# NOUVEAU PROCÉDÉ PRATIQUE DE LA TRANSFUSION DU SANG

## By: L. de BELINA

### A TRANSLATION BY PHIL LEAROYD

A copy of the paper 'New practical method of blood transfusion' by Mr. L. de Belina, published in 1869 in the journal *Comptes rendus hebdomadaires des séances de l'Académie des sciences* [reference: Volume 79, Number 14, Pages 765-768] can be read or downloaded from the following site:

https://gallica.bnf.fr/ark:/12148/bpt6k30260/f767.item

NOTE: Although the name of the author of this paper is stated to be 'Mr. L. de Belina', he is identified in the title page of his book* published in the same year as being 'L. von Belina-Swiontkowski'. The author's surname has been given various interpretations in other texts, including Ladislao de Belina and L. Belina-Kwiatkowski, as well as the more frequently used L. de Belina or L. von Belina.

* 'Die transfusion des blutes in physiologischer und medicinischer beziehung' (The transfusion of blood in physiological and medical terms) – see:
https://wellcomecollection.org/works/xyaxdznu

NOTE: This same device is described and illustrated by Belina in exactly the same manner (virtually word for word) in an earlier paper published in 1868 in German, which was prior to him using it for an actual transfusion - the reference for this paper is as follows:
Belina-Swiontkowski, Dr v. (1868) Ein neuer transfusionsapparat [A new transfusion apparatus.] *Wiener Medizinische. Wochenschrift*. 44, 713-714.
https://books.google.co.uk/books?id=RZfOMPMsoY4C&pg=PA739&source=gbs_selected_pages&cad=1#v=onepage&q&f=false

This paper describes Belina's first transfusion device which is designed to be used with defibrinated blood. As identified above, this same device is also described in an earlier paper (in 1868) as well as in his book identified above (in 1869), together with a number of transfusion devices designed by different people. NOTE: I have also translated the section (pages 101-125) of this book that contains this information into English – see separate document.

Having identified what he considers to be the necessary requirements of the 'ideal' blood transfusion apparatus, the author describes his indirect transfusion device and how it works, developed by him (based on an idea by Dr Helmholtz) that utilises compressed air (rather than a syringe plunger) to infuse defibrinated blood.

Two transfusion cases using this device are then briefly described together with some deplethoric transfusion experiments on animals.

I have produced a translation of this paper from the original French into English to enable its content to be appreciated by a wider audience. Whilst I am aware that instantaneous computer generated translation is available, this process struggles with accurately reading the original text and interpreting specialist terminology, as well as producing a 'colloquial

style' not always representative of the original text. In addition, an 'automatic translation' may either purposely or inadvertently alter the wording to 'make it read better' but in doing so there has to be an element of interpretation involving something on the lines of 'I believe that this is what the author is actually trying to say'. I want to avoid that as much as possible and try to present what the author actually wrote and as a result the reader may find that the English text does not 'flow' as well as it could. Although I have taken great care in accurately identifying the original text and producing a true representative translation of the author's original wording I cannot guarantee that this work does not contain 'translational errors' and the reader is recommended to check specific details against the original text.

## Dr. LADISLAO DE BELINA-SWIONTKOWSKI (1840 – 1889)
## BIOGRAPHICAL INFORMATION

After he received his initial education at home, then at the high school in Warsaw, he started medical studies in Berlin in 1856, but in 1859 he moved to Krakow. However, after signing a petition to Emperor Franz Joseph demanding the introduction of Polish as a language of instruction at the university, he was expelled from Krakow and returned to Berlin, where he continued his studies. Because he joined the Polish independence movement, he was also expelled from Berlin in 1863 by the Prussian authorities. He moved to Heidelberg and continued his studies at the University Karol Rupert in 1864, primarily under the supervision of the famous physiologist Herman von Helmholtz. There he obtained his doctorate in December 1867 with a thesis on blood transfusion. This was subsequently published with the title 'Die Transfusion des Bluts in physologischer und medizinischer Beziehung' in 1869 in Heidelberg.

In 1869 having presented his theses in the field of midwifery and thereby obtained the right to lecture at the university, he asked for six months leave to conduct research in France, and never returned to Heidelberg. In 1870–71 he became a military doctor in the 119th Infantry Regiment of the French Army and participated in the war with the Prussians. Based on the collected materials about other people's attempts at blood transfusion and his own experience in this field, he devised his own transfusion device which he presented to the French Ministry of War in 1870. He remained in Paris until 1874, when he left for Mexico, where he intended to conduct further research and where he remained, perhaps as a result of his marriage, but although he published several articles between 1878 and 1882 these were not on the subject of blood transfusion. He died of typhus in Mexico City in 1889.

## NEW PRACTICAL METHOD OF BLOOD TRANSFUSION
## Mr. L. de Belina

The main causes of the failure of blood transfusion and, consequently, of the discredit into which this system has fallen in France are: the use of non-defibrinated blood, the failure to measure the quantity of blood to be used and finally the imperfection of the instruments and operating procedures.

The use of non-defibrinated blood inevitably causes coagulation in the tubes of the device; then either the transformation becomes impossible, or clots can be introduced into the vein, and the operation becomes dangerous and even fatal. If the clots are too large, obstruction of the pulmonary artery and immediate death; if death is not immediate, it may come from an embolism produced by the deposit of clots in any part of the circulation.

Fibrin is not an essential part of the blood and can be removed from it without inconvenience; moreover, the operation that is performed to defibrinate blood has the advantage of saturating it with oxygen and ridding it of carbonic acid.

As to the quantity, either too much blood or too much at the same time has often been used; hence an influx to the heart, consequential paralysis, or at least dangerous congestions in different regions of the body.

Up to now, at least twenty different devices have been invented, without any one satisfying all the required conditions. These conditions are:

1° That the device can be kept in a state of perfect cleanliness;

2° That its capacity is sufficient to contain the necessary quantity of blood, and that it can be handled easily and precisely;

3° That it is possible to keep the desired temperature in blood;

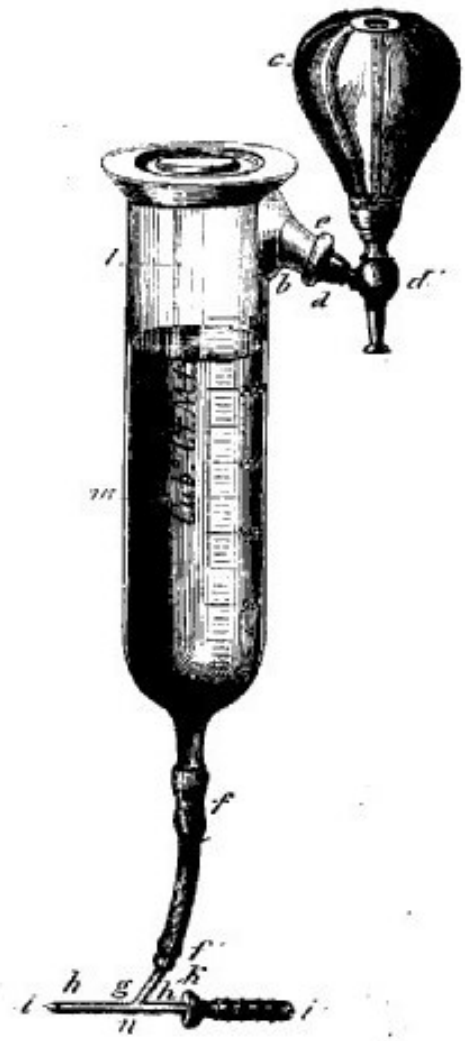
4° That the introduction of air bubbles into the vein is made impossible.

I have built a device which seems to me to meet all the above conditions. The attached figure represents this device. It is, as we see, an oblong, graduated bottle, which can hold 250 grams. At the opening of tube *b*, a compressed air pump is placed. This pump is composed of a black rubber balloon *c* and an accessory part with two ball valves near *d* and *d'*. The balloon can be easily held by hand; its diameter is about 6 centimetres. The opening of the accessory tube of the compression pump, which is 2 centimetres long, is, near *e*, covered with thick gauze, folded in half, to retain dust and organic germs suspended in the air. The neck of the bottle *f* is joined, by means of a tube of black rubber *ff'*, 5 centimetres long and 6 millimetres thick, to an infusion trocar constructed according to my instructions. This trocar is composed of two silver pipes; connected to each other, and a stylet. The first pipe *f'g*, 2 centimetres long, discharges at almost right angles, with a slight inclination, into the other pipe *hh'* 5 centimetres long. The thickness of both pipes is about 2 millimetres. The stylus *ii'* adjusts with gentle friction with the pipe *hh'*. The tip, triangular in shape, protrudes 5 millimetres from the opening of the silver pipe. Near *k*, a spring is placed, which relaxes, when the stylus is removed, in a groove located on the stem thereof, and, in this way, prevents it from being able to be removed further.

In order to avoid too great a variation in the temperature of the blood, especially if it is necessary to inject very slowly, and if the temperature of the patient's room is not very high, the bottle may be provided with a woollen blanket; a notch has been provided, which allows the quantity of blood supplied to the patient to be given on the metric scale engraved on the bottle.

The transfusion is carried out in the following way: we begin by defibrinating the blood, using a twisted glass stick; then it is filtered through a thick cloth; then it is introduced through the opening *b* with a glass funnel. The opening *b* is closed with a black rubber stopper and the flask is placed in a bath of water heated to 40 degrees.

After bandaging the patient's arm, as if for a bloodletting, the median vein is uncovered, by making a 1 centimetre long cut. The flask is removed from the water, dried; then, holding the collar down, pull the rubber plug and insert the decompression pump.




The stylet is then withdrawn up to *n*, and the blood expels all the air contained in the trocar tube in the direction of *fgh* communication, which is thus restored. When this has been ascertained by seeing the blood flowing through the opening of the pipe, the stylet must be replaced, the blood from the trocar must be wiped off, the flask held by an assistant, and, after fixing the vein with the left hand, the trocar must be inserted into it and the stylet is withdrawn. The band is then removed from the arm; the trocar is held in place by the assistant; then taking the bottle with the left hand, the compression pump is handled with the right. Each pressure on the pump ball brings about 40 to 50 grams of air into the space *l*; the air is compressed inside and presses on the blood *m*. By handling this ball in a continuous manner and by regulating the flow of blood by the introduction of the stylet, which can be used here as a tap, it will be possible to make the blood flow into the vein in a safe and uniform manner. The operation lasts thirty and forty minutes. As it has been established by experience that the blood drawn and collected outside the subject who supplies it retains all its reviving properties for two to three hours, there is no inconvenience to be feared from the duration of the operation.

This device, which can be easily built anywhere, meets all the conditions previously listed. It is convenient to transport, and the operator only needs one helper, even inexperienced.

This instrument can also be used with utility in infusions and histological injections.

I have used transfusion with the most complete success in two cases. The first is a case of puerperal eclampsia, as a result of uraemia. Here are the details of the observation. A twenty-three year old woman; 33 attacks, coma, insensibility, intermittent pulse, breathing having ceased altogether at times for thirty-six hours, the patient cannot take either food or

medicine, because of trismus; she is abandoned by doctors. I try transfusion. After a preliminary bleeding of 420 grams, I inject 210 grams of the defibrinated blood of a young colleague. Immediately after the operation, regaining consciousness; accesses cease, improvement slow. After three weeks, the cured patient leaves the hospital and is doing well so far. (This took place in the obstetric clinic of Heidelberg, January 1868.)

The second case occurred this very year (April), in Karlsruhe. A Russian lady, Baroness V., following a shock on the railway, was delivered prematurely, of a child asphyxiated by the constriction of the cord. After infusing 30 grams of the defibrinated blood of the mother's placenta into the umbilical vein, I produced a sudden and lasting revivification of the child.

To determine whether deplethoric transfusion could not be used successfully in pyemia, puerperal fever, and diphtheria, I experimented with transfusion on animals which I had previously put in a similar diseased state, by artificial putrid infection, and I obtained, by means of repeated deplethoric transfusions, favourable results. I made these experiments in 1868, in the physiological laboratory of Professor Helmholtz, at Heidelberg.