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Cell proliferation and tissue remodeling are major determinants of cancer metabolism and the response to drugs targeting metabolism

Elke Markert[1], Philip Tedeschi[1], Sonia Dolphi[1], Kim Hirshfield[1], Joseph Bertino[1], Zoltan Oltvai[2], Alexei Vazquez[1*]

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Background

Alterations in cell proliferation and tissue remodeling are major hallmarks of cancer. Given that these two physiological processes require a significant investment of metabolic resources, we hypothesize that the metabolism of cancer cells is, in a first approximation, determined by the magnitude of cell proliferation and tissue remodeling.

Materials and methods

To address this question in further detail we have analyzed *in vitro* data characterizing cancer cell lines and gene expression profiles of human cancers.

Results

We show that the metabolism of cancer cells is strongly correlated with cell proliferation and tissue remodeling. Based on *in vitro* data, cancer cell lines align from an extreme of highly proliferating cells of relatively small size to another extreme of slowly proliferating cells with large size and mesenchymal properties [1]. Similarly, in human cancers we detect a strong negative correlation between gene signatures associated with cell proliferation and tissue remodeling [2]. The stratification of human cancers based on the cell-proliferation/ tissue-remodeling signatures results in divergence in the survival plots as significant as those obtained using current site-specific classifications. Furthermore, *in vitro* data suggest that these different subtypes have a differential sensitivity to diverse drug classes targeting metabolism [1].

Conclusions

We conclude that human cancers can be subject to a universal cell-proliferation/tissue-remodeling classification independent of their site of origin that can guide personalized treatment targeting cancer metabolism.

Authors' details
[1]Rutgers Cancer Institute of New Jersey, New Brunswick, NJ, USA.
[2]Department of Pathology, University of Pittsburgh School of Medicine, Pittsburgh, PA, USA.

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[1]Rutgers Cancer Institute of New Jersey, New Brunswick, NJ, USA
Full list of author information is available at the end of the article