advances in Hematology and Hemotherapy
- Neurological Physiotherapy

09

Methodology

This program offers students a different way of learning. Our methodology follows a cyclical learning process***: Relearning***.

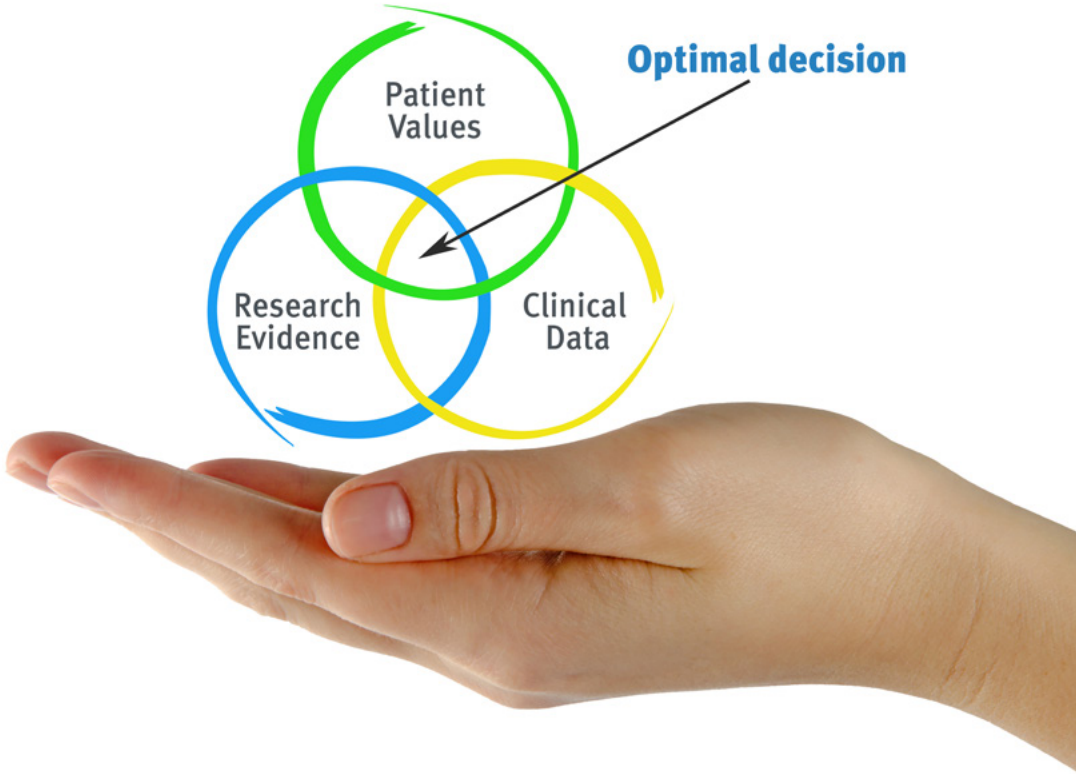
This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the ***New England Journal of Medicine*** have considered it to be one of the most effective.

Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

At TECH we use the Case Method

What should a professional do in a given situation? Throughout the program, students will face multiple simulated clinical cases, based on real patients, in which they will have to do research, establish hypotheses, and ultimately resolve the situation. There is an abundance of scientific evidence on the effectiveness of the method. Specialists learn better, faster, and more sustainably over time.

With TECH you will experience a way of learning that is shaking the foundations of traditional universities around the world.



According to Dr. Gérvas, the clinical case is the annotated presentation of a patient, or group of patients, which becomes a "case", an example or model that illustrates some peculiar clinical component, either because of its teaching power or because of its uniqueness or rarity. It is essential that the case is based on current professional life, trying to recreate the real conditions in the physician's professional practice.

Did you know that this method was developed in 1912, at Harvard, for law students? The case method consisted of presenting students with real-life, complex situations for them to make decisions and justify their decisions on how to solve them. In 1924, Harvard adopted it as a standard teaching method"

The effectiveness of the method is justified by four fundamental achievements:

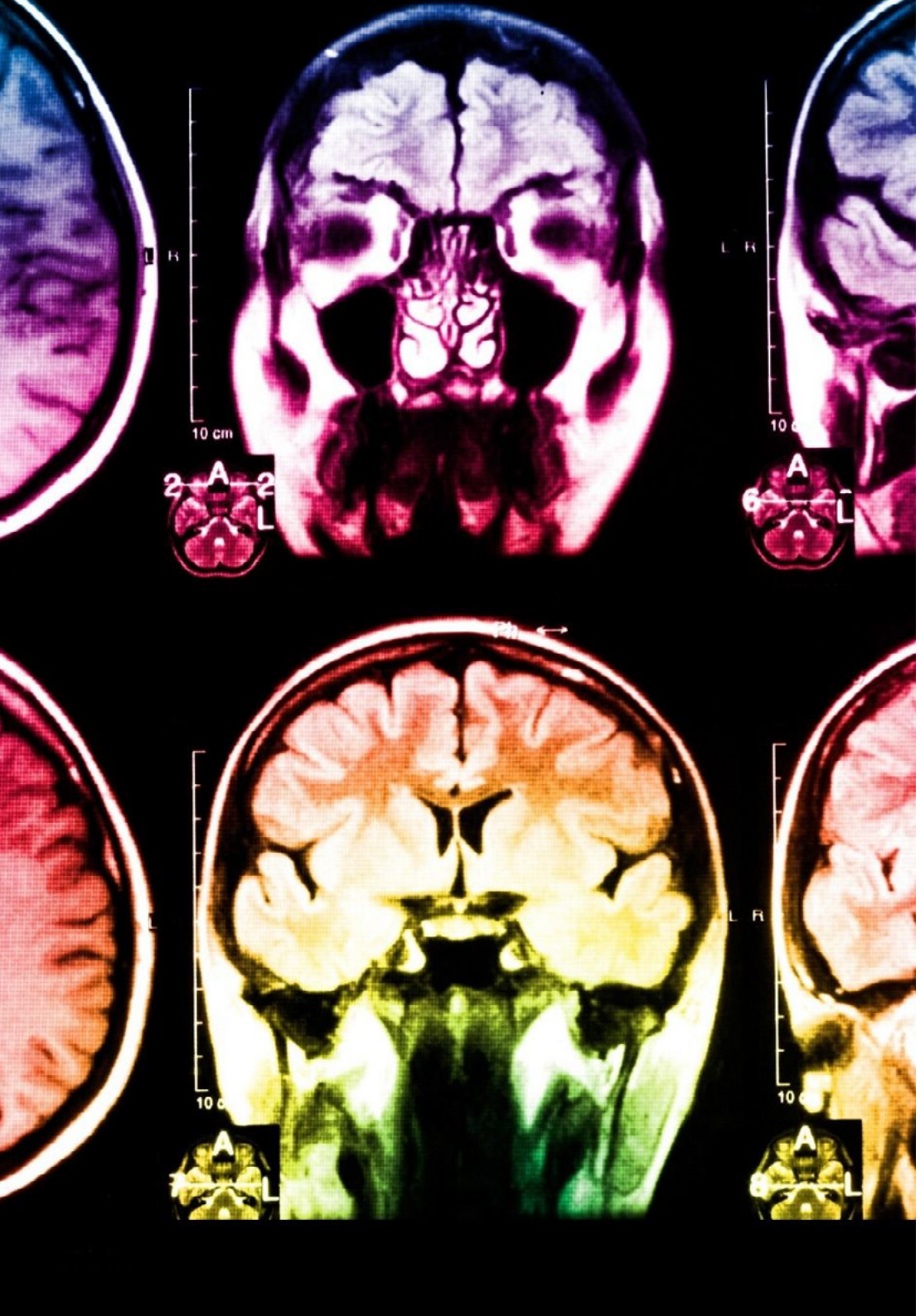
1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that evaluate real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.

Relearning Methodology

At TECH we enhance the case method with the best 100% online teaching methodology available: Relearning.

This university is the first in the world to combine the study of clinical cases with a 100% online learning system based on repetition, combining a minimum of 8 different elements in each lesson, a real revolution with respect to the mere study and analysis of cases.

Professionals will learn through real cases and by resolving complex situations in simulated learning environments. These simulations are developed using state-of-the-art software to facilitate immersive learning.



At the forefront of world teaching, the Relearning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best online university (Columbia University).

With this methodology, more than 250,000 physicians have been trained with unprecedented success in all clinical specialties regardless of surgical load. Our pedagogical methodology is developed in a highly competitive environment, with a university student body with a strong socioeconomic profile and an average age of 43.5 years old.

Relearning will allow you to learn with less effort and better performance, involving you more in your specialization, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation to success.

In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

The overall score obtained by TECH's learning system is 8.01, according to the highest international standards.

This program offers the best educational material, prepared with professionals in mind:

Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.

Surgical Techniques and Procedures on Video

TECH introduces students to the latest techniques, the latest educational advances and to the forefront of current medical techniques. All of this in direct contact with students and explained in detail so as to aid their assimilation and understanding. And best of all, you can watch the videos as many times as you like.

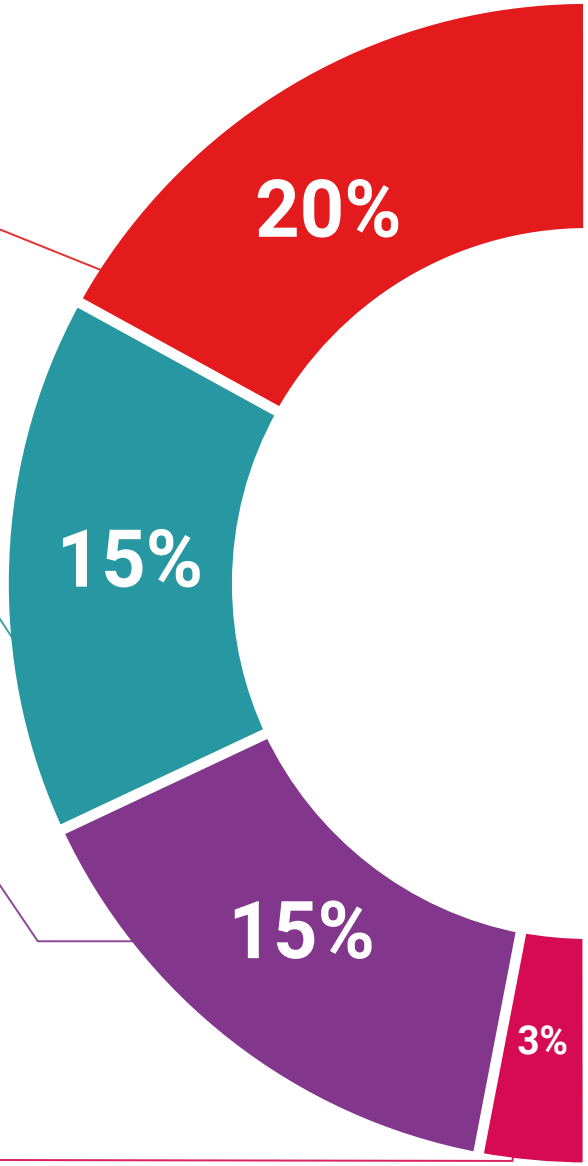
Interactive Summaries

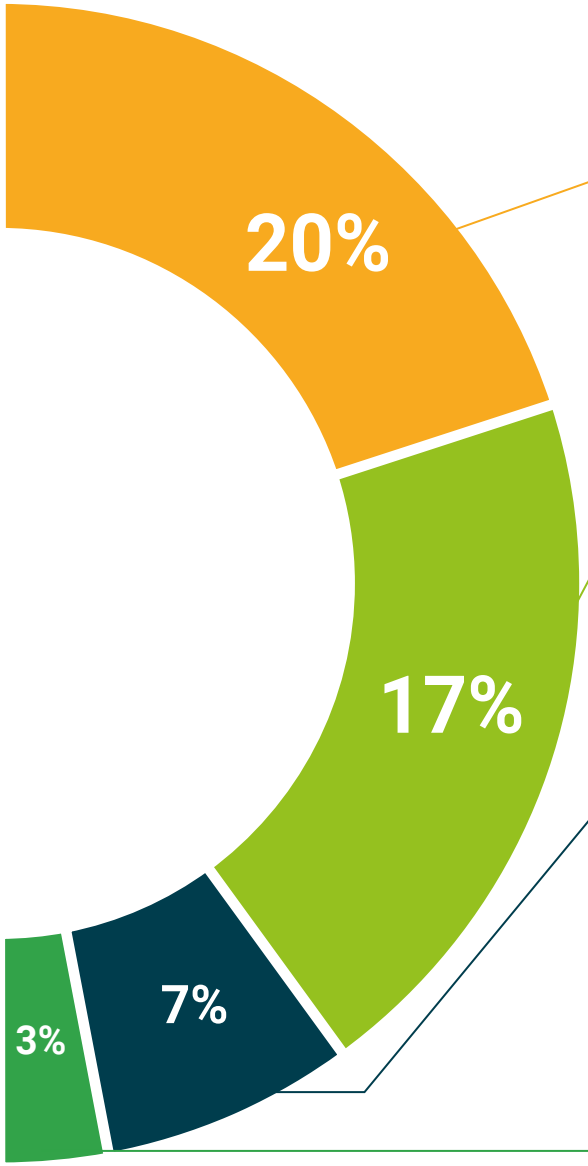
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story"

Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





Expert-Led Case Studies and Case Analysis

Effective learning ought to be contextual. Therefore, TECH presents real cases in which the expert will guide students, focusing on and solving the different situations: a clear and direct way to achieve the highest degree of understanding.

Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.

Classes

There is scientific evidence on the usefulness of learning by observing experts. The system known as Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical, and effective way to help students progress in their learning.

10

Certificate

The Hybrid Master's Degree in Genomic and Precision Medicine in Hematology:Thrombosis guarantees students, in addition to the most rigorous and up-to-date education, access to a Hybrid Master's Degree diploma issued by TECH Global University.

Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork"

This program will allow you to obtain your **Hybrid Master's Degree diploma in Genomic and Precision Medicine in Hematology: Thrombosis** endorsed by **TECH Global University**, the world's largest online university.

TECH Global University is an official European University publicly recognized by the Government of Andorra (***official bulletin***). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Hybrid Master's Degree in Genomic and Precision Medicine in Hematology: Thrombosis**

Course Modality: **Hybrid (Online + Clinical Internship)**

Duration: **12 months**

Certificate: **TECH Global University**

Recognition: **60 + 5 ECTS Credits**


tech global university

Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Hybrid Master's Degree in Genomic and Precision Medicine in Hematology: Thrombosis

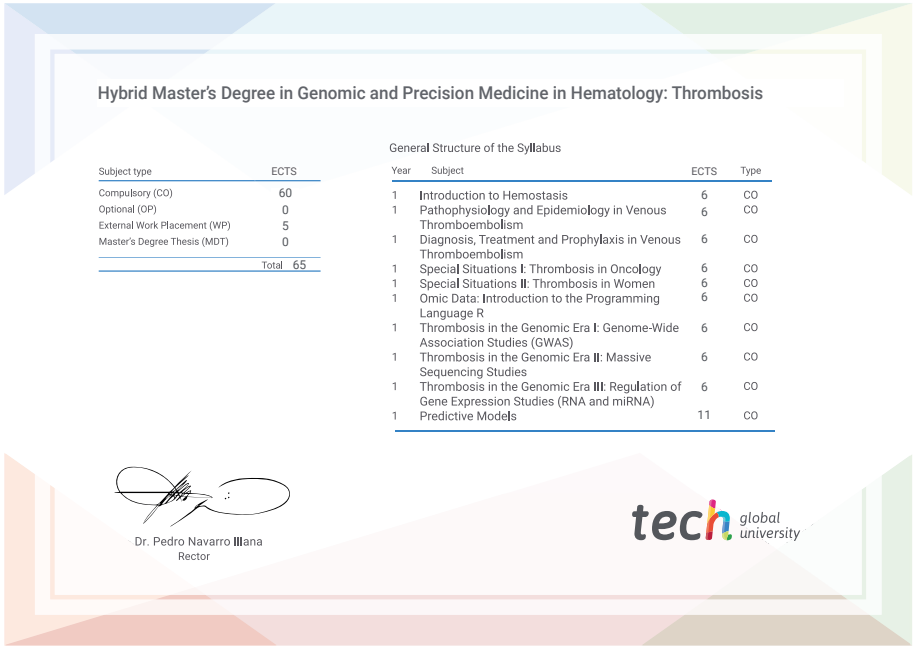
This is a program of 1,620 hours of duration equivalent to 65 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Rector

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates


Hybrid Master's Degree in Genomic and Precision Medicine in Hematology: Thrombosis

Subject type	ECTS
Compulsory (CO)	60
Optional (OP)	0
External Work Placement (WP)	5
Master's Degree Thesis (MDT)	0
Total	65

General Structure of the Syllabus

Year	Subject	ECTS	Type
1	Introduction to Hemostasis	6	CO
1	Pathophysiology and Epidemiology in Venous Thromboembolism	6	CO
1	Diagnosis, Treatment and Prophylaxis in Venous Thromboembolism	6	CO
1	Special Situations I: Thrombosis in Oncology	6	CO
1	Special Situations II: Thrombosis in Women	6	CO
1	Omic Data: Introduction to the Programming Language R	6	CO
1	Thrombosis in the Genomic Era I: Genome-Wide Association Studies (GWAS)	6	CO
1	Thrombosis in the Genomic Era II: Massive Sequencing Studies	6	CO
1	Thrombosis in the Genomic Era III: Regulation of Gene Expression Studies (RNA and miRNA)	6	CO
1	Predictive Models	11	CO

Dr. Pedro Navarro Illana
Rector

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*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

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Hybrid Master's Degree

Genomic and Precision Medicine in Hematology: Thrombosis

Modality: **Hybrid (Online + Clinical Internship)**

Duration: **12 months**

Certificate: **TECH Global University**

60 + 5 créditos ECTS

Hybrid Master's Degree

Genomic and Precision Medicine in Hematology: Thrombosis

tech global university