

# TULSA WORLD

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World Staff Photo by Ron Hart

Jim Lawson, a Red Cross volunteer, examines frozen blood samples at the Red Cross laboratory.

## Tulsa Volunteer Becomes Blood Expert

By CATHY MILAM  
Of the World Staff

A local volunteer at Tulsa Red Cross has become an expert at unraveling the complex mysteries of the red blood cell.

Jim Lawson, a geophysicist who works as a seismologist at the Oklahoma Geophysical Observatory at Leonard, has devoted his "leisure" time over the past 15 years in logging and researching rare blood factors.

While many people know whether they have type-A positive or O-negative blood, few laypeople realize those classifications offer a very limited description of inherited factors that lie on the red blood cell.

"The ABO system accounts for only four or five factors that reside on the red blood cell ... the

RH system (whether your blood is 'positive' or 'negative') accounts for about another 40 blood group factors," Lawson explained.

"But there are about 600 known blood factors, so you can see there's a lot more to it than most people realize," Lawson said.

Most of the time, these other factors have no impact on the health of individuals, but in the case of an individual requiring a blood transfusion, a factor that may appear in only a tiny percentage of the population can mean the difference between life and death.

Lawson recalls one case in which he struggled until 3 a.m., trying to discover why the structure of one woman's red blood cells refused all attempts at finding a match.

"It was a woman who had re-

ceived only one unit of blood previously. That transfusion unfortunately gave her hepatitis, but it also gave her something else," Lawson said.

"Six or seven years ago, she was admitted to a small hospital in southeast Oklahoma, requiring emergency surgery. She was A-positive, which should have posed no great problem. But when the technician in the hospital tried to cross-match her blood with the units on the hospital's shelves — every time the donor blood was introduced it fell in a clump to

the bottom of the tube," Lawson said.

Realizing that some factor was preventing a cross-match, the woman was flown by airplane to Oklahoma Osteopathic Hospital in Tulsa, where the hospital's technicians began seeking a match from their stored blood units. No luck.

Lawson was called in to try to test the woman's blood to see which factor was being attacked by antibodies produced by her red blood cells. He said he exposed the

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woman's blood to about 50 different factor-sera before finding the correct one — anti-Rautenberg.

"This woman tested negative to the Rautenberg factor, which is carried by only about 1 out of 4,000 individuals," said Lawson.

Red Cross officials were able to obtain the negative Rautenberg blood from its national headquarters in Washington, D.C., and the woman's life was saved, he said.

Mapping the face of the red blood cell and its 600 factors is an integral part of understanding the chemical communication system that fuels life. Lawson's work at Red Cross headquarters may help an immunologist halfway around the world unlock the secret of the body's method of warding off disease.

Lawson speaks with a precise, technical manner of a professor. But his enthusiasm for the subject of the red blood cell is that of an explorer.

"People with type A or B blood have a million copies of sugar chains imprinted on the surface of each blood cell. An individual with type O has another substance," he explained.

"... O-type blood is called the universal donor blood because the body doesn't produce an antibody to the (surface substance), whereas a person with O-type blood — if he were given type A, would produce antibodies to the sugar chains. The antibodies would tag the A red blood cells for destruction ..." Lawson said this attacking of the A red blood cells would cause the injured cells to clog the kidneys of the O-patient, and cause a form of clotting throughout his vascular system — probably causing death.

Lawson explained that for each of the 600 known factors, a patient registers either negative or positive. A problem only occurs when a patient is "negative" for a particular factor, is exposed to blood that is positive for that same factor and produces antibodies for that factor. If, later, the patient is again exposed to blood containing the positive factor, the already created antibodies will attack the "foreign" red blood cells, triggering a serious — and sometimes fatal — reaction.

The names of dozens of heretofore unheard of blood factors roll off of Lawson's tongue —

Kell-negative, Duffy-A, Kidd-A. Many of the negative factors appear in only one person out of 1,000.

Although some of the factors cut across all racial and geographical lines, others seem to occur frequently among some racial groups, while being very rare in others.

One racial-linked blood factor is DIB or Diego B, which occurs primarily in Asiatics and American Indians.

Lawson said most of the time researchers are unable to unravel why various factors became a part of the body's chemistry, but in one case — with factors Duffy A and B — the reason has become very clear.

"Among white or American Indian people, nearly everyone is positive for both A and B, but among American blacks, about 60 percent are negative for both Duffy A and Duffy B," Lawson said.

"In West Africa, about 98 percent of the population is negative for both A and B. Contrast that to the fact that only about four white individuals have been identified who are negative for both A and B," he said.

Lawson said researchers at the National Institute of Health developed a system for recording how one strain of malaria first surrounds and then attacks the red blood cell.

Coupling their results with a second study, the NIH scientists discovered that when the red blood cells of individuals who were negative for both Duffy A and B were attacked, the malaria would attach to the cell and then drop off.

"They discovered that red blood cells that were negative to both Duffy A and B were completely resistant" to that strain of malaria, Lawson said.

Lawson said scientists hypothesize that a mutation occurred in West Africa centuries ago, producing one or more children with the negative Duffy A and B cells. "And in a relatively short period of time — perhaps 40 or 50 generations the offspring of those children were so successful in surviving in the malaria-prone region that virtually all of the inhabitants of the region were soon carrying the negative A and B inheritance."