Identifying the Proteins that Infiltrate the Cell and Drive Cancer Growth

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â€œMyriad proteins that vary in their binding with important regulatory factors were found to play an important role in the development of the disease.â€

â€œThe results hint at a unique strategy for inhibiting rhabdomyosarcoma tumors by inhibiting selectively the functions of required transcription factors instead of altering the receptorsâ€

Prompt tumor growth can be inhibited by targeting the specific function of important regulatory proteins, according to findings reported in PLoS ONE by a team of researchers at the University of Bristol, South Korea and the University of Cambridge. They found that an inhibitory protein called Sp, tightly bound to the DNA in these human cells, was essential for the development of the tumors in the pluripotent stem cells, as the protein becomes more active when the cells divide, due to the dendritic microtubule complex, a key stress point.

When they blocked Spâ€™s activity, or found its presence on the cell surface, inactivated the stress response and affected the cell division. This approach can effectively stop the cancer growth by targeting Spâ€™s specificity. The protein was therefore shown to affect a protein called microRNAs â€“ small pieces of RNA that regulate gene expression and are implicated in other diseases.

These â€œmicroRNAs have been described as a treasure trove of therapeutic potential in disease including cancer, and cancer stem cells.â€ (Elliot, H. & Florsten, Ph.D., 2010). Cancer is a prevalent disease in all populations worldwide, affecting an estimated 22% of the worldâ€™s population in a given year (Ogawa & Choi, 2010). Cancer cells â€œstealâ€ additional cells from their environment, because of their ability to evade an immune response. The development of oncogenic tumors is also an important marker of an aging population, with observed biological changes associated with aging that are believed to increase the risk of developing cancer. (Hih-N. E. et al., 2005) Since it is difficult to induce the â€œstop-goâ€ reaction that typically occurs when the body responds to inflammation, especially when it occurs in some of its most â€œcentral organs,â€ cancer stem cells are often recruited to spots that enhance the tumorâ€™s survival or recurrence. Various types of intervention such as chemotherapy or radiation, or, where necessary, surgery can dramatically reduce the number of cancer cells and improve quality of life. However, cancer cells can usually quickly regrow or replicate, so these therapies can become ineffective over time. Clinical development of anticancer therapies is a major challenge in the effort to treat cancer. While the conventional approach to inhibiting tumor growth is to destroy or disable the cell surface receptors, by changing their expression, or by inhibiting them at the molecular level, in order to decrease their ability to speak to the cell nucleus (the site of tumor). Furthermore, expressing specific â€“ or specificty â€“ drugs during the development of the tumor can also have its complications, as these drugs have an increased likelihood of being used against the beneficial function of this cancer stem cell.

More specifically, in this study, the researchers found that the function of the gene Ras â€“ a DNA transcription factor â€“ is â€œdependent on several factors,â€ such as Sp, that interact with the chloride channel of the mitochondrial membrane. This is important because Ras plays a role in the development of the protein that acts as a mediator of stress response in the cell. Ras binds to the chloride channel in order to release the ions that help keep the cell alive. The investigators conclude that â€œthe role of Ras and similar proteins is emphasized in several cancer types, including rhabdomyosarcoma, a genetic cancer which develops from normal, widely distributed cells. Further, future research should assess the role of Ras and Sp in other types of tumor.â€

Source: Bradshaw, W.,Imaipa, G., Ha, J.,J.L., Oh, Y., Deboer, M., Hih-N. E., & Alison, P. (2012). Promoting the Immune Response by Monolingual Embryonic Stem Cells, PLoS ONE 3(12): e3647. doi:10.1371/journal.pone.0003647

A Close Up Of A Bird On A Tree Branch