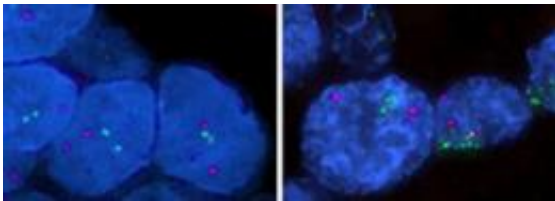# Study shows gene positions may aid cancer diagnosis

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Genes including ERBB2 (green) and MYC (red) are positioned differently in normal (left) and cancerous (right) tissue. Credit: Meaburn, K.J., et al. 2009. *J. Cell Biol.* doi:10.1083/jcb.200909127.

Certain genes switch their nuclear position in tumor cells, offering a potential new method of diagnosing cancer, say researchers from the National Cancer Institute. The study by Meaburn et al. will be published online today and in the December 14, 2009 print issue of the *Journal of Cell Biology* (JCB).

Individual genes preferentially localize to specific points within the nucleus. The reasons for this aren't known, but the positions can be reshuffled during differentiation. Meaburn et al. wondered whether genes might also rearrange during carcinogenesis, when large-scale changes in nuclear morphology occur. The researchers previously identified four genes that shift their location in a 3D culture model of early breast cancer, and now turned their attention to human tissue.

The team analyzed 20 genes and found that most were positioned uniformly in healthy breast tissue from numerous individuals. Eight of these genes consistently relocated in the nuclei of invasive breast cancer cells, including HES5, which had an altered localization in all tumors examined. The researchers were able to distinguish between normal and diseased tissue on the sole basis of these genes' nuclear localization with success rates similar to current clinical tests.

The next step, says lead author Karen Meaburn, will be to repeat the study on a larger number of samples. HES5 is unlikely to be repositioned in all of these, so the authors hope to identify a set of genes that, in combination, can accurately diagnose breast cancer. The approach may be useful for prognosis, too—in vitro studies suggest that gene movements are an early event in cancer development, so gene positions might provide an indication of the cancer's future progress.

More information: Meaburn, K.J., et al. 2009. *J. Cell Biol.* doi:10.1083/jcb.200909127

Source: Rockefeller University (news : web)