

San Raffaele Scientific Institute Cardiothoracic and Vascular Anaesthesia and Intensive Care Fellowship

Period and Aims of the Fellowship

The Cardiothoracic Anaesthesia Fellowship at the San Raffaele Scientific Institute in Milan is offered for a duration of one or two years.

Aim of the Fellowship Programme is to train anaesthesiologists who have finished their residency training to become proficient in cardiothoracic and vascular anaesthesia.

The candidates must be board certified or board eligible according to European residency programme standards, and must be proficient in Italian language (B2 LEVEL is required). If the candidate is proficient in English or in Spanish (B2 LEVEL is required) he will be asked to study and learn Italian within the first 8 weeks after the beginning of the fellowship.

The fellows will have the opportunity to gain extensive experience in the fields of cardiac, thoracic and vascular anaesthesia and intensive care medicine. After completion of the programme, they will be able to work independently as consultants in cardiac, thoracic and vascular anaesthesia.

The fellowship programme in Milan is organised and directed by the local head of cardiothoracic anaesthesia and intensive care (Prof. Dr. Alberto Zangrillo), by the Head of Research (Prof. Giovanni Landoni), the leader of the ECMO team and in charge of the intensive care (Dr Federico Pappalardo) and the head of cardiac anaesthesia (Dr. Fabrizio Monaco) as programme directors. Completion of the programme will be acknowledged by the Department of Anaesthesia and Intensive Care at the San Raffaele Scientific Institute in junction with European Association of Cardiothoracic Anaesthesia (EACTA). In particular, criteria for EACTA certification will be determined and communicated before the start of the Fellowship and their fulfilment will be mandatory in order to receive the joint certification (San Raffaele Scientific Institute and EACTA). A logbook for all clinical activities and a final examination are planned..

Obligation of the Fellow

The Programme includes pre-, intra- and postoperative care of patients undergoing cardiac, vascular, thoracic operation, transcatheter ablation of ventricular or supraventricular arrhythmias, percutaneous or transapical treatment of structural heart disease. The Fellow takes part in the clinical routine as well as in clinical conferences with the Departments of Anesthesiology and Intensive Care, of Cardiology, of Cardiac Surgery of Vascular Surgery, of Thoracic surgery and of Arrhythmology. The fellow is trained in transesophageal echocardiography by formal courses and teaching in the operating room and intensive care unit: the fellow is expected to perform at least 120 TEE examination per year. The fellow takes part in

preparation and presentation of case conferences. The didactic curriculum is provided through lectures and conferences and allows the fellow to acquire the knowledge to care for the patients. In addition, academic projects including preparation and publication of review articles, book chapters, manuals for teaching or clinical practice, clinical research or other academic activities are offered and strongly encouraged. The fellow is responsible for the documentation of the cases and TEE examinations done during his fellowship.

Evaluation

The fellow's progress will be evaluated and discussed with the fellow every 3 to 6 months by the programme director and the division heads. The fellow's professional attitude, fund of knowledge, and clinical judgment will be assessed as well as his/her practical skills, social competence and efficiency for patient management and critical analysis of any relevant clinical situation. The fellow will be involved in programmes of quality assurance and risk management. At the end of the training period, the fellow will receive a testimonial. We will motivate the fellow to attain EACVI/EACTA TEE certification following him/her during the all process.

Faculty

The division heads and the programme directors have a large experience in cardiothoracic and vascular anaesthesia, for details please see the attached CVs. Dr Landoni is responsible for the fellowship programme and will direct it in accord with the following co-directors: the local head of cardiothoracic anaesthesia and intensive care (Prof. Dr. Alberto Zangrillo); the leader of the ECMO team (Prof Federico Pappalardo); the in charge of the intensive care (Dr Mara Scandroglio), the head of cardiac anaesthesia (Dr. Fabrizio Monaco); a senior anesthesiologist with extensive expertise in TEE (Dr Martina Crivellari). They will devote sufficient time to provide substantial leadership to the programme and supervision for the trainees. In addition to the primary coaches of the fellow, further senior members of the cardiothoracic and vascular anaesthesia and ICU team serve as faculty, clinical teachers and coaches for the fellows in daily clinical practice (Calabrò MG, De Luca M, Di Tomasso N, Di Prima AL, Fano G, Fominskiy E, Franco A, Frau G, Gerli C, Melisurgo G, Mucchetti M, Pieri M, Oriani A. The Division of Cardiothoracic and Vascular anaesthesia consists of over 20 consultants who are specially trained in cardiothoracic and vascular anaesthesia and intensive care and some of them in perioperative transesophageal echocardiography.

Resources

The San Raffaele Scientific Institute is one of the leading private scientific research institutes in Italy, recognized by the Italian Ministry of Health as a Research Hospital. At the same time, with almost 30,000 surgical procedures per year it is an high volume surgical center. It comprises both clinical and research activities, conducted by a highly specialized and qualified staff with 1,357 beds and a research institute with around 1,600 basic, clinical and translational scientists. San Raffaele integrates its research with the education and training activities conducted within the Vita-Salute San Raffaele University which comprises the faculties of medicine, psychology and philosophy and provides specialized post graduate courses, residency programs in various medical specialties, and international PhD programs.

The San Raffaele Scientific Institute is located in Milan and is one of the most important cardiac, vascular and thoracic vascular surgical centre in Italy. It has a high level of medical care with a twenty--four--seven emergency department, operating rooms which are all adequately designed and equipped for the management of cardiothoracic and vascular surgery patients and three intensive care units for neurosurgical patients (6 beds), cardiac surgical patients (14 beds) and medical/general surgical patients (8 beds). Staff physicians are all board certified in their medical specialty and have extensive experience in cardiovascular and pulmonary diseases, echocardiography including transesophageal echo, clinical cardiac electrophysiology, cardiac, thoracic and major vascular surgery such as in the management of patients undergoing heart structural disease correction with transapical or percutaneous approach . The monitoring and advanced life support equipment is representative of current levels of technology. There are facilities which are readily available at all times to provide prompt laboratory measurement pertinent to the care of cardiothoracic and vascular surgical patients as well as prompt non-invasive and invasive diagnostic and therapeutic cardiothoracic procedures. These include but are not limited to echocardiography, cardiac stress testing, cardiac catheterization, electrophysiological testing and therapeutic intervention, cardiopulmonary scanning procedures and pulmonary function testing.

Overall, the fellow will have the opportunity to work in the 3 cardiac surgery theatres, 3 hybrid rooms for invasive cardiological procedures, 2 rooms for vascular and thoracic surgery, 14 ICU beds.

Cardiac Surgery

The Department of Cardiovascular and Thoracic Department at the San Raffaele Scientific Institute performs over 1300 adult cardiac procedures per year including TAVI and Mitralclip. The Chief surgeon is Prof Alfieri Ottavio.

Recent activities per year included 1496 hospitalization, 1360 cardiac surgery procedures:

Mitral Valve Repair 420

Tricuspid Valve repair 92

Aortic Valve repair 12

Aortic Valve replacement 327

Mitral Valve replacement 197

Revascularization-Bypass 226

Mitraclip 55

Transapical/Transaortic/Transaxillary Tavi 15

Tranfemoral Tavi 65

General Brief description of the of the Cardiac Surgery Unit	The Cardiac Surgery Unit of the San Raffaele University Hospital represents a high quality centre for the treatment of cardiac diseases. About 1300 open heart procedures are performed every year, involving the most wide range of cardiac pathologies. The Unit is a national and international reference centre for the mitral valve repair, for surgical treatment of atrial fibrillation and congestive heart failure, for coronary beating-heart surgery. Minimally invasive approaches and new technologies are widely used.
Key competence	Adult Cardiac surgery. Mitral valve repair. Minimally invasive technique. Surgical ablation of atrial fibrillation. Mechanical assistance for congestive heart failure. Team work with other specialities in the Cardio-Thoracic-Vascular Department. New treatments, devices and alternative routes. Participation in national and international clinical trials. Preclinical trials validation and cooperation with University research centres and animal facilities. Cost/benefits approach
Facilities	<ul style="list-style-type: none">• Engineering laboratories for preclinical studies and bench testing, in vitro and ex vivo study validation• Laboratory of Echocardiography (Dr. Giovanni La Canna), equipped with modern equipment (three-dimensional echocardiography, post-elaboration data center)• 38 beds in hospital, including 18 fully monitored for semi-intensive therapy• Support of post-operative intensive care unit (Prof. Alberto Zangrillo) with 14 beds equipped with the latest cardio-circulatory and respiratory technological assistance• Outpatient's clinic for pre and post-operative evaluation, for heart failure, for surgery of arrhythmias, for valvular surgery• Animal facility laboratory for research on mice, rats, rabbits, pigs, sheep and ovine

Lead Physician	Surname, Name Alfieri Ottavio
	Head of the Cardiac Surgical Unit of the San Raffaele University Hospital, Milan, Italy from 1997 and Professor and Chairman of Cardiac Surgery at the Vita-Salute San Raffaele University. Director of the Cardio-Thoracic and Vascular Department of the San Raffaele University Hospital. Past President of the European Association for Cardio-Thoracic Surgery. Member of the editorial board of several Scientific Journals. He is Author or Coauthor of approximately 500 papers in national and international journals.

Interventional Cardiology

The Division of Cardiovascular and Thoracic Department at the San Raffaele Scientific Institute also covers the interventional cardiology theatre. Last year a total of 3281 procedures were performed, including 232 cardiac structural interventions with the presence of anesthesiologists (158 TAVI, 67 MitraClip, 62 ASD/PFO closure and 12 LAA closure). The fellow will be involved and trained in the management of these procedures.

Thoracic Surgery

Part of the fellowship programme is the anaesthetic management of adult patients undergoing thoracic surgery. The Department of Thoracic Surgery performs over 650 thoracic operations per year which includes video-assisted thoracoscopic surgery and open procedures.

Electrophysiology Unit

The Electrophysiology Unit treats patients with all types of arrhythmia and is a centre of excellence for the treatment of ventricular arrhythmias in patients with and without structural heart disease.

These procedures are often targeted at patients with hemodynamic instability and in 2015 a total of 51 periprocedural extracorporeal supports were provided for these patients (15 IABP, 4 IMPELLA, 32 ECMO).

Vascular Surgery

The Department of Vascular Surgery covers all major vascular procedures. In 2012 more than 2000 procedures were performed in the descending aorta and the abdominal aorta, including bypass surgery on the lower extremity and carotid TEA. The focus of the department is the treatment of thoracoabdominal aortic aneurysms with more than 80 cases last year and bypass surgery on the lower extremities with 263 cases last year.

Anaesthesia

Cardiac Anaesthesia

Fellows are trained to provide perioperative anaesthetic management for patients with severe cardiopulmonary pathology. The cardiac surgeries are the following: coronary artery bypass surgery (CABG) both on cardiopulmonary bypass as well as on a beating heart, heart valve surgery (especially mitral surgery), aortic reconstruction requiring deep hypothermic arrest, thoracic aortic aneurysm repair and aortic dissection repair.

Adequate exposure and experience are provided in the management of adult patients for cardiac pacemaker and automatic implantable cardiac defibrillator placement and surgical treatment of cardiac arrhythmias. There is exposure also to techniques such as percutaneous aortic valve replacement and mitral valve intervention.

Fellows also gain experience in perioperative medical (anaesthetic) management of the cardiac patient, including management of intra-aortic balloon pumps (IABP) and ventricular assist devices (VAD), post-operative ICU care, point-of-care coagulation testing, blood transfusion medicine, electrophysiology, and transthoracic echocardiography.

As for transfusion policy at our institutions, allogenic blood products are administered according to a specific protocol Rotem guided. Packed red cells (PRC) are transfused to maintain haemoglobin value >8 g/dL in the overall population and >10 g/dL in patients with hemodynamic instability or severe cardiac or pulmonary complications. Fresh frozen plasma (FFP) are used for the treatment of active bleeding. Platelet concentrates are used in case of active bleeding and platelet count $< 50 \times 10^9/L$. The transfusion rate in our center is low as documented by several international multicentre randomized trials performed over the years. Point of care coagulation test are currently being implemented.

In addition, fellows will be involved in the management of patients treated with VV- and VA-ECMO. All the activities in the Cardiothoracic Intensive Care Unit will be supervised by Dr Federico Pappalardo, Dr Bove Tiziana, Dr Calabrò Maria Grazia, Dr Scandroglio Anna Mara.

Fellows will receive proper theoretical and practical training both for basic and advanced TEE. Each patient undergoing cardiac surgery is receiving pre- and postsurgical transesophageal examination. The fellow will perform and document the TEE examinations with increasing independence and review each examination with a senior echocardiographer. We'll motivate him to attend the EACTA Echo and follow the EACTA accreditation process. The local referee for accreditation is Dr. Eustachio Agricola. The TEE training will be therefore based on the understanding of the basic principles of ultrasound and learning of basic skills of TEE (physics, standard views for examination, Doppler principles and quantification etc). As soon as the fellows master the basic skills, TEE training will continue with advanced applications of intraoperative TEE including assessment of valvular function, 3D, AQ for assessment of ventricular function, Stress and Strain, Tissue Doppler).

Thoracic and Vascular Anaesthesia

Clinical work of fellows includes anaesthetic management of adult patients undergoing thoracic and vascular surgery. Fellows are trained to manage different types of thoracic surgeries, including video-assisted thoracoscopic surgery (VATS), open thoracotomy, and robotic surgery. Fellows achieve expertise in different techniques of lung isolation and ventilation, including the use of double-lumen endotracheal tubes, bronchial blockers, fiberoptic bronchoscopy, and jet ventilation.

Advanced Monitoring and Invasive Techniques

The complex nature of cardiothoracic surgery necessitates extra training to acquire the skills needed to be a cardiothoracic and vascular anaesthesia consultant. Fellows are trained to achieve expertise in the advanced monitoring techniques including invasive blood pressure measurement, arterial blood gas analysis, cardiac output monitoring and central venous oxygen saturation.

Finally, invasive procedures completed by the cardiothoracic anaesthesiology fellows include arterial line placement (femoral, axillary, brachial, radial), central venous cannulation (internal jugular, subclavian, femoral), pulmonary artery catheter placement, transvenous pacemaker placement, thoracic epidural catheter positioning, intrathecal lumbar catheter positioning for cerebrospinal fluid drainage fiberoptic endotracheal tube placement, 2D/3D transesophageal echocardiography and ultrasound guidance of vascular access.

Intensive Care

The Hospital has three intensive care units for neurosurgical patients (6 beds), cardiac surgical patients (14 beds) and medical/general surgical patients (8 beds). The “cardiac” and the “general” ICU manage the:

--cardiac-thoracic-vascular patients

--VV-ECMO patients for refractory hypoxiemia in ARDS patients and VA-ECMO patients for severe cardiac dysfunction (either admitted from the emergency department or referred from other centres or in-hospital emergencies). Over 100 patients receive ECMO every year in our Institute.

--patients with mechanical devices (IABP, IMPELLA, VAD, total artificial heart)

Fellows will follow all the activities of the ICUs under the supervision of senior specialists.

Overall, the team, the environment and the skills are similar to those described above for the anesthesiological part.

Structure of the Fellowship Programme

The Fellowship

During the first year of the Fellowship, the Fellow is directly supervised and gets a 1:1 supervision with a senior cardiac consultant.

1st Month

- Familiarisation in cardiothoracic and vascular anaesthesia, coached mainly by the programme directors or division heads
- Anaesthesia management for standard cardiac procedures
- Daily participation to intensive care ward rounds and preop anaesthesia clinic

2nd -4th Month

- Clinical duties as a member of the cardiac team for standard cardiac procedures (isolated CABG, aortic and mitral valve replacement), under supervision
- Daily participation to intensive care ward rounds and preop anaesthesia clinic-Acquisition of basic echocardiographic knowledge (books, media, course, teaching in the operating theatre)
- On – call duties, under supervision
- Evaluation of the educational progress of the fellow by programme director and division head. Meeting with the fellow, discussion of the evaluation, mutual feedback
- Planning of participation in a national or international cardiac and thoracic conference. Participation in the Annual Meeting of EACTA in one of the two fellowship years.

5th – 7th Month

- Clinical duties as a member of the cardiac team for standard and advanced cardiac procedures, including transcatheter aortic valve implantation (transapical / transfemoral), aortic valve bypass and anterolateral mitral valve repairs / replacements), under supervision
- Daily participation to intensive care ward rounds and preop anaesthesia clinic
- Acquisition of basic TEE skills. The fellow learns to obtain the 20 standard views
- Planning and presentation of clinical case conference
- On – call duties, under supervision

8th – 10th Month

- Clinical duties as a member of the cardiac team for standard and advanced cardiac

procedures, including transcatheter aortic valve implantation (transapical / transfemoral), aortic valve bypass and anterolaterale-mitral valve repairs / replacements, under supervision

- Daily participation to intensive care ward rounds and preop anaesthesia clinic
- Self consistent TEE examination (Pre - and postoperatively) under bedside supervision
- On – call duties, under supervision

11th 12th Month

During the last part of the first year of the fellowship, the Fellow is working more and more independently but gets a remote supervision. A senior faculty member is immediately available.

- Self-consistent clinical duties as junior anaesthesia consultant in elective cardiac, thoracic and vascular surgical patients
- Self consistent TEE examination
- On – call duties as a junior consultant, together with a backup senior consultant
- European accreditation in TEE by EACTA / EAE (or shortly after the end of the fellowship)
- Continuous medical education in the field of cardiac, thoracic and vascular anaesthesia
- Presentation of a case at the clinical case conference once every 6 months

Second year of the fellowship

The Fellow will focus on the activity of the cardiac surgery ICU (14 beds) and the general ICU (8 beds) and to the management of VV-ECMO, VA-ECMO patients, and those with mechanical devices (IABP, IMPELLA, VAD, total artificial heart). Fellows will follow all the activities of the ICUs under the supervision of senior specialists.

Prof. Giovanni Landoni

Fellowship Programme Director and Head of Research

Anaesthesia Department of Anaesthesia and Intensive Care Medicine

San Raffaele Scientific Institute, via Olgettina 60, Milan, Italy

e-mail: landoni.giovanni@hsr.it

Prof. Alberto Zangrillo

Head of Cardiothoracic Anaesthesia Department of Anaesthesia and Intensive Care Medicine

San Raffaele Scientific Institute, via Olgettina 60, Milan, Italy

Prof Federico Pappalardo

Leader of the ECMO team

San Raffaele Scientific Institute, via Olgettina 60, Milan, Italy

Dr. Fabrizio Monaco

Head of Cardiac Anesthesia

San Raffaele Scientific Institute, via Olgettina 60, Milan, Italy

Dr. Anna Mara Scandroglia

Head of Cardiac Intensive Care

San Raffaele Scientific Institute, via Olgettina 60, Milan, Italy

Dr. Martina Crivellari

EACTA TEE Certified

San Raffaele Scientific Institute, via Olgettina 60, Milan, Italy