ARTICLE

REINVENTING PRECLINICAL SCIENCE: ETHICAL AND TRANSLATIONAL POWER OF EMERGING ANIMAL MODELS

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Animal models remain central to drug discovery by enabling the study of disease mechanisms, drug responses, and toxicity in biologically relevant systems. This review evaluates the scientific and translational value of traditional and non-primate models, analyses ethical-legal considerations and species-specific limitations, and highlights emerging innovations such as genetically engineered organisms and advanced in-vivo imaging. Emphasis is placed on Drosophila, zebrafish, Xenopus, planarians, and sea urchins, whose unique strengths advance mechanistic insight and support 3Rs-aligned, next-generation drug research.