13

Utilizing the Preclinical Database to Support Clinical Drug Development

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The primary goal of the preclinical phase in drug development is to generate information that can be used for the rational and informative conduct of clinical studies. This goal of the preclinical phase can be achieved through use of a variety of in vitro or ex vivo technologies such as isolated organs and tissues, cell cultures, cellular fragments, subcellular organelles, receptors, ion channels, transporters and enzymes, and whole animal in vivo investigations (1–3). Traditionally, many preclinical studies support early clinical drug development, i.e., clinical pharmacology, pharmacokinetic (PK), and pharmacodynamic (PD) studies; however, various preclinical studies are conducted to support late clinical development as well as postmarketing needs (4,5).

From the perspective of clinical drug development, the aims of preclinical studies should be evaluations of both safety and efficacy in various experimental settings of animal species that can be integrated into the information database for the safe and effective use of the drug in humans. More specifically, the preclinical safety evaluation should focus on identification of (1) an initial safe dose and subsequent dose escalation schemes in humans, (2) potential target organs for toxicity and their reversibility, (3) safety parameters for clinical monitoring, and (4) at-risk populations (6,7). Likewise, the specific aim of efficacy evaluation during the preclinical