

drugs in clinical studies for some tumor localizations. Analysis of antitumor activity in patient-derived xenograft (PDX) models has provided a more accurate selection process for the identification of agents which have activity in clinical trials, suggesting that some of these models may provide a useful hint for activity in the clinic (Furman et al. 1999). A fundamental move for the improvement of PDX is the humanization of these models. Different approaches such as the establishment of a human stroma, the cotransplantation of human hematopoietic stem cells, or the development of humanized homing niches have been successfully realized (Fu et al. 2014; Wege et al. 2014; Thibaudeau et al. 2014). Another effective method is the generation of novel mouse strains with humanized setting dropping highly informative preclinical data (Zhou et al. 2014; Rongvaux et al. 2014).

Genome-wide analyses of gene expression using oligonucleotide microarrays have allowed the determination of molecular characteristics present in xenograft models that mirror tumor behavior and relate to disease progression and survival (Nevins et al. 2003). Furthermore, correlations between the growth of xenograft models derived directly from patient tumors and the clinical prognosis of donor patients have been reported (Angevin et al. 1999; Peterson and Houghton 2004). In the future, the use of patient-derived human tumor xenografts will therefore play a key role in the search for more efficacious cancer treatments (Perez-Soler et al. 2006; Fichtner et al. 2004, 2008; Becker et al. 2004; Garber 2009). The ability to identify and assess antitumor activity in well-characterized xenografts in correlation with particular genetic or molecular characteristics may aid the development of new therapeutic regimens.

Conclusions from what we discussed here are:

- Drug discovery, systems biology, and translational research are moving together to address all the new hallmarks of cancer and increasing the success rate of drug discovery.
- In vitro versus in vivo models or vice versa – both models have limitations and advantages, however, when used critically, all generate important and reliable results.
- Panels of patient-derived xenograft (PDX) models represent an important tool for translational research.
- Predictive value of the preclinical models is increasing steadily; however, even genetically engineered “humanized” mice are still not men.

References

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