**Ethical Consideration Reflection**

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Clinical research is the systematic investigation of medical interventions and treatments in order to better understand the human body and improve health outcomes. However, this raises important questions about the methods used and how to ensure that research is being conducted ethically. The paper written by Emanuel et al., dives into the 7 ethical requirements needed in preclinical studies. These 7 ethical requirements are social or scientific value, scientific validity, fair subject selection, favourable risk benefit ratio, independent review, informed consent, and respect for potential and enrolled subjects. An example of a preclinical experiment in animal studies is testing a new drug to mitigate symptoms of Alzheimer’s disease in mice genetically engineered to express Alzheimer-like pathology.

In preclinical research, **social or scientific value** ensures that the study contributes knowledge beneficial to health or enhances understanding of biological mechanisms. In this case, the study on Alzheimer's disease in mice has significant scientific value because it can help discover potential therapies for a condition with a high societal burden. Furthermore, understanding how this drug modulates symptoms in animal models can provide insights into its efficacy before human trials. Ethical values in animal studies are important because it emphasizes not taking advantage of anyone and using resources wisely. By testing in animals first, the research helps make sure that humans will not face unnecessary risks in the early stages of drug development. Experts should be proficient in Alzheimer's pathology and preclinical trial design to assess whether the study’s potential outcomes justify the use of animal subjects.

For the study to be ethical, the **risks** to the animals (pain, discomfort, or mortality) must be outweighed by the potential **benefits** (insight into drug efficacy). In preclinical studies, risks must be minimized, for instance, by using anesthesia during invasive procedures and providing post-operative care. The potential benefit is the advancement of knowledge regarding Alzheimer's treatment, which could lead to human clinical trials if the drug shows efficacy in mice. In animal research, minimizing harm is vital, and only when the expected benefits (such as advancements in treating Alzheimer’s) are significant enough can any harm be justified. Expertise in veterinary science is necessary to evaluate how risks to the animals are mitigated.

**An independent ethical review** must be conducted to assess the study’s design, the potential risks to the animals, and the anticipated benefits. This ensures objectivity and reduces the potential for conflicts of interest, especially if the research is tied to financial or career incentives. Independent review committees evaluate whether the study follows ethical guidelines for the humane treatment of animals and whether its scientific goals justify the use of animals. Independent review upholds the value of accountability and transparency, ensuring that the research is not conducted purely for personal or financial gain but for the advancement of knowledge that can benefit society. Independent reviewers should include ethicists, animal welfare experts, and scientists specializing in preclinical drug research. These experts should have the authority to modify or terminate the study if ethical standards are not met.

In conclusion by applying these ethical standards, preclinical animal studies can be conducted responsibly, ensuring that the research is valuable, risks are minimized, and independent oversight is in place to protect animal welfare.