

# 6<sup>th</sup> World Congress of Total Intravenous Anaesthesia – SIVA

## **FROM THE FOUR HUMORS TILL INTRAVENOUS CATHETERS**

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### **Abstract:**

Spanning from ancient times till the late 19th Century, medical practitioners were convinced that all diseases were related to impurities of blood, stomach and bowel, caused by bad food intake. Consequently, treatments were based on the art of therapeutic bloodletting, vomiting (by the administration of emetics) and cleansing enemas (clysmata). They firmly believed that those who are weak from disease and impurities of blood can be cured by pure and very temperate blood infusions. However, there was no need for human blood to save a man as animal blood was preferred due to its purity and lack of contamination from the wide range of bad food ingested by humans. Blood donated by the youth was also considered pure.

Since the golden age of Greece (400 BC), Hippocrates, Aristotle, and later Galen of Pergamon (129-210AD) had a strong believe in the primacy of blood, and their theories would determine medicine until the advent of modern medical research. For millennia, it was assumed that blood did not circulate, but rather moved in a slow ebb and flow sequence. Blood was considered important as ingested food was transformed in the liver into blood, distributed into veins and ultimately turned into the flesh of tissues. Blood contained not only nutrients, but also heat and vital spirits. In the left ventricle, blood was mixed with air, heated and disseminated to tissues via arteries, according to the body's needs. Blood contained four 'humors' (black bile, yellow bile, phlegm and blood), determining a person's unique humoral composition and temperament, with linked mental and physical processes.

All diseases and disabilities were supposed to result from an excess or deficit of one of the four humors. Good health results when the humors are in balance ("in temperament") with each other. The humoral theory was a model for the working of the body, adopted by the Indian Ayurveda system of medicine (based on the balance between three fundamental bodily bio-elements or doshas called Vata, Pitta, and Kapha), was systemized by Hippocrates and adopted by Greek, Roman, Islamic and European physicians and became the most commonly held view of the human body until the nineteenth century.

Health was associated with a balance of the humors. For more than two millennia, the common belief persisted that a variety of physical diseases and mental ailments were the results of an imbalance of 'bad humors' or 'poisons' in the blood. A patient could have been cured by removal of the bad blood (bloodletting) in exchange of pure blood from animals or young boys. Transfusion with 'cool' blood could restore the order of mind of the mentally unstable. These

were the underlying reasons why early experiments focused on the intravenous (IV) administration of several medications and 'poisons' that eventually led to the transfusion of blood. In the 17th century the focus was not the clinical practice of blood replacement following severe blood loss, but on the popular concept of changing personality, vigour or youth.

William Harvey would eventually replace the Galenic system of physiology through observations and lay the foundation of modern medicine. He described the circulatory system in 'Exercitatio Anatomica de Motu Cordis et Sanguinis Animalibus', and showed that blood flowed through a systemic circulation of blood vessels in one direction, pumped through the body by the heart. Harvey further described that drainage of blood is best achieved by putting an IV cannula in the peripheral vein in the opposite direction to the administration of fluids and drugs, as valves in veins prevent flow down the limb.

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