

The Columbus of cardiovascular surgery. A tribute to Francis Fontan (1929–2018)

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The Fontan operation is an eponym given for the final palliation in patients with a structurally or functionally univentricular heart. However, for the average Frenchman the family name *Fontan* is not associated with medicine, but with sport. Francis' father, Victor Fontan, was a professional cyclist and frequent competitor in the *Tour de France*, *Giro d'Italia*, and *Volta a Catalunya*. He can be seen in a photograph (Fig. 1) from that period, in which the crowds applaud Victor Fontan as he runs along the route of the *Tour de France*, carrying a bicycle with broken front forks on his shoulder [1].

Francis Fontan was born in 1929. At the age of 17 he was admitted to the Faculty of Medicine of the University of Bordeaux. He recalled that his main problem was not studying, but the acquisition of food (food stamps in post-war France existed until 1948). After six years Francis Fontan became *l'interne des hôpitaux* for the next five years, after which he received a gold medal for outstanding doctors. In the third year of his internship he chose a specialisation and the recently established Cardiac Surgery Clinic. The application of cardiopulmonary bypass was the topic of his doctoral thesis.

Francis Fontan became interested in the problem of tricuspid atresia after his experience with a teenage boy who died because of this defect. He was asked to perform a post-mortem examination of the patient and write a case report, which served as a contribution to the debate on the possibilities of surgical treatment of this defect. The text appeared in print in French (*Sur un cas d'atresie tricuspidiennne*). A year later, in the same journal, a review work was published under the title *L'atresie tricuspidiennne et son traitement chirurgical*. Research conducted as part of this text's publication led Francis Fontan to familiarise himself with a cavopulmonary shunt technique (Bakulev procedure, Glenn and Patino shunt).

In 1965 Francis Fontan established the first homograft bank in Europe. Three years later he became the head of the Cardiology Clinic of the University of Bordeaux, where he performed the eponymous procedure. Fate once again put

before him a patient with tricuspid atresia; this time it was a young woman. Cardiac surgery at the time could not offer much: either the Blalock-Taussig shunt or the Glenn shunt. Francis Fontan decided to attempt to return to the surgical procedure he once performed on dogs. The absence of a favourable outcome of his own experiments did not discourage him. The woman survived. Despite this success, Francis Fontan did not describe the case. Two years later he came upon another patient: a 30-year-old woman with tricuspid atresia. Both of these cases were published in a French journal in 1971. While Fontan waited for his article to be accepted for print, he performed another surgery. Unfortunately, it was unsuccessful. A post-mortem examination of the patient revealed pulmonary hypertension. The three cases were published in *Thorax* in 1971.

It was a breakthrough in the treatment of patients with so-called single functional ventricle. The appearance of the article in an English-language journal gave publicity to the method. Soon there emerged the first cardiac surgeons who introduced modifications to the Fontan procedure. Some changes were also introduced by the author himself. In 1977 Francis Fontan, along with Alain Choussat, formulated a list of morphological and haemodynamic criteria (the Decalogue) that were then considered a sine qua non for producing a positive outcome of the procedure. The next step was the conception of a total cavopulmonary connection (TCPC). In 1988 Marc de Leval proposed the intracardiac tunnel variation of TCPC. Another interesting innovation appeared in the form of an extracardiac tunnel, introduced two years later by Carl Marceletti (extracardiac Fontan). Years passed, and the Fontan procedure gained popularity. The author received many honours and was granted honorary member status in multiple societies.

Francis Fontan was the first person in France to perform the Senning procedure, he also performed the fourth heart transplant in France. He had the opportunity to meet the biggest giants of cardiac surgery: Ross, Cooley, Kirklin. His own

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Figure 1. Victor Fontan (Francis' father) and his damaged bicycle during the *Tour de France*, 1929 (courtesy of Gaby Gibert-Fontan)



Figure 2. Prof. Francis Fontan (courtesy of Prof. Jane Somerville)

name has become a widely used eponym: *Fontan procedure*, *Fontan circulation*, *Fontan palliation*, *Fontan physiology*, *failing Fontan*. He considered the founding of the European Association for Cardio-Thoracic Surgery (EACTS) his greatest success. Nowadays EACTS offers several awards, the highest of which is The Francis Fontan Prize, established during the lifetime of its patron (a rare occurrence), for training at a chosen European centre.

This son of a cyclist (Fig. 2) liked golf and good wine, as expected from a native Frenchman and a resident of Bordeaux. He emphasised the support he received from his father and which he later strived to provide to his children (Marie, Edouard, and Etienne). As a retired man he had time to devote himself to his hobbies — playing golf and travelling with his wife, Maryse. For several years he had been involved in the renovation of Chateau l'Ermitage in Preignac (near Bordeaux). The apple in his eye was his Sauternes vineyard. His products were awarded Prix d'Excellence during wine festivals.

In 2016, a 313-page book entitled *Columbuses. Cardiology in eponyms* was published in Poland [2]. The work tells about the genesis of eponyms most commonly used

in cardiology. One of the 51 chapters is devoted to Francis Fontan, who at that time was one of the few survivors of cardiac eponyms. Professor Fontan received this book with a personal dedication from the author. Isaac Newton, the famous 18th-century physicist, is known to have said “*If I have seen further than others it's only by standing on the shoulders of giants*”. Modern cardiac surgery owes its origin to the giants — the pioneers of cardiovascular surgery, the Columbuses, who have discovered the new fields of cardiac surgery. Francis Fontan was one of them. He opened a new chapter in the history of medicine.

Francis Fontan died on January 14th 2018 aged 88 years and was buried with his father, Victor, in the cemetery of Nay, in the foothills of the Pyrenees.

Conflict of interest: none declared

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