Biotechnology

SECTION EDITOR

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Editorial

Vanessa Zaiatz Bittencourt wrote our very first EMWA journal Biotechnology section article in the March 2022 issue.[1] That article discussed research using animal and non-animal alternatives. In the article that Vanessa wrote for our current issue, she discusses the mental health of those who conduct research using animals then write their findings, and how their better mental health can be supported. In *Dealing with animal death and writing about it,* Vanessa highlights issues from perspectives of documentation, daily research routines, and the psychological impacts of euthanising animals. She provides some suggestions to support those using animals for research and gives her perspective on seeing colleagues involved in using animals for their research. Vanessa's article is important as while there are global efforts to reduce, replace, and refine the use of animals in research, animals are still used, and written about. And as long as research is conducted on animals, mental health support will be needed for those who euthanise animals for research purposes and then write about it.

Jen Bell

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Dealing with animal death and writing about it: Cultivating resilience in biotechnology writing

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Ensuring safety through documentation and post-market testing

In the realm of medical writing, the task of documenting research findings is not merely a procedural step but a critical component of the scientific process. Writing serves as a cornerstone in ensuring successful regulatory authorisation for products to reach the market. The precision and clarity of scientific documentation are essential in demonstrating the efficacy, quality, and safety of a product to regulatory bodies.[1] Properly documented findings ensure that potential risks are identified and mitigated, safeguarding patients and building public trust in biomedical advancements. For scientists and researchers involved in *in vivo* and *in vitro* experimentation, this responsibility takes on an added layer of complexity. These individuals have a double job, they are writers and scientists or researchers. We must remember that a scientist and or a researcher is also a writer.[2]

Researchers involved with *in vivo* studies are not only tasked with the emotional burden of ending an animal's life[3] but also with the meticulous documentation of their results. This documentation spans books, scientific publications, and protocols, while also serving as a vital means of effectively communicating findings to healthcare providers and stakeholders.[1] This dual role underscores the importance of medical writing in translating complex research data into coherent, accessible information. By carefully recording the outcomes of their experiments, these researchers contribute to the broader scientific community, ensuring that their findings can be scrutinised, replicated, and built upon. This process is essential for advancing medical knowledge and developing new treatments, highlighting the indispensable role of medical writers in the research ecosystem.

The use of animals in research has been a controversial topic for decades, with supporters and opponents on both sides of the debate.[4] While animal research has been crucial in advancing scientific understanding and improving human health, the treatment of animals used in research remains a contentious issue.[5-7]

The mental health of scientists working in biotechnology, particularly those involved in

animal research, is a critical yet often overlooked area of concern. This article aims to provide a comprehensive overview of the mental health challenges faced by biotechnology scientists engaged in animal research and scientific writing, focusing on the stressors unique to this field and proposing strategies for mitigation.

A day in the life of a researcher who uses animals for work

The life of a researcher is thoroughly planned and multifaceted. It begins with outlining the day's experiments, ensuring every step is well-documented and every protocol followed precisely. Researchers organise the necessary chemicals, verifying concentrations and volumes to maintain accuracy. They schedule the use of essential equipment like real-time PCR machines, flow cytometers, and biosafety cabinets, coordinating with colleagues to avoid scheduling conflicts. For many, a visit to the animal facility is essential, where they plan and conduct experiments, carefully considering ethical guidelines for animal care and use. This includes determining the method of euthanasia, the organs to be harvested, and the subsequent techniques for analysis.

The daily life of a scientific researcher working at the bench is a blend of creativity, rigorous research, and structured routine. On top of this routine, we must remember that a researcher is also a writer. The researcher must review current scientific literature to stay updated on the latest developments and breakthroughs. This is followed by outlining and drafting articles, while developing hypotheses and thinking about future experiments. Deadlines are a constant companion as well, requiring efficient time management and the ability to quickly turn around revisions.[8,9]

Interactions with editors, researchers, and other writers is frequent. Balancing writing with research time is extremely challenging and significantly impacts a researcher's mental well-being.[2] It's no surprise that mental health in the biotechnology field is both crucial and often overlooked, as finding alternatives to change this demanding routine remains difficult. To mitigate these issues, it is crucial for employers to provide mental health resources, create supportive work environments, and encourage open discussions about mental health.

The psychological impact of animal research

Scientists involved in animal research often experience ethical dilemmas that can lead to profound moral distress.[3,10] The conflict between the pursuit of scientific knowledge and the welfare of animals creates an ethical tension that can weigh heavily on researchers.[11] The necessity of euthanising animals, performing invasive procedures, and witnessing animal suffering can lead to intense feelings of guilt, sadness, and anxiety, impacting the research and writing skills.[5] These emotional burdens, if left unaddressed, can contribute to long-term psychological stress, potentially resulting in burnout and other serious mental health issues. While there are regulations in place to ensure the welfare of research animals,[12] recent studies have highlighted the mental toll that researchers using animals face.[3,10]

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Compassion fatigue,[13] a form of secondary traumatic stress, is a significant risk for these researchers. This condition arises from the emotional distress experienced when individuals are exposed to the traumatic experiences of others, often shown in healthcare workers. In the context of animal research, scientists are repeatedly exposed to distressing situations, such as handling and caring for animals that will undergo or have undergone painful procedures. This continuous exposure can lead to emotional exhaustion, characterised by a diminished

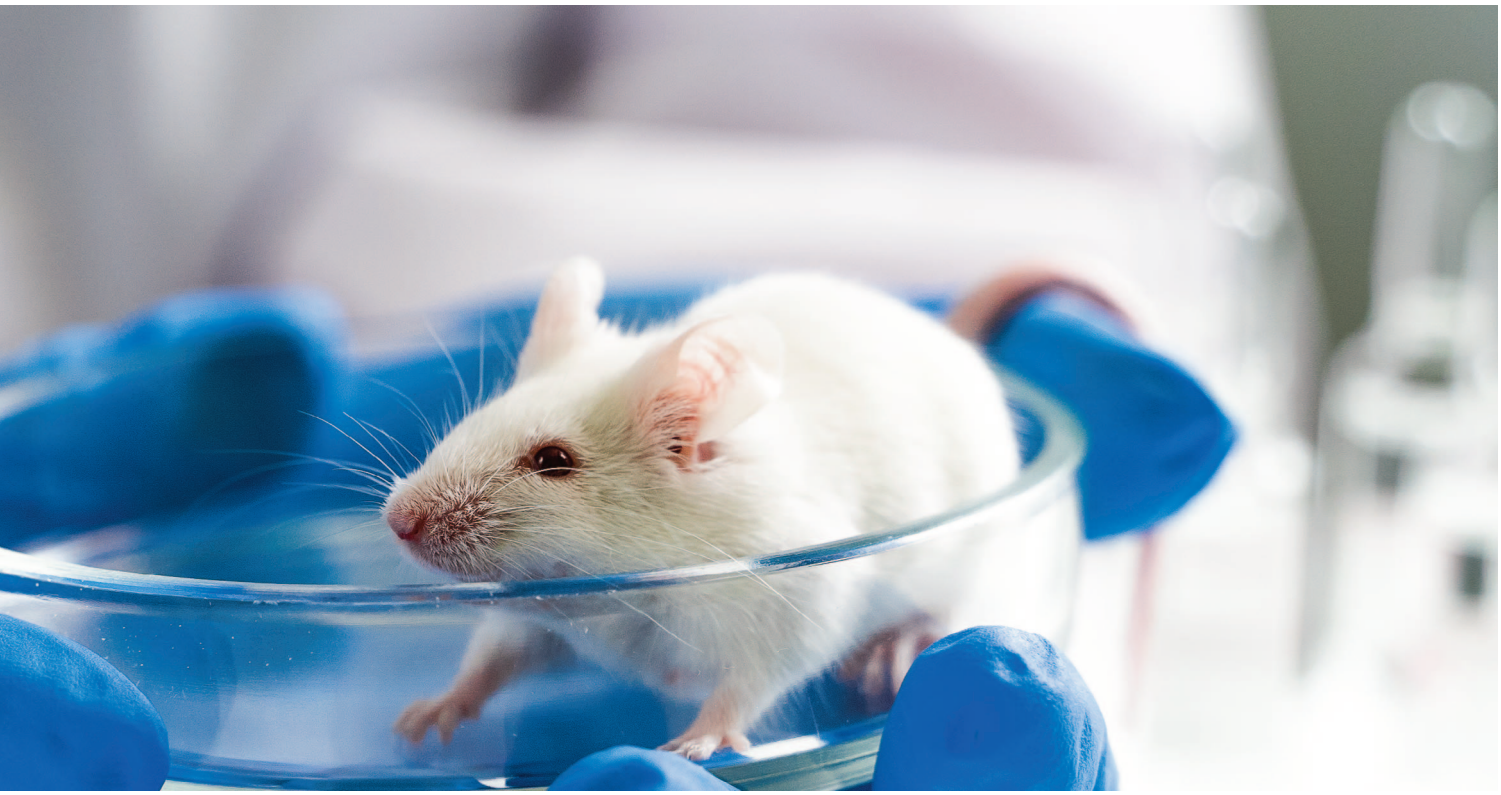

Photo: Freepik

capacity for empathy and emotional engagement. Over time, the relentless cycle of witnessing animal suffering and death can erode a researcher's emotional resilience, impacting both their personal well-being and professional performance.

The consequences of compassion fatigue are far-reaching.[13,14] Personal relationships may suffer as researchers struggle with the emotional toll of their work. Professionally, this exhaustion can lead to decreased job satisfaction, reduced productivity, and increased turnover rates.[15] Additionally, the inability to engage empathetically can affect the quality of care provided to the animals and the integrity of the research itself. Research animals that are badly handled promote animal behavioural changes and altered physiological responses, which may affect the results of experiments.[14] To mitigate the effects on human mental health, it is crucial for institutions to provide support systems, such as counselling services, peer support groups, and training in stress management and self-care techniques.[13]

Strategies for systemic change concerning animals in research

Strategies for systemic change need to consider the needs of those involved in animal research. It is important to keep in mind that all research must be written up, and many researchers transition to industry medical writing roles. Notably, industry is increasingly embracing animal research replacement, reduction and refinement (the 3Rs), driving innovation in alternative methods and influencing academic research to adopt these principles, thereby fostering a more ethical and sustainable research environment.[16,17]

Institutional support systems

To address the mental health crisis in academia, institutions must implement robust support systems.[18,19] These may include:

- Access to mental health services: Providing easily accessible counselling and mental health services for students.
- Workshops and training programmes: Offering workshops on stress management, resilience, and coping strategies.
- Mentorship programmes: Establishing mentorship programmes that promote healthy mentor-mentee relationships and provide guidance on navigating academic challenges.

Role of principal investigators (PI)

PIs play a crucial role in promoting mental well-being within their research groups.[17,20] PIs should:

- Model healthy behaviours: Demonstrate a commitment to their own well-being and encourage a healthy work-life balance.
- Foster open communication: Create an environment where students feel comfortable discussing their mental health concerns without fear of judgement or repercussions.
- Provide support and resources: Actively support students in accessing mental health resources and developing coping strategies.

Empowering trainees

Graduate students must also take an active role in managing their mental health.[21] They should:

- Be attentive to mental health: Recognise signs of mental distress and take proactive steps to address them.
- Seek professional help: Utilise available mental health services and seek professional help when needed.
- Develop coping strategies: Engage in activities that promote mental well-being, such as exercise, mindfulness, and maintaining a healthy work-life balance.

Promoting a supportive work environment

Creating a culture of openness and support within research institutions is essential. Encouraging open discussions about mental health, providing training on recognising and addressing mental health issues, and fostering a non-judgemental atmosphere can help reduce stigma and promote well-being.[20,22]

Using animal alternatives in research[6] such as novel methodologies to substitute animals, not only promotes ethical practices but also fosters a supportive work environment that can reduce the mental health issues faced by scientific researchers.[13] By implementing innovative techniques that replace or minimise the use of animals in experiments, researchers can alleviate the ethical dilemmas and emotional distress associated with animal research.[5] This shift towards alternative methods not only aligns with the 3 Rs (reduction, replacement and refinement) principles of humane treatment of animals but also contributes to a more positive workplace atmosphere.[6,11]

Improved mental well-being can enhance researchers' cognitive function, creativity, and productivity, leading to more effective problem-solving and innovative scientific discoveries.[23] In this way, promoting animal alternatives and supporting researchers' mental health go hand in hand, ensuring their findings are communicated effectively and with passion.[16]

Conclusion

The act of writing up results serves as a form of cognitive processing for researchers, allowing them to reflect on their work and its implications. By framing their experiences within the context of scientific inquiry, researchers can find meaning and purpose in their work. Additionally, the detailed documentation required in medical writing ensures that the ethical considerations and humane practices employed during the research are transparently communicated. This transparency not only upholds the integrity of the research but also fosters a culture of accountability and ethical responsibility within the scientific community. In this way, medical writing becomes a crucial step for researchers to take the reins, transforming their experiences into valuable scientific contributions. Scientists and writers engaged in animal research is a multifaceted issue that requires comprehensive attention and proactive measures. By addressing the unique stressors associated with this work and implementing supportive strategies, research institutions can foster a healthier, more resilient workforce.

There are different perspectives on this issue, but from what I've seen, most people didn't enjoy the aspect of animal research that involved euthanising mice for their studies.

Post script: A personal perspective on people involved in animal research

During my time in my master's and PhD programme, I saw how using animals in research could weigh heavily on my colleagues who had no other option. Whenever someone had to head to the animal house, you could tell from their faces that they weren't thrilled about it. Some even grumbled about wishing for alternatives that just weren't available yet, or that their PI was not interested in trying something new.

When they came back up with organs in plastic tubes, their expressions never looked happy. While there were some who didn't seem bothered at all and even went on to run labs focused solely on animal research, others decided to go a different route. After graduating, some of my colleagues vowed never to work with animals again, choosing instead to work exclusively with human samples. It's clear that there are different perspectives on this issue, but from what I've seen, most people didn't enjoy the aspect of animal research that involved euthanising mice

for their studies. It's something that I think PIs often overlook – how doing animal research affects the mental well-being and enjoyment of research for their team members

Disclaimers

The opinions expressed in this article are the author's own and not necessarily shared by her employer or EMWA.

Disclosures and conflicts of interest

The author declares no conflicts of interest.

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