

# DOCIMASIA PULMONUM HYDROSTATICA

*From Galen to Ploucquet and back  
again*

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Although Galen was the first to note the differences between the lungs of a stillborn fetus and those that had undergone respiration, the medical-forensic test utilizing these differences to investigate suspected cases of infanticide was not developed until the seventeenth century. Controversial even at the time of its development, hydrostatic *docimasia* of the lungs is still mentioned today in forensic pathology textbooks but always in the context of its substantial limitations.

Keywords: docimasia, hydrostatic test, infanticide, stillbirths, W.G. Ploucquet

During a recent meeting of our problem-based learning course, a discussion about meconium aspiration unfolded into a more general conversation on respiration in the fetus. This incidentally brought to mind a recollection from one of our first year gross anatomy lectures: the lungs of a stillborn fetus will sink when put in water because pulmonary respiration had not yet begun whereas the lungs of an infant who died after birth will float because the infant had respired. The logic makes sense and the forensic application makes it a memorable fact for medical students. Yet few practitioners know that this test, “*docimasia*” (also known as “the hydrostatic test”, “the floatation test”, or “the lung test”), has a controversial history and that, although it is sometimes still used today, its results are by no means definitive.

For *docimasia*, as for many topics in medicine, Galen can be used as a primary point of reference. In *De usu partium*, he states that through the process of pulmonary respiration “the nature of the flesh of the lung changes from being red and heavy and dense

to being white and light and less dense.” This statement was often cited in the past as the foundation behind *docimasia*, sometimes with the allusion that Galen himself was aware of a forensic application, though there is nothing to support that he was (1). Rather it was not until the 17<sup>th</sup> century that a test for suspected infanticide based on the physiologic changes in the lung was suggested. Throughout the 17<sup>th</sup> and 18<sup>th</sup> centuries, the test of hydrostatic *docimasia* was disputed, criticized and upheld by various members of the medical community. New methods were designed to improve upon it and were later conducted in conjunction with the original test. In 1781, Wilhelm Gottfried Ploucquet’s *De nova pulmonum docimasia* was published; this new method, which examined the ratio of body weight to lung weight, rested upon the idea that respiration coincides with an increased mass of blood entering the lungs, whereby the weight of a lung that had respired should be greater than one that has not (2). However, this method was equally criticized, and by the turn of the 20<sup>th</sup> century, *docimasia* was known

to give rise to false positives and false negatives (1,3).

The medical history surrounding the use of *docimasia* in cases of suspected infanticide follows an equally controversial legal history. In England, the statute of 1624 shifted the burden of proof away from the prosecution by equating concealment of the death of an infant with murder (4). Social issues continued to be a factor following the repeal of the statute in 1803, and both women who concealed their pregnancy and unwed women were disproportionately prosecuted (5). The level of concern over the incidence of infanticide is reflected in the Mannheim prize question posed in 1780, Germany: “What are the best workable means to prevent infanticide?” (2) This intersection of social, legal and medical issues surrounding infanticide also occurred elsewhere in Europe and has now become a significant area of research (6,7).

*Docimasia* was certainly intended to improve the delivery of justice in cases of suspected infanticide and the ability of medicine to offer such a test did coincide with the decline of confessions obtained under torture (2). However the fact that most lungs will have a tendency to float points to the disturbing conclusion that many women may have been unjustly condemned to death as a result of this test (3).

Forensic pathology textbooks today still explain methods for “the flotation test” but are quick to state that the results are merely suggestive and that there are a multitude of confounding factors. For example, even a minimal level of decomposition invalidates the test (3,8). Yet towards the end of his discussion of the test, *Knight’s Forensic Pathology* appears quite reminiscent of Galen’s assessment of the lungs. He begins by stating that “the best way of seeking proof of respiration is to look at, to feel and to listen to the lungs.” He then continues, saying that while the fully respired lung is pink or

mottled in appearance and spongy in texture, “the lungs of a stillbirth are dark, small, heavy and liver-like, even though they may still float” (3).

First alluded to by Galen and later implemented as a medicolegal test of infant viability in the 17<sup>th</sup> century, the controversy of the hydrostatic *docimasia* persists in the medicolegal forensic pathology literature centuries later.

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