



## Rapid communication

## Animal experimentation in forensic sciences: How far have we come?



C. Cattaneo\*, E. Maderna, A. Randinelli, D. Gibelli

LABANOF, Laboratorio di Antropologia e Odontologia Forense Sezione di Medicina Legale Dipartimento di Scienze Biomediche per la Salute Università degli Studi di Milano, V. Mangiagalli 37, 20133 Milan, Italy

## ARTICLE INFO

## Article history:

Received 19 August 2014

Received in revised form 24 June 2015

Accepted 25 June 2015

Available online 15 July 2015

## Keywords:

Ethics

Forensic pathology

Forensic sciences

Animal experimentation

## ABSTRACT

In the third millennium where ethical, ethological and cultural evolution seem to be leading more and more towards an inter-species society, the issue of animal experimentation is a moral dilemma. Speaking from a self-interested human perspective, avoiding all animal testing where human disease and therapy are concerned may be very difficult or even impossible; such testing may not be so easily justifiable when suffering–or killing–of non human animals is inflicted for forensic research.

In order to verify how forensic scientists are evolving in this ethical issue, we undertook a systematic review of the current literature. We investigated the frequency of animal experimentation in forensic studies in the past 15 years and trends in publication in the main forensic science journals.

Types of species, lesions inflicted, manner of sedation or anesthesia and euthanasia were examined in a total of 404 articles reviewed, among which 279 (69.1%) concerned studies involving animals sacrificed exclusively for the sake of the experiment. Killing still frequently includes painful methods such as blunt trauma, electrocution, mechanical asphyxia, hypothermia, and even exsanguination; of all these animals, apparently only 60.8% were anesthetized.

The most recent call for a severe reduction if not a total halt to the use of animals in forensic sciences was made by Bernard Knight in 1992. In fact the principle of reduction and replacement, frequently respected in clinical research, must be considered the basis for forensic science research needing animals.

© 2015 Elsevier Ireland Ltd. All rights reserved.

## 1. Introduction

Hundreds of millions of animals are used every year in laboratories all over the world, with a disproportionately small number of 11.5 million used in the European Union [1,2]. The need for fast, scientific improvement has spread this pandemic to virtually every field of science, apparently fuelled by the illusion that the use of animals may quickly lead to sound and useful results. However, if in clinical research the sacrifice and suffering of non-human animals may be considered by a majority as secondary to the therapeutic advantages which may be derived, in forensic sciences the use of animal models can, in most instances, be questionable. In 1992 Bernard Knight had already focused on this issue, and recognized that the forensic field had to face the thorny topic of animal rights [3]. Interestingly, very relevant arguments against the use of animals in forensic experimentation have to do not only with ethics but also with practical limits. Knight in fact

had already observed that “a vast amount of published material using animal experimentation seems to have little practical relevance, other than to expand the curriculum vitae and the career prospects of the researcher” [3]. This point of view has been more generally stressed by Pound et al. who in 2004 shed doubts on the presumed validity of animal experimentation even in the clinical field [4].

Knight raised in 1992 some additional issues which need to be reconsidered, especially now, after more than 20 years, that the use of animals in forensic sciences is indeed continuing if not increasing: “painful, sometimes mutilating experiments on conscious animals” in order to obtain “tenuous potential benefit to some medico-legal problem” cannot be condoned, particularly if one considers that such works “are not regularly used in routine forensic practice” and just “gather dust in university libraries”. Furthermore, the pitfalls encountered when extrapolating results obtained on animals to the human situation have to be considered, particularly in the forensic field. Knight's conclusion was not to accept such works unless there was a compelling reason and the results provided important advances in the practice of forensic science [3].

\* Corresponding author. Tel.: +39 02 50315679; fax: +39 02 50315724.  
E-mail address: [cristina.cattaneo@unimi.it](mailto:cristina.cattaneo@unimi.it) (C. Cattaneo).

In his 1992 article Knight describes some cases of studies performed on animals. The infliction of wounds and burns for dating lesions by histological and histochemical techniques, and the “classical research” on drowning unanaesthetized dogs are given as examples of rather dubious correspondence between scientific data on animals and humans [3]. In 1992, the pointless abundance of such experimentation had led the Editor of one of the most important forensic journals to take a stance on this issue, discouraging animal testing; but what has happened since? Was the call taken/listened to? Has the forensic scientific world modified and evolved its attitude towards animal experimentation?

Our review shows that it has not. Literature still provides plenty of such cases, for example administration of pesticides [5–7], ante mortem production of traumatic brain injury [8–10], blunt injury to the precordial regions in dogs [11,12] air embolism in rabbits [13], gunshot or stab wounds to pigs [14,15]. In addition several experimental protocols concerning the assessment of the effects of hanging [16], electrocution [17–19], myocardial ischemia [20], asphyxia [21,22] trauma [23,24], drowning [25,26], hypovolemic shock [27] in mice, rabbits and dogs can still be found.

This short review briefly aims at illustrating how little has changed in the past 15 years; in addition to what had been anticipated by Knight, we wish to stress the exact same point, this time with numbers and details at hand.

## 2. Materials and methods

A meta-analysis of scientific articles published between 2000 and 2014 was undertaken on Pubmed and Medline databases. Articles published in the main forensic medicine and forensic science journals which referred to animal experimentation were selected. The journals considered were “American Journal of Forensic Medicine and Pathology”, “Forensic Science International”, “International Journal of Legal Medicine”, “Journal of Forensic and Legal Medicine”, “Journal of Forensic Sciences”, “Legal Medicine”, “Medicine, Science and Law”, “Science and Justice”, “Forensic Science, Medicine and Pathology”.

The use of animals in general was the main criterion for selecting the article. This enabled the authors to discover how much research in forensics is actually being done using animal models, how much of this research uses animals which have died for reasons not related to the experiment (for example pigs accidentally crushed by other pigs [28]) compared to those who have been used and killed for specific forensic purposes.

The different kinds of species, types of lesions, manner of sedation and killing were also taken into account, as well as, in the case of animals selected and sacrificed for forensic purposes,

whether the experiment took place ante mortem (e.g. wound healing) or post mortem (e.g. taphonomy), and with what anaesthesia.

## 3. Results

The review yielded 404 articles. This is a probable underestimate since some articles do not bear “animal” or animal experimentation among the keywords, abstracts or titles. Of these, 279 (69.1%) represent experiments where the animals were specifically killed for the purpose of the forensic experiment, versus a more modest 105 (25.9%) where animals which had died from other causes were used. In 20 (4.9%) of cases the specific reason why the animal was killed and how was not specified. Among the cases where animals were sacrificed for the purpose of the experiment, in 84.6% the test was performed antemortem sometimes with an unclear description of the manner of sedation (Table 1).

As can be seen in Table 2 a total of 8203 animals were sacrificed for the research: 81.3% (approx.) were rats and mice, the remaining 18.7% being rabbits, pigs, dogs, sheep, calves and monkeys (Fig. 1).

In relation to the different types of studies, 30.2% of all animals were killed for toxicological tests ranging down to 9.5% for the study of perimortem trauma, and to 3.5% for electrocution research (Fig. 2). Other areas concerned wound healing processes (14.6%), estimation of the post mortem interval (23.4%), hypothermia and hyperthermia (4.9%) and mechanical asphyxia (5.1%) (Fig. 2).

Fig. 3 shows the apparent trend in the number of articles reporting the use of animals. Table 2 shows the number of animals sacrificed, of which species and whether anesthesia was used for the experiment or if information of this sort was not given, as well as the area of forensic science the article involved. Mice, rats and rabbits were the most frequent animals used; however there is still a surprising use of dogs, rabbits and monkeys. Research areas are still quite varied and include experiments on wound healing (which involves inflicting lacerations or bone fractures on live animals and sacrificing them at set intervals), thermal injury, electrocution, various types of mechanical trauma and drugs and toxicology. Only in 4984 (60.8%) cases were the animals clearly anesthetized.

“Euthanasia” methods included the “humane” injection of sodium pentobarbital, but also exsanguination and blunt trauma [29–31]. In some cases, the type of trauma examined or the actual experiment ended up being the cause of death [32–34]. It is surprising how many details are omitted by various authors, even the number of animals used, and whether the animal was anesthetized and if so how it was euthanized. Table 2 shows the correlation between the species involved in the experiments,

**Table 1**  
Journals, number of articles involving animal experimentation and type of experimental project (death related or unrelated to the experiment or unspecified).

Review of years 2000–2014	No. of publications	Death related to the experiment		Death unrelated to the experiment (post mortem)	Unspecified/unknown relation of death of the animal to the experiment
		Ante-mortem experiment	Post-mortem experiment		
American Journal of Forensic Medicine & Pathology	29	15	2	11	1
Forensic Science International	121	63	16	29	13
International Journal of Legal Medicine	78	47	11	17	3
Journal of Forensic and Legal Medicine	7	4	1	1	1
Journal of Forensic Science	75	35	5	35	0
Legal Medicine	70	57	7	4	2
Medicine Science & Law	3	2	0	1	0
Science & Justice	8	3	0	5	0
Forensic Science Med and Path	13	10	1	2	0
<b>Total</b>	<b>404</b>	<b>236</b>	<b>43</b>	<b>105</b>	<b>20</b>

Download English Version:

<https://daneshyari.com/en/article/95360>

Download Persian Version:

<https://daneshyari.com/article/95360>

[Daneshyari.com](https://daneshyari.com)