

## Forensic pathology: past, present and future

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### Abstract

Forensic pathology is the scientific branch which, more than every other, today draws from new technologies inherent to other medical fields. In the last century history of forensic pathology has been characterized by a necessary conjunction between tradition and innovation, which primary achievement is finding the truth and scientific objectivity. During the past centuries several studies have enriched scientific forensic panorama, until the most recent introductions in radiological fields (3D post-mortem CT and MRI) and in the molecular biological one, with disclosure of miRNA. MiRNAs are small, endogenous, single stranded, non-coding RNA molecules identified in plants, animals and DNA virus transcriptome. Various and growing are the fields of application: to establish time of death, to evaluate vitality of skin lesions, in cases of head trauma, and cases of acute myocardial infarction. The introduction of new molecular biology techniques will certainly be useful in the coming years to find the “truth” in challenging judicial cases. *Clin Ter 2020; 171 (4):e302-302. doi: 10.7417/CT.2020.2232*

**Key words:** forensic pathology, miRNA, molecular biology

Dear Editor,

Medicine is a “mix of continually evolving applied sciences” where forensic pathology is probably the one which, more than every other, today draws from new technologies inherent to other medical fields. In the last century history of forensic pathology has been characterized by a necessary conjunction between tradition and innovation, which primary achievement is finding the truth and scientific objectivity.

For the first time in 1575, surgeon Ambroise Paré described the correct method to use when distinguish gunshot wounds from sharp-force ones.

In 1663 the Danish doctor Thomas Bartholin established that stillborn lungs sink in water, since they never breathed. After 20 years this finding had been crucial to solve a trial:

a German 16 years old girl was accused of killing her newborn by drowning. During the trial doctor Johann Schreyer sunk baby's lungs in water and since they drowned, he proved the baby was a stillborn. The girl was cleared of murder charges.

At the end of VII century, Austrian doctor Eduard von Hofmann published an Atlas of Legal Medicine, where several death manners were described: strangulation, hanging, suffocation, blunt trauma, drowning, poisoning (carbon monoxide, sulphuric acid and arsenic).

During the decade 1970-80 various histological and histochemical techniques had been introduced, especially in order to evaluate the vitality of lesions and to detect cause of death.

The introduction of immunochemistry methods was ground-breaking in forensic pathology: with a specific antigen-antibody reaction is now possible to detect molecules previously not identified.

Immunohistochemistry plays a pivotal role in anatomical pathology for diagnosis and classification of cancers; forensic pathologists imported this technique especially when dating of a lesion or a myocardial infarction was needed.(1-3).

Simultaneously, introduction of forensic genetics progressively played a crucial role in the detective branch: DNA analysis of biological samples collected on a crime scene or identification of rare gene mutations as cause of death (4-6).

XXI<sup>st</sup> Century has been marked by the introduction of new radiological techniques, as CT and MRI, used during the pre-autoptic phase. Post mortal 3D CT scans provide forensic pathologist a more objective interpretation of available data; this method allows to reconstruct precisely the intrasomatic trajectory of the bullet and to detect metallic flakes, foreign bodies or bone fractures. (7-9). Nowadays the greatest part of forensic scientific publications is represented by case reports; regardless of this trend, forensic research is gradually focusing on molecular biology: microRNA (miRNA) (10-13).

MiRNAs are small, endogenous, single stranded, non-coding RNA molecules identified in plants, animals and DNA virus transcriptome.

In 2009, Hanson et al. (14) Firstly introduced miRNA in forensic pathology; they extracted from different biological fluids and analysed 452 miRNA, using a quantitative PCR method. Odriozola A. et al (15) used miRNA to establish time of death, analysing miRNA concentration in vitreous humor.

MiRNAs expression in paraffined samples has been used to evaluate vitality of skin lesions, in cases of head trauma, and cases of acute myocardial infarction (16-17).

The introduction of new molecular biology techniques will certainly be useful in the coming years to find the “truth” in challenging judicial cases.

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