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NEW VOICES IN MEDICAL ILLUSTRATION

# Hirudo medicinalis: the medicinal leech

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## History

Leeches have been used for medical treatment worldwide for over 2000 years. In 18th and 19th Century Europe, leeching became so popular that the term 'leech mania' was coined. In France alone, 32 million leeches were used throughout 1927, and in Paris there was even a fashion for embroidering leeches on dresses. During this period leeches were almost harvested to extinction.

It is difficult for us to imagine today how blood-letting could ever be considered acceptable practice, let alone for so many conditions – leeches were used to treat rheumatism, syphilis, migraine, tuberculosis and obesity (*Figure 1*). However, in the context of early medical theories bloodletting made sense: the body was believed to be made up of fluids whose correct proportions and movement were thought essential for well-being. Illness was believed to be caused by an inbalance or blocking of fluid, so the patient might be prescribed purging, sweating, vomiting and/or blood-letting to remove the 'excessive' or 'corrupted' fluids, thus restoring the balance and with it, their health.

In medieval Europe blood-letting was not only recommended for the sick but encouraged as a prophylactic, particularly in Spring and Autumn. Benefits were thought to include improved sight and hearing; and sounder sleep and calmness.

There were several techniques for blood-letting: venesection (lancing a vein); scarification and cupping (the application of a hot cup over small cuts, thus creating a vacuum which drew out blood); and stimulation by drugs (such as sanguinaria). However, leeching was the more controlled and safer method. The degree of blood-letting was determined by many factors and, at different periods of history, these included some or all of the following: the patient's gender, age, star sign, the season and the prevailing weather. However, as medical science advanced, leeching was scrutinized more objectively and by 1850 'vampirism' as its critics called it, had more or less died out.

**Figure 1.** *'The Tyrant Heraclet being leeched for obesity' from* Histoires Prodigieuses *by Pierre Boaituau, 1505.* Courtesy of The Wellcome Library.

## Current practice

In the late 20th century microsurgery developed enabling surgeons to replant tissue, such as a severed finger or tip of the nose, and also to transplant free flaps of tissue directly from one part of the body to another. A possible complication following such surgery is venous congestion, caused by the stagnation of venous blood in the replanted tissue. This occurs when tissue has an adequate incoming arterial flow but poor venous outflow, so the blood collects in the reattached tissue. If the blood is allowed to stagnate the replanted tissue will die. Applying leeches is a very effective way of removing the stagnant blood, creating an artificial circulation which gives the body time to re-establish its own circulation through new vessel ingrowth.

Leeches were re-introduced into hospitals following widespread publicity of a case in America, where leech therapy instigated as a last resort (following hearsay), salvaged an ear replantation on five-year-old boy.

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**Figure 2.** *The medicinal leech at birth and after 6 months.*

Despite the range of drugs available today, it has not been possible to artificially replicate the effectiveness of leeches in blood drainage. So what is their secret? A leech has three jaws, so that when attached, it creates a wound that is slow to heal. It also has the ability to ingest 5–15 ml of blood. However, the therapeutic effect of leech application comes not from the volume of blood ingested, but from the leech's ability to create a wound that will continue to bleed for ten hours or more after the leech has detached. This trickle of blood removes a further 150 ml and it is this that relieves the venous congestion.

This is made possible by the leech's saliva, which contains a potent mix of pharmacologically active ingredients:

- Anaesthetic – to remove the chance of detection
- Vasodilator – increasing local blood flow to the site
- Anticoagulants – to delay blood clotting
- Dispersal agent – to enable the other chemicals to spread and act quickly.

These chemicals have been developed by the leech to enable efficient feeding, and to keep the ingested blood liquid for the six months it takes them to digest. The number and frequency of leech application needs to be adapted to the size and condition of the tissue being treated. Ideally, the bite wounds should remove the amount of blood equivalent to the amount of fresh blood needed by the tissue.

Staff carefully explain the proposed treatment and give patients the opportunity to voice their concerns, or to refuse. Not all patients are enthusiastic. However, if the patient has a good understanding of the treatment, this, together with supportive nursing staff, will make it more likely that they will persevere for the necessary three to ten days of therapy. Because of a small risk of infection due to bacteria that live in the leech's gut, patients are given prophylactic antibiotics.

For successful leech application, leeches must be extremely hungry. This can be established by observing their activity – a leech that actively 'seeks' exhibits the necessary feeding behaviour. A leech needs about twenty to thirty minutes to have its fill. If after this time it has not spontaneously detached, a stroke with a cotton bud dipped in alcohol will do the trick. Leeches are delicate and should not be pulled off, as part of the mouth may remain embedded and cause infection.

The application of leeches is for them their last meal; because of the risks of cross-infection they are strictly used. Once detached, the leech is placed into alcohol in a final bacchanalian finish that kills it. Now treated as biohazardous waste they are incinerated.

### Conclusion

Although early blood-letting therapies were ineffective and sometimes fatal, the medicinal leech today is of proven value in improving the survival rates for replantations and tissue flaps.

# Albinism and melanocytes

PASCALE POLLIER

Last year's Cambridge 2000 joint IMI/MAA conference holds a special memory for me because I was one of the 'New Voices'. I spoke about my research into the condition of albinism and the intriguing world of cell biology and ophthalmology that opened up to me.

I have been fascinated by albinism for many years, dating back to when I was a fine art student in Belgium. I found myself more interested in the absence of pigment rather than in colour, a strange thing for a painter coming from a heritage of Flemish painting with such a rich colour palette. It was this interest that first drew me to albinism. I found the physical appearance of a person with albinism

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