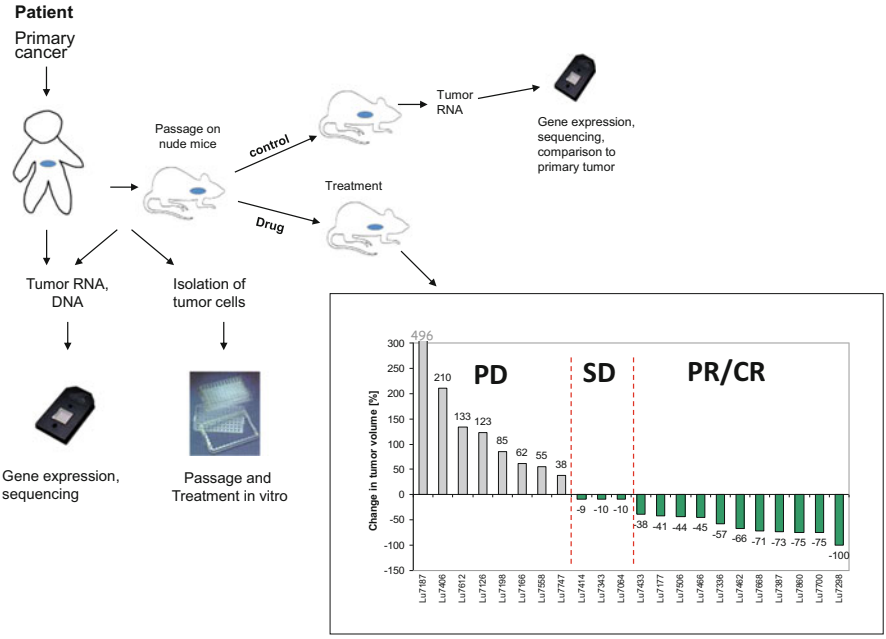

Fig. 2 Workflow of preclinical research using convenient PDX mouse models. Patient-derived material – expanded in mice – undergoes molecular biological and therapeutic screening. A waterfall plot distinguishes responder from nonresponder (Fichtner et al. 2008). RECIST criteria: *PD* progressive disease, *SD* stable disease, *PR*/*CR* partial or complete response

A key component of preclinical strategies is the so-called patient to mouse xenotransplantation model (PDX), established by transplantation of fresh patient material to immunodeficient mice (shown in Fig. 2). After a successful engraftment (growth to a tumor volume between 500 and 1,500 mm^3) within 2–6 months, the PDX can be used for serial transplantation over several generations (P2–P10). Expanded material can be used for drug response or biomarker studies, the establishment of cell lines, and molecular/histopathological analyses and is preservable due to cryoconservation (Scott et al. 2013). Target validation using a broad cohort of clinically relevant PDX models provides more reliable information. As FDA requests drug development to be accompanied by the development of a companion diagnostic test, both require close collaboration between the preclinical experts. Disease-related PDX panels are seen as the optimal basis for the detection of predictive, prognostic, and early-response biomarkers. Possible resistance mechanisms, predictors of response, and rational targets for combinations can be identified, and further the physiological mechanism of action can be analyzed (Amendt et al. 2014).

Next to elementary target or biomarker identification and validation, PDX models will serve as an important tool for the implementation of a personalized medicine.