

Survival of the fittest: even cancer cells follow the laws of evolution

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Scientists from The Institute of Advanced Studies at Princeton and the University of California discovered that the underlying process in tumor formation is the same as for life itself—evolution. After analyzing a half million gene mutations, the researchers found that although different gene mutations control different cancer pathways, each pathway was controlled by only one set of gene mutations. This suggests that a molecular "survival of the fittest" scenario plays out in every living creature as gene mutations strive for ultimate survival through cancerous tumors.

This finding, which appears in the August 2008 issue of *The FASEB Journal*, improves our understanding of how evolution shapes life in all forms, while laying a foundation for new cancer drugs and treatments.

"This study lays the groundwork for understanding the nature of different mutations in cancers," said Chen-Hsiang Yeung, first author of the study, "and helps with understanding the mechanisms of cancers and their responses to drug treatments."

To arrive at these conclusions, researchers analyzed about 500,000 cancer mutation records from the Catalog of Somatic Mutations in Cancer database and then divided the data into 45 tissue types. Within each tissue type, they calculated the frequency that multiple genes were mutated in the same sample. They identified the frequencies of mutations that were significantly higher or lower than if the genes had mutated independently. Then they mapped out how these genes

ultimately lead to cancerous tumors and checked whether the genes occurring in specific tissues used the same or different cancer pathways.

"Little could Darwin have known that his 'Origin of the Species' would one day explain the 'Origin of the Tumor,'" said Gerald Weissmann, MD, Editor-in-Chief of *The FASEB Journal*. "This research report completely changes our understanding of the many gene mutations that cause cancer."

Source: Federation of American Societies for Experimental Biology

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