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## Principles of genomic explanations for the complex histopathologic features of tumors

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1. The histopathologic features of tumors are complex, and have long been described in terms of loss of specialised activities (“de-differentiation”) and abnormal cell-growth processes, especially “anaplasia” (1) and “neoplasia”. The precise molecular genomic bases for these histopathologic complexities of tumors have been little discussed. This paper analyses the phenomenology of tumors using genetic concepts, especially of traits, linkage of traits, and variation.
2. The individual abnormalities / traits of tumor cells are mainly (i) Unceasing accumulation of cells. (ii) Variable deviations (‘traits’) in cellular morphology, especially specialised activities. (iii) Variable deviations in normal spatial arrangements of tumor cells to each other (abnormal architecture). (iv) Variable deviations in spatial relationships of tumor cells to non-tumor cells (compression, invasion). (v) Ability to grow in other tissues (metastasis).
3. The combinations of abnormalities exhibit (i) Regular specificity so that types can be readily distinguished. (ii) Variability from tumor type to tumor type; between cases of the same tumour type; and between different foci of the same tumor. (iii) Variability in incidence of progressions. (iv) Variability in the appearance of ‘subtype’ morphologies. (v) Variability in the incidence of progression.
4. Genomic explanations suggested are: (i) The combinations of traits may be due to ‘large’ genomic events affecting complex loci. (ii) The variabilities in most aspects of tumors may be explained by variable ‘functional morphisms’ of genes.
  - Bignold LP et al “David Paul Hansemann, Contributions to Oncology”, Birkhäuser, 2007.
  - Bignold LP “Principles of Tumors”, Elsevier Academic, 2015, chapters 1 and 8.

### Biography

Bignold graduated in Medicine from the University of Western Australia, and has post-graduate qualifications in internal medicine, experimental pathology, and diagnostic histopathology. From the 1980s, he has practiced and taught general and diagnostic histopathology at the University of Adelaide and the South Australian state government pathology service (SA Pathology, formerly Institute of Medical and Veterinary Science). Dr Bignold has written many articles on how genomic instability might explain the histopathological features of tumors, as well as related issues. In 2015, he published “Principles of Tumors: a Translational Approach to Foundations”, Elsevier, Academic Press, Waltham, MA. With colleagues, he has also published a study of the origins of tumor pathology: “David Paul Hansemann: Contributions to Oncology” Birkhäuser, Basel, (2007) and a volume on the history of medicine: “Virchow’s Eulogies” Birkhäuser, Basel, (2008). In 2006, he edited a volume “Cancer: cell structures, carcinogens and genomic instability”.

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