

DIE TRANSFUSION.

**TRANSFUSIO, TRANSFUSIO SANGUINIS, CURA MEDEANA,
METHAEMOCHYMIA, TRANSPLANTATIO MEDICA NOVA.**

**DIE UEBERLEITUNG DES BLUTES VON DEM EINEN INDIVIDUUM IN DAS
ANDERE.**

By: J.F. DIEFFENBACH

A TRANSLATION BY PHIL LEAROYD

A copy of chapter VIII (pp. 110-120) of Johann Friedrich Dieffenbach's book 'Die Operative Chirurgie', published in Leipzig by F.A. Brockhaus in 1845, which is titled 'The Transfusion' and sub-titled 'The transfer of blood from one individual to another', can be read or downloaded from the following site:

<https://archive.org/details/dieoperativechir01dief/page/110/mode/1up>

The title of the chapter also includes five Latin terms: Transfusio, Transfusio Sanguinis, Cura Medeana, Methaemochymia and Transplantatio medica nova.

Dieffenbach initially provides a short history of blood transfusion in the 17th century. Ignoring the first animal-to-animal transfusion performed by Lower, he starts by providing brief details of the first transfusions to humans performed in France (the first three performed there), as well as the first performed in England, Germany and Italy. The text however includes a number of errors; for example he identifies the French surgeon Emmerez as Emery, whilst when moving on to the 19th century, he credits Doubleday and not Blundell with 'bringing transfusion out of the darkness of oblivion'.

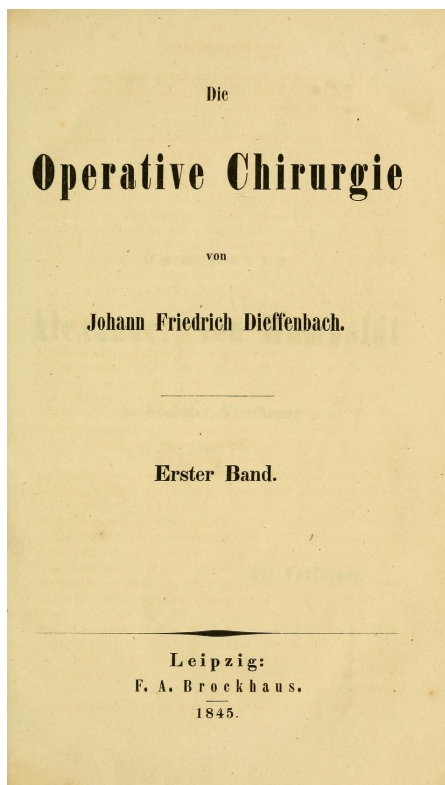
When considering the problems associated with blood transfusion to humans, Dieffenbach makes a number of statements that he does not clarify, for example he makes the comment 'transfusion should be rejected until we know more about the active principle of blood' and 'the wide field of suspicion, belief and hope opens up in transfusion without it being justified by experience', – but then goes on to describe his own (unsuccessful) blood transfusions to a man suffering from rabies and three patients dying from cholera. He does not for example comment on the increasing realisation (in 1845) of the importance of transfusion in the treatment of post-partum haemorrhage.

Although Dieffenbach does not clearly identify the method that he uses for performing his transfusions other than stating that 'fresh human blood was injected', he concludes the chapter by highlighting a number of practical points regarding the performance of an indirect transfusion operation.

I have produced a translation of this chapter of Dieffenbach's book from the original German 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.

The paragraph settings, general layout and the spelling of people’s names within the original document have been maintained in the translation. The chapter does not contain any references and the book does not include a bibliography. I have included, within square brackets, additional translations of the Latin and French text included within the original chapter.



Title page of J.F. Dieffenbach’s book
(Image credit: archive.org)



Johann Friedrich Dieffenbach (1792-1847)
(Image credit: Wikipedia)

JOHANN FRIEDRICH DIEFFENBACH (1794-1847) – BIOGRAPHICAL INFORMATION

Johann Friedrich Dieffenbach was born in Königsberg, Prussia, in 1794, where his father taught philosophy at the Gymnasium. When his father died when Johann was very young, the family moved to Rostock, his mother’s family home. He originally studied philosophy and theology at the University there, but joined the Mecklenberg cavalry in 1813. After his discharge from the army in 1815 he returned home and studied medicine at the University of Königsberg (1816-1820), after which he attended the University of Bonn to devote himself entirely to the study of surgery. Following visits to Paris and Montpellier he received his doctorate at the University of Würzburg in 1822, after which he settled in Berlin, specialising in skin transplantation, plastic and reconstructive surgery. As well as his extensive work on reconstructive surgery of the face, he wrote on a variety of different topics, such as the treatment of urethral stricture (1826), better methods of bandaging (1829) and nursing

(1832). It is during this period that he also researched infusion and blood transfusion, publishing *Die Transfusion des Blutes* in 1828. In 1832, he became an associate professor at the University of Berlin, and in 1840 became director of the Clinical Institute for Surgery at Charite Hospital where he focussed on reconstructive oral and maxillofacial surgery. He died in 1847 in Berlin, being now generally recognised as the founder of modern plastic surgery

Additional information:

https://journals.lww.com/plasreconsurg/Citation/1968/07000/Johann_Friedrich_Dieffenbach_1794_1847_4.aspx

THE TRANSFUSION

**Transfusio, Transfusio sanguinis, Cura Medeana,
Methaemochymia, Transplantatio medica nova.**

THE TRANSFER OF THE BLOOD FROM ONE INDIVIDUAL TO ANOTHER

No operation is more likely to arouse people's curiosity and interest than transfusion, a thousand ideas and questions are linked to the mere idea of an exchange of blood between two individuals.

We now smile at the questions asked by old doctors during transfusions: does a dog get wool after sheep's blood? Does a dog eat herbs? Does he get horns? Does a sheep get bitten by dog blood? Do old women become young again through children's blood? etc., questions which were asked not only by individual men but by entire learned bodies, and which were just as forgivable as the novelty of the discovery of the circulation pointed out, and which, given the smallness of the physiological knowledge, wanted to bring blatant fruits from the doctrine gained.

The story of the transfusion begins with the Egyptian priests, from whom the sorceress Medea is said to have received the first instruction in it. Medea rejuvenated Jason's old father, as Ovid tells us. Marcus Pegelius, a professor at Rostock, is often mentioned as the real inventor of transfusion, but there are no other reasons for this than that he taught the remedies to the sick in an unusual way. Libavius in Halle calls the unknown inventor a common charlatan (1650).

The discovery of the circulation of blood was at the same time an indication of how the operation was to be carried out, and, as noted, it was used to establish many physiological principles, albeit only according to the harsh principles of life at the time. But just as the alchemist sought to make gold, so limited humoral pathology sought to make life and health through blood, and therefore it was equal to gold-making. The infusion is older than the transfusion, but the transfusion was suspected and thought of earlier because it is more poetic, just as poetry is older than prose.

The first of several attempts at transfusion failed. The London Philosophical Society induced the brothers Coxe, Wilkins, and Hock to make experiments, which at first failed, except that of T. Coxe, who bled a pigeon to death and then brought it back to life by the blood of another. This experiment is certainly fictitious as far as success is concerned, for bird's blood coagulates too quickly to be brought to any other small animal. Lower's experiment showed that a dog that had bled to death from the jugular vein could be brought back to life by the blood of two other dogs, the blood being transferred from a large artery through a tube into the jugular vein, as was the case with most experimenters. He recommends the operation especially in gout.

Boyle presented the following problems to Society: whether the transfusion causes a change in temperament? Would a bold dog become fearful through the blood of a timid one? Would he recognize his master again? Could diseases be cured and transmitted in

this way? Does this make a small dog bigger? Would the colour of his hair change afterwards? Can an animal be transferred from one species to another in this way? Is a dog transformed into a sheep, or a warm-blooded animal into a turtle or a fish by cold blood? How will the transfusion affect the pups of a pregnant dog? A large transfusion in various animals carried out by the scientists commissioned for this purpose was associated with the preservation of life, but the expected adventurous effects completely failed to materialize. Too much foreign blood killed and a fox died from the lamb's blood with the greatest suffering.

While the English tried with untiring zeal sought to find new things through transfusion, which was dear to them as a useful application of their property of circulation, the French tried to achieve a quick medical advantage through it. It was Denis, physician, and Emery, surgeon, who in 1667 pursued transfusion with tireless zeal and opposed its numerous enemies. Denis's views on the operation were in part very shrewd, and it is only due to his defective physiology that he thought animal blood to be the most excellent thing for injecting into humans, because animals did not harm themselves through excesses of debauchery or passion, and because their blood could be prepared by feeding, but also because the meat of mammals was healthy for man.

Strong in faith because of such views, Denis made the first transfusion ever performed on a human being on 1st June 1667. The patient was 16 years old, emaciated by a fever, sleepy, anaemic, and the remaining blood was thickened; he had been bled some 20 times. After draining three ounces of blood from a vein in his arm, Denis transfused him nine ounces of blood from a lamb's carotid artery. Afterwards the patient felt a warmth in his arm, became more alert and health was gradually restored. Denis attributed this brilliant success to fermentation and the resulting development of the spirits of life.

The second person to whom the transfusion was performed was a paid palanquin bearer who, after receiving 10 ounces of lamb's blood, felt so well that he was immediately able to drink a lot of wine and could go about his heavy business.

Through the brilliant successes of this new, wonderful operation, Denis acquired enemies from everywhere; in particular Lamy Magister Artium [Master of Arts – PL] rose up against him and attacked him sometimes with the sharpness of his wit, sometimes with scholastic wisdom. But the transfusion had not yet reached its glory period it was now approaching, when Denis and Emery undertook the same on the son of the Swedish minister Bond in Paris. It was only when all the doctors gave written testimony that the patient's death would take place in a few hours that they decided to operate. Six ounces of calf's blood were injected into the dying man, whereupon the pulse increased and the convulsions subsided and consciousness returned. The next morning the operation was repeated, but death occurred on the same day. The autopsy showed a pathological condition of most of the abdominal organs.

Denis and Emery saw a happier success after transfusing calf blood to a crazy valet; although he became very ill afterwards, he recovered after a profuse bloody urination and was apparently less crazy than before. A woman who was paralyzed on one side claims that Denis completely cured her with lamb's blood.

All these results from a few transfusions could not satisfy the exaggerated expectations that people had of it in all countries. It was still the secret or uncanny, the demonic niche, which attracted. It was therefore inevitable that the Paris faculty's reluctance to transfusion and its limited success soon cured the doctors and the public of their dizziness. The decline of the operation followed immediately on the heels of its fame, and it fell not through prohibitions but through its own fall.

In England people were transfused later than in France. In 1667, King performed the operation on a 32-year-old theologian, Arthur Coga, of whom it was said: his brain was a little too warm. Lower calls him *hominem amabili vesania affectum* [a lovable man with a feeling for insanity – PL]. He was given wine before the operation, then bled, and was then given 10 ounces of lamb's blood into his veins. He smoked heavily and drank vermouth wine. When asked why he had lamb's blood poured into him, he replied: *quia sanguis agni habet symbolicam quandam facultatem cum sanguine Christi* [because the blood of the lamb

has a certain symbolism with the blood of Christ – PL]. He was so comfortable that after a few weeks he was given another 14 ounces of lamb's blood, after 8 ounces of blood had previously been taken from him. He remained as he was, and proud of the honour bestowed upon him, he ever since called himself the martyr of the London Philosophical Faculty.

I have shared these observations of greater historical interest from the first brilliant era of transfusion in a little more detail here. Later experiments on humans became more and more economical, while infusion into animals and humans on the other hand became more general. Even if experience had taught us at least some degree about transfusion, it did not extend so far as not to expect the most adventurous things from it. In Germany, for example, Elsholz posed the question: whether a reciprocal transfusion could not reconcile discordant spouses or siblings with each other and make them of one mind?

The first human transfusion in Germany was made by Kaufmann in Küstrin, who transfused lamb's blood into a patient suffering from leprosy. Another with a feeding rash had his condition made worse by the transfusion. Purmann, who assisted, says: the two people had hardly recovered from their sheep-like melancholy in a year and a day.

In Italy, Riva made the first human transfusions in 1668, some with success; following his example, Paulus Manfredus also transfused in Rome. B. Santinelli was zealous against this and exclaimed with Seneca when he speaks of the murder of the gladiators: homo, res sacra jam per lusum et jocum occiditur! [man, a sacred thing is already killed by sport and fun!]

Transfusion became more and more the property of physiology, and Bichat's, Portal's and especially Rosas' experiments are of particular interest. The most numerous and most important transfusions for pathology however were carried out by Viborg with the blood of sick animals into healthy ones, to which the large number of those carried out by Hertwig in the Berlin School of Veterinary Medicine deserve to be placed alongside them.

The ingenious experiments of Dumas and Prevost bear a purely physiological character, but notwithstanding all their efforts, they ascertained no more than the well-known fact that an animal which has almost bled to death is resurrected by the blood of others, and that the blood of animals of different classes has life-threatening accidents, and often brings about death. Transfusion in humans should therefore be rejected until we know more about the active principle in the blood. This will probably take some time, and Patissier finishes the transfusion once and for all with the following words in the Dictionnaire des Sciences Medicales: Nous ne chercherons pas à prouver combien etait ridicule cette operation que l'on a regardée comme devant conduire à l'immortalité: le lecteur doit être assez pénétré des principes de l'economie animale, pour que nous n'ayons pas besoin de lui inspirer de l'éloignement pour ce moyen, dont nous n'avons fait mention ici que pour l'histoire de l'art. [We will not seek to prove how ridiculous this operation was which was considered to lead to immortality: the reader must be sufficiently immersed in the principles of animal economy, so that we do not need to inspire him of the distance for this means, which we have only mentioned here for the history of art. - PL]

While in recent years the French have been testing the infusion in a variety of ways from a physiological and toxicological point of view, Doubleday in England began to bring the transfusion out of the darkness of oblivion, and he practiced it with decisive success on several women who had almost bled to death. His example was followed by Uwins, Waller, Knox, B. Brown, Jewel and others, whose observations I can add to my own very numerous experiments on animals and operations on humans that I carried out a number of years ago.

I did the first transfusion on a hydrophobic man who had been bitten by his mad lap dog. He had a burning thirst, a violent disgust for drinks and shiny objects, and the mere sight of which caused the most violent cramps in the sphincters and throat muscles. All symptoms worsened despite the most appropriate treatment, *Decoct. genistae* had been injected through a stomach pump, &c. A severe bloodletting was performed on the patient's arm and he was transfused with three cups of Dr. Thulemeir's blood. The condition initially improved, but soon the same terrible conditions returned. The next day as the apparitions continued, the operation was repeated; soon afterwards he was able to drink water without reluctance; an hour later he had a violent fit of rage and died. The autopsy showed absolutely nothing abnormal, neither traces of hydrophobia nor of transfusion. – My transfusions on cholera

patients only occurred on ice-cold, blue, pulse-less, almost dying individuals. Fresh, warm human blood could perhaps stimulate the flagging activity of the heart and vessels with the simultaneous use of other stimulating agents. With much effort, two ounces of thick black blood were brought out of the open median vein by stroking the arm of the first pulse-less cholera patient, and then five ounces of fresh, healthy human blood were immediately injected in three batches. A few minutes after the first injection, mild clonic convulsions occurred. After the second injection, made six minutes later, the breathing became deeper, the previously dilated pupil contracted and the eyes became brighter. After the third injection, the pulse was first felt to vibrate slightly, the axillary artery, on which no beat had previously been felt, now showed regular pulse beats with a rhythm of 55-58 beats per minute. Half an hour later the agony began in exactly the same way as it usually occurs in cholera sufferers and without its character having been changed by the transfusion. During the autopsy the blood was found in coagulated masses in the heart and in the great vessels.

– In a 65-year-old woman with cholera asphyctica, whose vein was empty and whose opened brachial artery was also without blood, I transfused fresh human blood into an arm vein in three intervals within 20 minutes. At first all that was noticed in the patient was alternating dilation and contraction of the pupil, then the pulse soon returned in the brachialis, soon also in the radialis. After the second injection, the count was 55-60 per minute, and soon you could feel it on your left arm up to the area of the elbow joint. After 5-6 minutes these regular beats stopped again, and then individual beats were noticed as a slight reverberation, now in this, now in that larger artery. Two hours later the patient died without any convulsions. During the autopsy, black grumous blood and fibrin-cruor clots were found in the heart and larger vessels; some watery fluid in the pericardium; there were no detectable signs at all in the corpse that showed that the transfusion had been carried out.

– In a third case, in a 61-year-old blue, pulse-less patient with great fear of suffocation, I opened several vessels to drain the blood, but no blood came out, then the axillary artery, it was completely empty and one could see into the open tube on both sides. I then brought out a few drachms of thick black blood from the axillary vein by stroking. After the first injection of fresh human blood into the median vein, an alternating dilation and contraction of the pupil was noticed, as was a slight vibration in the radial artery. After the second injection no change, after the third there was a stronger pulse in the right radial artery than in the left. The patient had received a total of about three ounces of blood. Soon afterwards the pulse stopped again and death occurred under the usual symptoms. The autopsy showed the same internal states as in the previous case.

What can be objected to these operations is that little more could be expected from them in such advanced disease with coagulation of the blood in the vessels. On the other hand, it would not have been advisable to undertake the transfusion in persons whose condition gave hope of being cured by milder means.

The importance of the transfusion can be assessed less from a pathological than from a physiological point of view; the result of the transfusions carried out on people is that a number of them, which were carried out on almost dying people as a half-witness of revival, were unable to do this, and that in other cases the operation did not produce any changes in actually healthy mentally eccentric people. That is all: the wide field of suspicion, belief and hope opens up in the transfusion without it being justified by experience.

The many experiments I carried out on animals produced several results that were quite different from those of others, but most closely approximated those of Prevost and Dumas. The following main points are particularly noteworthy.

Mammals that had bled to death could be brought back to life immediately using transfused blood from other individuals of their gender if the operation was carried out without errors and no air or coagulum was transferred.

Arterial blood abolished apparent death somewhat earlier than venous blood.

The animals did not become ill after any of these types of blood, especially if they were infused with a little less than they had lost. If more was transfused, they appeared sluggish and suffering; and the operation sometimes resulted in the loss of urine and faeces.

The symptoms were the same after the direct transfer of the blood or after that by a syringe. It revived blood that had been exposed to the air for several hours, the fibre of which had been removed by beating or made liquid by caustic soda, as good as fresh blood.

The most common symptoms during the operation were alternating dilation and constriction of the pupil, then rapid breathing, initially slow, then accelerated heart and pulse beats. Bowel movements frequent, rarely blood urine. In the case of illnesses after the operation, even of the most dangerous kind, health is quickly restored, though mucous bloody diarrhoea if too much related or foreign blood has been transfused.

Foreign blood also awakened animals that had bled to death, but they always suffered greatly afterwards. Dizziness, difficult respiration, palpitations, skipped pulse, beating of the flanks, initially increased, later decreased temperature of the body, pale, sometimes spotted tongue, swelling of the abdomen and death. The autopsies showed hydropic exudations on all internal serous membranes, withering and pallor of the heart, and dark mottled colouring of the lungs.

Herbivorous animals were less attacked by the blood of carnivorous animals than vice versa; most dogs died when they were revived by sheep or other blood, and little foreign blood made them sick. Urination of blood occurred only after overflowing with a larger quantity of related blood than was withdrawn. Among the mammals, cats were the most sensitive to foreign blood and after a few drachmas of it, died with fear and howling. Young animals on the mother's breast, which are otherwise very insensitive to wounding, died after a few drops of foreign blood, and a whole litter of young kittens succumbed in this way to hydropic exudation on all serous membranes.

The transfusion touches the innermost life and for this reason it is so risky. Blood from birds injected to an ounce, kills larger mammals, but a bird, for example a pigeon, dies from a few drops of mammalian blood with the symptoms of prussic acid poisoning, as it enters the circulatory system.

The blood of animals poisoned from the stomach by narcotic substances does not produce any effects of this kind. Many diseases, especially impetiginous ones, are only rarely communicated to healthy animals through transfusion with the diseased blood.

It would take me too far if I were to cite several more results from transfusions carried out by others and my own on animals and humans, but Burdach, Müller and Magendie have recently paid attention to this subject. Therapeutically, transfusion is probably only recommended for bleeding, which is where Schönlein and Marcinkowsky also recommend it. It should also be tried in the case of apparent death, as Blasius also advises, namely indirect transfusion. Since the direct one can only happen from an artery into the vein, it must not be done in humans.

The indirect transfusion, where the blood previously drained from another person is transferred, is carried out exactly as I described above with the infusion and can be seen there. The vein is exposed through a skin incision, the cell tissue is removed, two threads are wound loosely around the vessel, the vessel is opened between them, a tube is inserted and then the blood from the arm vein of another person is flowed into a warmed vessel, from a warmed syringe drawn in and injected slowly. Just add one to two ounces each time, then take a break again. The whole amount should probably not be more than six ounces.

v. Gräfe has developed his own artificial apparatus, but this cannot be used even in experiments on animals because the tubes are very long and the blood clots in them. The English surgeons, following Blundell's example, use Reed's stomach pump, but an ordinary syringe still has significant advantages.

During the operation, special care must be taken to prevent air from entering the vein. Before inserting the syringe with its short tube into the cannula, which is located in the venous wound, you have to squirt out some blood and not empty the entire syringe so as not to overdo the coagulum.

After the operation is completed, the threads surrounding the vein are removed, the arm is washed with lukewarm water, dried and then the wound is united with plaster strips and a bandage is placed over it.