



**Cover:** Immunofluorescence image showing a section of an intraductal adenoma with stroma within a prostate carcinoma of a 30-week-old *TRAMP* mouse carrying an *Acta2-CreER* transgene and *R26<sup>LSL-tdTomato/+</sup>* reporter given tamoxifen at 4 weeks. Red indicates tdTomato+ cells derived from *Acta2*-expressing cells at 4 weeks, green indicates cells expressing ACTA2+ (smooth muscle cells), blue indicates DAPI staining of nuclei. As described in the article by Yang et al. on page 39, *Acta2*-expressing cells of the smooth muscle-lineage expand not only in the smooth muscle layers, but also invade into intraductal stromal space between epithelium folds and become cancer reactive stroma. Thus, smooth muscle lineage is a cell-of-origin for intraductal cancer reactive stroma in *TRAMP*. Image created by Zhaohui Yang and licenced under a Creative Commons Attribution 4.0 International licence.

## OBITUARY

- 1 Susan Lindquist: a tribute  
Siegel, V.

## REVIEW

- 3 3D bioprinting: improving *in vitro* models of metastasis with heterogeneous tumor microenvironments  
Albritton, J. L. and Miller, J. S.

## RESEARCH ARTICLES

- 15 A novel brain tumour model in zebrafish reveals the role of YAP activation in MAPK- and PI3K-induced malignant growth  
Mayrhofer, M., Gourain, V., Reischl, M., Affaticati, P., Jenett, A., Joly, J.-S., Benelli, M., Demichelis, F., Poliani, P. L., Sieger, D. and Mione, M.
- 29 Prenatal ethanol exposure in mice phenocopies *Cdon* mutation by impeding Shh function in the etiology of optic nerve hypoplasia  
Kahn, B. M., Corman, T. S., Lovelace, K., Hong, M., Krauss, R. S. and Epstein, D. J.

- 39 Stromal hedgehog signaling maintains smooth muscle and hampers micro-invasive prostate cancer  
Yang, Z., Peng, Y.-C., Gopalan, A., Gao, D., Chen, Y. and Joyner, A. L.

- 53 S113R mutation in SLC33A1 leads to neurodegeneration and augmented BMP signaling in a mouse model  
Liu, P., Jiang, B., Ma, J., Lin, P., Zhang, Y., Shao, C., Sun, W. and Gong, Y.

## RESOURCE ARTICLE

- 63 Standardized echocardiographic assessment of cardiac function in normal adult zebrafish and heart disease models  
Wang, L. W., Huttner, I. G., Santiago, C. F., Kesteven, S. H., Yu, Z. Y., Feneley, M. P. and Fatkin, D.