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Editorial

Resuscitation Plus: The right journal for a new dawn for experimental resuscitation science research

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Experimental research has represented the basis of modern medicine since the 6th–5th century BC when animals were first dissected in ancient Greece for anatomical studies.[1] Although the "reproducibility crisis", due mainly to variance in the models and study designs and in the small sample size commonly employed, has led to skepticism towards basic science and experimental animal studies, experimental resuscitation studies are essential if the clinical science is to move forward and improve patient outcomes.[2] Modern resuscitation science was born, and continues to develop, standing on translational research advances. Indeed, the most important resuscitation interventions, namely chest compressions and defibrillations, were first tested in animals before translation to patients in the 1960s.[3,4] Similarly, the first proof of neuroprotection by mild therapeutic hypothermia came from experimental studies on dogs.[5–7] Since then, experimental animal studies have continued to provide important findings that have increased our understanding of cardiac arrest pathophysiology and has introduced novel interventions.[8-10] In a recent review on the use of drugs during cardiopulmonary resuscitation, a search of ongoing trials identified only six trials testing drugs during cardiopulmonary resuscitation.[11] This illustrates a serious concern and could reflect a lack of new promising interventions to be tested clinically.

For more than 25 years, *Resuscitation* has been the preferred journal for experimental animal studies on cardiopulmonary resuscitation. Nevertheless, recently, the journal changed its publication strategy so that animal studies would generally no longer be considered for publication (Fig. 1). This made publication of animal research challenging as illustrated by the many different journals publishing cardiac arrest animal studies. A review of contemporary animal models of cardiac arrest from 2011 to 2016 found 490 articles published in 154 different journals.[12]

Resuscitation Plus is a new open access journal that will embrace basic science and experimental resuscitation studies of high quality.[13] We hope that the extensive experimental cardiac arrest community will look at *Resuscitation Plus* as an opportunity to consolidate studies on experimental cardiac arrest in one journal. This will lead to an increased focus on experimental cardiac arrest and hopefully inspire researchers to translate findings from the laboratory to the clinical setting. This is much needed as reflected by the relatively few clinical trials that are currently ongoing.

In a review on bias and reporting in animal models of cardiac arrest, insufficient reporting and methodological shortcomings was a frequent finding. This included important methodological issues such a lack of randomisation and blinding and no or poor definitions of primary outcomes.[14] In order to ensure that findings from animal studies can be translated to the clinical setting and that *Resuscitation Plus* can become the leading animal research journal, high methodological standards in reporting, experimental setup and clinical relevance are required. To improve the standard of reporting, submitted manuscripts must therefore comply with the Animal Research: Reporting of In Vivo Experiments (ARRIVE) Guidelines.[15] In order to ensure clinical relevance, study design (e.g. timing of intervention, other interventions applied) and the animal model should resemble clinical practice. Since the very first animal studies of cardiac arrest, pacing-induced cardiac arrest has been the preferred method of cardiac arrest induction, while a myocardial infarction-based model, the most common cause of out-of-hospital cardiac arrest, is very infrequently used.[3,12,16] Similarly, the timing of drug administration and duration of cardiac arrest is often too short and not

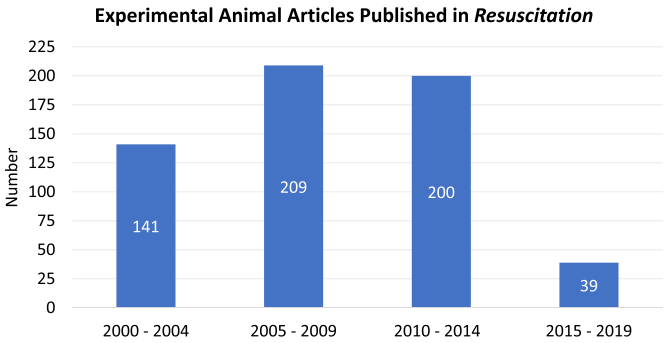

Fig. 1. Experimental animal articles published in *Resuscitation*.

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clinically relevant, as time to drug administration often exceeds 20 minutes from cardiac arrest in out-of-hospital cardiac arrest.[17,18] In order to ensure that findings in the laboratory are translatable, we need to dare to make more clinically relevant animal models of cardiac arrest at the expense of lower survival rates and more costly experiments. With this in mind, the experimental setup should match the research question, as simple research questions can be answered using simple experimental setups.

We hope that resuscitation researchers will rise to this challenge of pushing experimental cardiac arrest science forward and will think of *Resuscitation Plus* as the future reference journal for high quality experimental resuscitation science.

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