

Development of the Perfusion Profession in Italy and Europe

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History of Perfusion Schools in Italy

The history of extracorporeal circulation began in 1953 with Gibbon. In the early years, surgeons and nurses worked as perfusionists. Afterwards, specialized technicians were formed. As in Europe, a uniform school system did not exist and perfusionists learned directly in his or her working place. Since 1991, the European Board of Cardiovascular Perfusion (EBCP) has been working in Italy and Europe to gain a professional status of the "European Perfusionist."

Some perfusion schools belonged to universities, whereas others were under control of the National Health Service. In 1973, in Italy, a specialized school for perfusionists was first started at the University of Rome. Four years later, a second school was opened in Verona, and at that time no other institutions were able to confer a degree in cardiovascular perfusion. Only later, in 1980, Chieti, Milan, Genoa and Siena became sites of permanent schools.

These schools were directly coordinated by the faculty of medicine at each site and were named as University Specialized School for Cardiac Surgery Technician. The number of participants was restricted following Act No. 910/69 article 1, DPR 162/82 art. 6 and both admission criteria and school duration have been changed several times. In fact, between 1973 and 1984 high-school students with a diploma as well as nurses who had a shorter school curriculum (two years versus five years for high school) could either enter a perfusion school for the course duration of two years. After 1984, only those with a high school diploma or nurse-degreed people could be admitted to these three-year schools.

Starting in 1988, only students with a high school diploma were admitted to the course, which still remained three-years long. Afterwards, the schools' name and regulations were changed. First these had been named "University Specialized Schools for Cardiac Surgery Technicians." Later, in 1988, a Presidential Act changed the name to "University Specialized School of Cardiocirculatory Physiopathology Technicians." Before Reform, students used to spend 400 hours in classes and an

additional practical part in operating rooms, intensive care units or cardiology laboratory. This practical part might be carried out as well in extracorporeal circulation-related institutions.

Theoretical parts of the course were comprised as follows:

First year: anatomy, physiology, pharmacology, anaesthesiology, clinical pathology, and biomedical technologies

Second year: cardiology, angiology, anaesthesiology, respiratory physiopathology, nephrology, cardiovascular surgery, and extracorporeal circulation

Third year: cardiovascular surgery, cardiac pacing, neurology, legal medicine, extracorporeal circulation, biochemistry, hemodynamics, the rheology of fluids, blood treatment, sterility, artificial oxygenator, filtration, postoperative progress, English language, and knowledge of the various perfusion methods and their possibilities.

Cardiac surgery, cardiology service, and cardiovascular service courses were mandatory. Courses officially end with the last examination on the relative subjects. A final assessment is given on the basis of written and oral proofs and practical examination. A final project discussion, chosen within the final six months, must be held at the presence of the Director of the University School.

The goals of the training were to give the student a good background in several areas including cardiac surgery, cardiology and general surgery.

The degree allows perfusionists to work for the National Health Service, universities or private institutions. Perfusionist research and teaching duties involve training perfusion technicians as well as physicians, surgeons and nurses.

Organization and management duties are quite hard in a highly bureaucratic country, like Italy.

Since 1988 the Minister of Health, in agreement with the Italian Society of Perfusionists (ANPeC) has changed the university school's programs so to make the diploma acknowledgement uniform. In 1992 a new Presidential Act (n. 502) established two new

regulations about the health system: the Minister of Health recognizes the professional figure while the Minister of Education was aimed to define didactic regulations and to organize the "University Graduate Degree". In January 1995, since there was reduction in the a number of perfusionists and because of the need to cut public expenses, the Minister proposed to join the perfusionists' training and the nurses' training. Perfusionists strongly contrasted this decision and asked to meet and discuss this with the Minister of Health. Because of missing expected answers by the Minister, a strike of the perfusionists and teachers was organized. In 1996, the diploma of the university schools was transformed into the "University Graduate Degree".

On July 27, 1998, the official Act n. 316 of the Ministry of Health established the regulations to identify the character and related professional profile of the "Cardiocirculatory Physiopathology Technicians and Cardiovascular Perfusion" as follow:

art.1

1. Perfusionists are individualized as follows: the Perfusionist is a surgical operator, in possession of a University Degree and registered in a professional role, who provides the management and the maintenance of the supplies.
2. The functions of the Perfusionist are exclusively of a technical nature. He cooperates with the physician supplying fundamental information or preparation on the hemodynamic diagnostic or assisted circulation working.
3. The Perfusionist plans and evaluates what is necessary for a good working of preparations, he guarantees the correct applications of the techniques of necessary support and he carries out his professional activity in public or private structure, in a regime of dependance or free professional.
4. The Perfusionist aids in forming the support personnel and directly contributes to the information relevant to the professional aspect and to the research in the subjects of his competence.

Afterwards according to Act 42, art. 4, February 2, 1999, the Minister of Health established that the University Diploma achieved at the School for Cardiocirculatory Physiopathology Technicians would have the same value as the "University Graduate Degree". Finally, in May 2001, as the degree became the "Medical Degree in Cardiovascular Physiopathology and Cardiovascular Perfusion" university schools, already existing in Milan, Rome, Pavia, Siena and Verona were transformed.

The duration is still only three years, but the program in perfusion sciences is more complete.

Furthermore, admission criteria include a high-school diploma and a passing grade for a multiple choice question test. In addition, the program comprises didactic training, clinical observation, laboratory experience and research. The student will continue to participate in clinical procedures under the direct and constant supervision of a certified perfusionist. The new university school is committed to all aspects of the education and training of highly qualified perfusionists.

Every lesson and practical training gives the student credits. One credit equals 25 hours. The student needs to achieve 60 credits/year for a total of 180 credits at the end of the course. The student will be followed by a tutor during the lesson and practice. To attend lessons and practice time is mandatory.

The practical training includes knowledge and treatment of common perfusion complications and emergency situations including: emergency pump, oxygenator change-out, mechanical pump failure, electrical pump failure, failure of tubing or other disposable products, ventilating gas failure and massive air embolism.

The perfusionist has to complete his preparation and carry out a certain minimum number of extracorporeal circulation (ECC) procedures under supervision and independently without supervision. During the training period the theory will be further explained, by means of audio-visual and practical experiments. Attendance at evening seminars is compulsory. Attendance at symposia, special courses or conference in the field of ECC, or areas, which have interfaces with this subject, is encouraged.

A final thesis, proposed by a teachers college, chosen within the final six months of training, must to be held at the presence of the Director of the University School. It has to include illustrations and references. The examiners will consider the scientific quality of the thesis, presentation and quality of results, difficulty of the project, its originality, the methodology and statistical analyses employed. The thesis could be published in a scientific journal.

Clinical experience is obtained in the following areas:

Cardiac Surgery

Cardiopulmonary bypass, LVAD, RVAD, artificial heart

Cardiology

PTCA (Standby), assisted circulation during high risk procedures

General Surgery

Oncology hyperthermia

Transplantation

Heart, lung, liver, organ preservation for transplantation

Intensive Care Unit

Assisted mechanical circulation

Manufacturing

Research

The course prepares the student for employment in clinical perfusion, research, teaching, organization and management and manufacturing.

The aim of the course is to get a good theoretical background of basic medical sciences:

- to understand the design control system and instrumentation, to give a through training in the concept of scientific method, to evaluate the problem and report results in scientific papers;
- to understand the scientific basis of medical problems encountered in clinical practice and find a solution;
- to understand the principles of management, cost analysis and economics as applied to the management and practice of perfusion;
- to achieve the medical knowledge and the practical skills to manage extracorporeal circulation and circulatory support; and
- to achieve the competence to set-up and manage all components and devices used for ECC.

The objectives of the course will lead to greater patient safety and will permit the perfusionist: to give more help to the medical staff of the team; to manage the junior staff of the perfusion team more effectively; to handle the financial aspects of materials in a more cost effective way; to aid the training of new staff and to integrate perfusion trainees; to gain good knowledge of the English language and correct use of computers; to help investigate problems in perfusion; and to aid in the development of new equipment for more efficient perfusion. It is important that the student has a clear vision of the standing of his findings in the wider field of perfusion practice.

Continued education of the perfusionist in the field of ECC occurs through special courses, seminars and workshops organized by the hospitals and through meetings and congresses organized by the Italian Society of Perfusionists (ANPeC). Since 2001, attendance at these courses, seminars and workshops, is mandatory for the perfusionist working in public or private institutions.

Every year each perfusionist must obtain:

10 credits	2001
20 credits	2002
30 credits	2003
40 credits	2004
50 credits	2005

According to the new University Reform, perfusion schools became a Medical Degree Program (duration 3 years). The next level is called 1st Level Master Degree. People can be admitted to this Master after Medical Degree and five years of working in the field. The duration of the course is 1500 hours. The next step should be represented by the Specialization Degree, which has not yet been established. Finally, a Second Level Master and a Research Doctorate should represent the highest area of study for the perfusionist.

Situation in Europe

In 1957, the Treaty of Rome gave the basis for the circulation of people in the six original community countries of France, Germany, Belgium, Netherlands, Luxembourg and Italy.

In 1988 the European Commission proposed a single acknowledgment system of three years high-school diplomas for professional training. Since 1989, professional training among EU countries has been recognized by Directive 89/48 EEC for higher education. The underlying principle was that fully qualified people exercising their profession in one of the Member States were believed to be skilled enough to practice in any UC country.

Since 1995, the European Union has been comprised of 15 countries so common rules and criteria for education and professional training were highly necessary. Thus, the European national societies started working together to get uniform perfusionists training.

The Societies of Perfusion in Italy and Europe

The Italian Society of Perfusionists (ANPeC) was founded in 1978. The primary goal of our association is to promote complete laws and rules in Italy in harmony with the European rules. The special goal was the official acknowledgement of our profession, in order to safeguard ourselves in our professional jobs, and the rights of citizens to get health care. Also ANPeC is interested in professional training, economic problems, etc., like representing the Italian perfusionists in foreign relationship.

Starting from 1988 the objectives of the Italian Perfusionists were:

- to obtain the professional status;
- to obtain in accordance with Act 42, art. 4, February 2, 1999, the Minister of Health established that the University Diploma achieved at the School for Cardiocirculatory Physiopathology Technicians had the same value of the University Graduate Degree;
- to carry out the University Reform: to transform the Special University Schools already existent, into "Medical Degree", Act 314/1990 art. 7, November 1990.

The Italian Society of Perfusionists and other national societies from the European Union gave rise to the European Board of Cardiovascular Perfusion (EBCP) in 1991 and in 1993 the Foundation for the European Congress on Extra-Corporeal Circulation Technology was founded.

The European Board of Cardiovascular Perfusion is comprised of representatives from the perfusion societies of several European countries with the support of the European Association for Cardiothoracic Surgery (EACTS), the European Society for Cardiovascular Surgery (ESCS) and the European Association for Cardiothoracic Anaesthesiologists (EACTA).

Officially the EBCP is represented by the Chairman, the General Secretary and the Treasurer. In addition, there is a Certification Subcommittee and an Accreditation Subcommittee which form the Academic Committees of the Board.

The objectives of the EBCP are:

- to establish the equality of standards in education and training in perfusion ;
- to establish essentials and guidelines;
- to develop an advanced level of education and training program for perfusion trainers;
- to establish the common perfusionists certification program in Europe;
- to issue a European certificate of competence in perfusion; and
- to liaison with the European Commission to legalize these objectives.

Figure 1

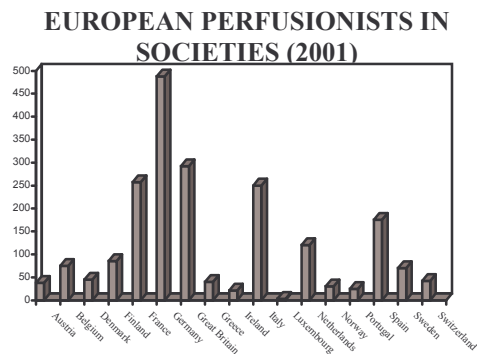


Figure 1 represents the perfusionists in Europe divided for nationality and national recognition. A total of 1800 perfusionists worked in 429 heart centers in the year 2001 in the European Union performing approximately 320,000 cardiopulmonary bypass procedures.

In EBCP, 17 European countries are represented and the perfusionists' course structure varies considerably. In eight countries it is considered as an academic level, where as in eight other countries it is a non-academic level. Only in one country has it achieved both levels. The major variations among countries include educational systems, cultural heritage, language and admission requirements.

National recognition of the profession has so far been obtained in the countries of Norway, Denmark, Great Britain, the Netherlands, Austria, Italy and Germany.

Admission requirements are as follows:

Academic:

- cardiac anaesthesiology
- engineer
- physician
- B.Sc.
- B.Sc. N.

Non-Academic

- nurse
- nurse with specialization in intensive care/anaesthesiology
- laboratory assistant
- radiology technologists/assistants
- medical technician

In France, Germany, Greece and Switzerland on-the-job training is still being performed. Basic university degrees exist in Italy and Germany. The majority of the countries have postgraduate training either on the academic or non-academic level. Such courses are being held or developed in Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Ireland, Netherlands, Norway, Portugal, Spain, Sweden and Switzerland.

In the European Union, the recognition of professional training among countries is governed by Directive 89/48 EEC for higher education with at least three years of education and training and Directive 92/51 EEC for other levels of education and training. The basic principle established that " a person fully qualified to exercise a profession in one Member State is assumed to possess the necessary qualifications for exercising the profession in another Member State." However, there are problems with these directives, for example, for activities reserved for certain professions. Professions may have the same title, but different fields of activity and professions may have the same title but different levels, such as nursing.

The Bologna Declaration was important to unite European perfusionists in their desire for equality of standards in both their training and professional status. It acknowledges the potential increase in labor mobility emerging with the European integration process.

The Bologna Declaration was important because it established:

- common framework of readable and comparable degrees;
- introduction of undergraduate and postgraduate levels in all countries;
- ECTS- compatible credit systems (including life-long learning activities);
- European dimension in quality assurance; and
- elimination of obstacles to free mobility of students.

Finally the new challenges of the EBCP are:

- new fields of application for CPB and perfusion technique;
- new clinical tasks for perfusionists;
- enlargement of the European Union;
- recognition of profession in all EU countries;
- exchange of students between EU countries;
- exchange between continents; and
- common perfusion education curriculum.

The other important society in Europe is FECECT (Foundation for the European Congress on Extra-Corporeal Circulation Technology). It was founded in 1993 to develop activities aimed at promoting the international exchange of knowledge relating to clinical experience and the results of scientific research.

The Executive Board of FECECT consists of the President, General Secretary, Treasurer and the Assistant Secretary. In addition, there are Organizing and Scientific committees. These positions are made up of delegates from the European Community (EC) and the European Free Trade Association (EFTA). The periodic organization consists of an international European Congress in the field of ECC and related subjects every two years.

The 10th European Congress will be held in Funchal, Portugal from June 11th to 14th, 2003.

The Situation in Italy

In Italy there are 107 public and private cardiac surgery departments and there is a yearly increase in the number of ECC cases of about 8%. Approximately, 250 perfusionists work in these departments and about 90% of Italian perfusionists have successfully completed the exam of the European Board of Cardiovascular Perfusion. Most of them, presumably, will apply for recertification this year.

The increase in the number of extracorporeal circulation procedures, in Italy from 1998 to 2001 can be seen in Figure 2. The numbers of transplantations in Italy for 2002 were:

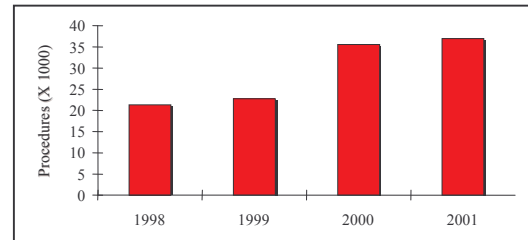
- heart 310
- liver 830
- lung 58
- heart-lung 1

The Italian geographical distribution of cardiac centres is throughout the country but a greater number

are located in Northern Italy and are divided into public, university and private institutions.

Figure 2

ACTIVITY IN CARDIAC SURGERY IN ITALY



Conclusion

Perfusionists are specialists in the field of ECC who mainly work in departments where cardiac surgery is practiced. They are highly responsible for the ECC during the surgical procedures in which heart/lung function is taken over by a heart-lung machine. They are professionals medically educated and trained in the science of ECC. Perfusionists work closely with surgeons and anesthesiologists. They are important members of a team, whom must ensure a safe management of physiologic functions during operative procedures.

The perfusionist independently decides which devices ensure a safer ECC. During the ECC the perfusionist is responsible for records and analysis of ECC data in order to maintain correct patient's homeostasis.

Under ANPeC guidance, many objectives have been reached and many tasks fulfilled but yet further improvement can be achieved in the field of recognizing a full autonomy to the professional figure of the Italian perfusionist.

Since the time the first school was established, 28 years ago, much hard work has been carried out to give to the Italian perfusionists the role and the acknowledgement that belong to this figure in the field of the Italian medical structure.