Chairperson's Introduction

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This session covers the subject of **cancer stem cells** (CSCs) in solid organs, the *aerodigestive tract* (Alison), *breast* (Groner) and also in *haematological malignancies* (Johnsen). Normal adult multipotential stem cells have a self-renewal mechanism in place, along with the ability to extrude or detoxify potentially cytotoxic xenobiotics (over-expression of ATP-binding cassette [ABC] transporters and aldehyde dehydrogenase [ALDH]). All speakers will suggest that multistep carcinogenesis begins with mutation in a normal stem cell or a closely related progenitor cell, and thus the CSCs may well inherit some of the attributes of normal stem cells. We now believe that most human tumours, both solid tumours and haematological malignancies, have a sub-population of CSCs. These cells are thought to be entirely responsible for sustaining tumour growth, often resulting in tumours with a heterogeneous phenotype, partly because of a deregulated hierarchical cell system. Whether this phenotypic diversity can be attributed to a multipotential CSC, or whether within a particular tumour there is more than one type of CSC, each producing a morphologically distinct clone, is unknown for most tumours. In many carcinomas, the process of *epithelial-mesenchymal transition* (EMT) at the invasive front generating CSCs is now recognised, and recently mutant *TP53* has been implicated in the process by a failure to induce MDM2 expression, a ubiquitin ligase that functions to degrade Snail, a repressor of E-cadherin expression. Speakers will also discuss the limitations of many of the current *in vivo* assays for CSCs that rely on the ability of prospectively isolated cells to form tumours when transplanted into immunodeficient mice, usually non-obese diabetic/severe combined immunodeficient (NOD/SCID) or nude mice.

The speakers will emphasise new therapies based upon targeting the apparent radio- and chemoresistance of CSCs; some are designed to make cells more sensitive to induced cell death (targeting the receptor tyrosine kinase [RTK], phosphatidylinositol-3-kinase [PI3K] and mammalian target of rapamycin [mTOR] pathway), while others target self-renewal pathways (e.g. Wnt, Hedgehog, Notch/Delta). If cancer stem cells are the 'root' of cancer, then the challenge over the next 5 years will be to gain much more information about the nature of these cells, opening the way for more effective targeting.

Conflict of interest statement

The author declares no conflict of interest.