

Patient Stories

A Bloodless Coup

World's First Adult-to-Adult Live Donor Liver Transplant Without a Blood Transfusion

Some said it could not be done. Others simply refused to attempt it. But Bill Jennings needed a liver transplant and he needed the procedure to be performed without the transfusion of blood or blood products. Neither his end-stage liver disease nor his religious beliefs as a Jehovah's Witness would allow for anything less.

Jennings already had a donor lined up: his older brother Scott, who was both able and willing. The problem was finding a doctor who would give Jennings a chance at a normal and healthy life while still respecting his religious convictions.

For Jennings, then 44, the father of two and owner of a computer business in Parker, Arizona, this was yet another bump in a road that had begun 20 years earlier with a diagnosis of primary sclerosing cholangitis or PSC. This rare, debilitating disease is associated with a narrowing and inflammation of the liver's bile ducts, eventually leading to cirrhosis of the liver. No one really knows what causes PSC and its resulting cirrhosis--a lack of understanding that frustrated Jennings, who does not smoke and only drank alcohol in moderation. And the only known cure is liver transplantation.

By the beginning of January, 1999, Jennings' condition had taken a turn for the worse. His disease had progressed and he had developed severe jaundice, his light skin taking on a deeply tanned hue. He could no longer work in his computer shop, and could neither sit nor stand for long periods of time. He then contacted three liver specialists in Northern California, where his mother lived. All declined to perform a bloodless version of the transplant he so desperately needed.

Finally, a family friend from Orange County who was a member of the L.A./Orange County Hospital Liaison Committee for Jehovah's Witnesses pointed Jennings in the direction of Randy B. Henderson, manager of the USC Transfusion-Free Medicine and Surgery Program. Henderson set up an appointment for Jennings to see hepatobiliary specialists **Rick Selby, M.D.**, and **Nicolas Jabbour, M.D.**

On June 15, 1999, Jennings and the USC team made history by taking part in the first-ever live donor liver transplant without a transfusion of blood or blood products.

The Power of Their Convictions

Jehovah's Witnesses are prohibited from the use of blood and blood



▪ [Home Page](#)

Areas of Expertise

- [Bloodless Surgery](#)
- [Liver Transplantation](#)
- [Live Donor Liver Transplant](#)
- [Liver Surgery](#)
- [Pancreatic Surgery](#)
- [Gallbladder/Bile Duct Surgery](#)
- [Portal Hypertension Surgery](#)
- [Radio Frequency Ablation](#)
- [Endoscopic Retrograde Cholangiopancreatography](#)
- [Pediatric Surgery and Transplant](#)

Information for Patients

- [Transplant Patient Guide](#)
- [Long-Term Transplant Care](#)
- [Patient Support Groups](#)
- [Financial Considerations](#)
- [Liver Glossary](#)
- [About the USC University Hospital](#)

Features

- [What's New](#)
- [Research and Development](#)
- [Calendar of Events](#)
- [Liver Newsletter](#)
- [Downloads](#)

General Information

- [Faculty and Staff](#)
- [Web Links](#)
- [Site Map](#)
- [Contact Us](#)

Search this site

products because of their acceptance of the Bible as "the inspired word of God," explains Henderson. "Based on several passages in both the Old and New Testament that refer to 'eating' blood and 'abstaining' from blood, they do not accept whole blood or major components—red cells, white cells, platelets or plasma."

But Jehovah's Witnesses are not the only people who are interested in, or even demand, bloodless alternatives. An increasing number of people are rejecting the use of blood for an increasing number of valid reasons. In addition, notes Jabbour, who is both medical director of the Program and associate director of abdominal organ transplantation at USC University Hospital, there are an increasing number of reasons for physicians themselves to consider bloodless alternatives, even if the patient has no objections to the use of blood products. "Blood products are useful but carry their own set of risks," says Jabbour. "Thus, whenever we can avoid using them, we should not only in Jehovah's Witness patients, but in every patient."

Bill Jennings was lucky in that he had the luxury of time. He needed the transplant, of course, and he needed it quickly. But there was time enough to build up his blood levels—in particular, his stores of red blood cells—so that his body could afford to lose some blood during what was sure to be a risky surgery.

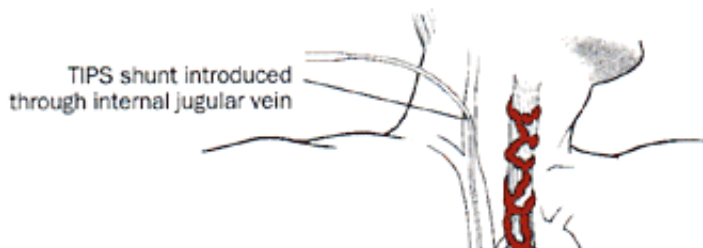
Blood has three main cellular components: red cells, white cells and platelets. The percentage of red cells in the blood is measured by hematocrit levels: The normal hematocrit value in an adult man is around 45 percent. Jennings' had dropped to as low as 17. Before they would operate, the USC surgeons wanted to see that boosted to the 45 percent range.

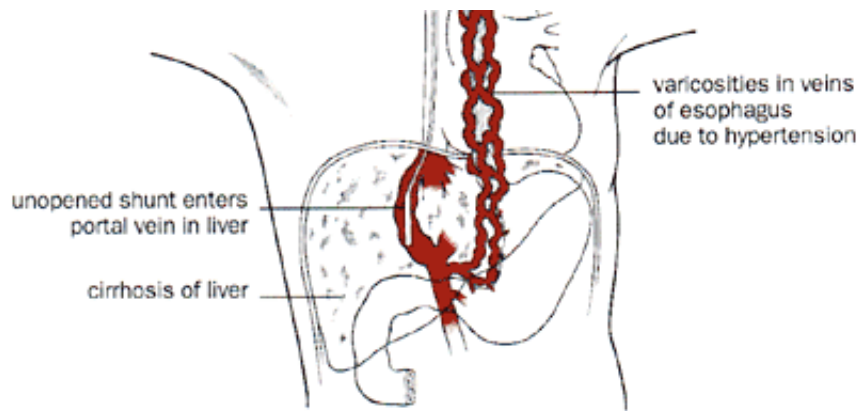
Several things were done to increase his levels. First, blood tests were used sparingly. Second, Jennings was given supplemental iron and folic acid, and a synthetic medication similar to erythropoietin, a hormone-like substance produced by the kidneys that stimulates the bone marrow to produce red blood cells. Those synthetic medications, Epogen or Procrit, are like naturally produced erythropoietin and have the same effects.

The interventional radiologists, led by Michael Katz, M.D., also placed a transjugular intrahepatic portal systemic (TIPS) shunt inside Jennings' liver. Patients with advanced liver disease tend to have dangerous increases in pressure in the veins flowing into the organ; because of the increased pressure, these vessels tend to bleed. A TIPS shunt decreases the pressure in the portal vein, reducing the risk of bleeding both before and during surgery.

Used all together, these techniques were a rousing success. By the day of his surgery, Jennings' hematocrit levels had hit 45 percent. He was ready to go.

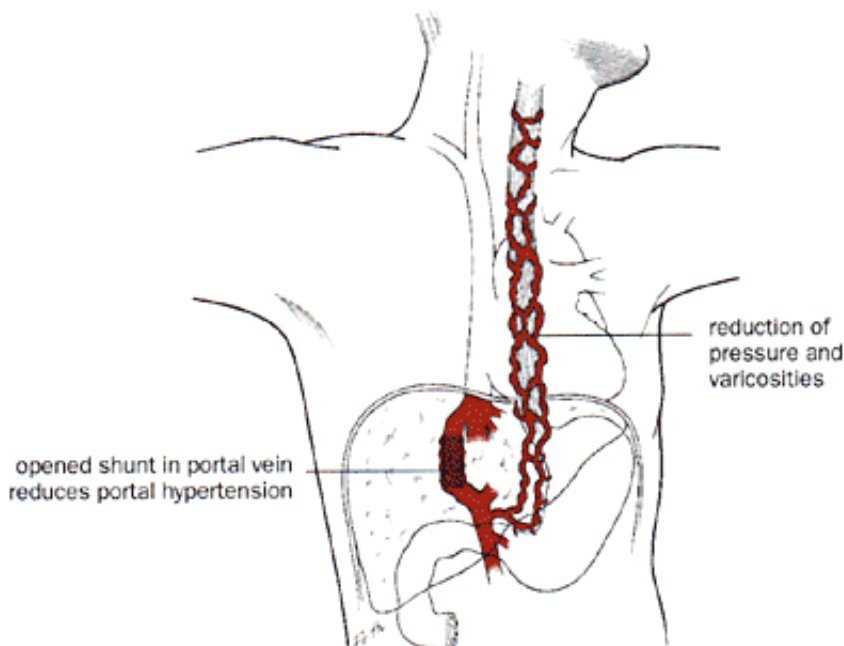
Transjugular Intrahepatic Portal Systemic Shunt (TIPS)





Above: To lower the risk of bleeding both before and during surgery, a transjugular intrahepatic portal systemic (TIPS) shunt is inserted into the portal vein in the liver via the internal jugular vein.

Below: The shunt reduces pressure in the portal vein and in distended veins--varicosities--nearby.



Assisting With Anesthesia

Getting Jennings' hematocrit levels up high enough was only the first step in ensuring a successful procedure. The next step was to have a series of reliable and efficient blood management techniques to deal with the inevitable bleeding during the surgery—a task that fell to a USC anesthesiology team of Earl Strum, M.D., Pajesh V. Patel, M.D., and Duraiyah Thangathurai, M.D.

One of these techniques is an approach called acute normovolemic hemodilution, in which the patient's whole blood is collected immediately prior to surgery, and the rest of the blood is diluted with non-blood products such as normal saline or other intravenous solutions.

"Consequently," notes Patel, an associate professor of anesthesiology, "if the patient bleeds during surgery, he is bleeding diluted blood." Once the operation is completed, the patient receives the concentrated blood that

was collected prior to surgery.

But because Jehovah's Witnesses do not donate or store their own blood, this technique needed to be tweaked in order to be used in the Jennings transplant. To address this, Strum--who serves as interim chair and associate professor in the Department of Anesthesiology, and also holds an appointment with the Department of Orthopaedics--used an innovative device that keeps the collected blood in circuit with the patient. "Since there is still a connection with the body, the collected blood can be transfused back into the patient," Strum notes. "This allows Jehovah's Witness patients to observe their religious beliefs concerning blood products."

A second useful technique involves a device called a "cell saver." A cell saver does precisely that: It collects the patient's blood as it is lost during surgery, cleans it and returns it to the patient. This is acceptable to most Jehovah's Witnesses, says Henderson, because, like the bypass procedure, it "can be viewed as an extension of their circulatory system. The belief is that since the Bible does not specifically comment on these products or equipment, it is left up to each individual to make a conscientious and informed decision."

Finally, doctors working on a bloodless procedure like Jennings' can give the patient drugs to reduce his blood pressure. This is called hypotensive anesthesia, explains Thangathurai, a professor of anesthesiology who also holds appointments with the departments of surgery and urology. Lowering blood pressure decreases the amount of bleeding that results when blood vessels are cut. "This approach has been especially effective in urology cancer patients," notes Thangathurai.

The Careful Cut

Jennings and his brother, Scott, underwent surgery on Tuesday, June 15th, at 7:30 a.m. The transfusion-free surgical team, under the leadership of **Selby, Jabbour** and **Yuri Genyk, M.D.**, first removed a segment of Scott's healthy right liver lobe along with the vessels supplying blood to that segment. Jennings' diseased liver was then removed and replaced by the donated healthy segment.

"Bloodless surgery does not require any special instrument or fancy technical changes," Jabbour explains. "All it requires is being meticulous as far as preventing blood loss when we are dissecting the tissue, and knowing how to control the bleeding decisively using sutures and electrocoagulation. Contrary to the image of the 'macho, aggressive, fearless' surgeon, one must be precise and gentle."

"We take our time when performing these major surgeries, including liver transplantation and liver resection," adds Selby. "Through a very careful, calculated approach, we can control the blood flow. Both Scott and Bill Jennings came through their surgeries beautifully. And just eight weeks later, Selby reported, both liver halves, through the organ's natural regenerative ability, had grown to normal size.

"I received excellent care from the surgical team," Jennings said in an interview following the surgery, "and was extremely impressed with their skill and willingness to treat me while respecting my religious convictions."





Related links:

- [HSC Weekly article, August 13, 1999 - PDF file, 156kb](#)
- [Live Donor Liver Transplant Home Page](#)
- [Bloodless Surgery Home Page](#)
- [USC Liver Transplant Program Faculty & Staff](#)



USC Liver Transplant Program and Center for Liver Disease
1510 San Pablo Street, Suite 430, Los Angeles CA 90033-4612
Phone: (323) 442-5908 Fax: (323) 442-5721
E-mail: uscliver@surgery.hsc.usc.edu