

Hallmarks of Cancer Series - Conclusion

This is the final article in the Hallmarks of Cancer Series that has highlighted 10 key features that distinguish cancer cells from normal cells. As noted by Dr. David Rodenhiser in the inaugural article, more than 200 different types of cancer have been described. While each type of cancer has its own distinct characteristics, the identification of the 10 Hallmarks of Cancer represents a critical advance for the field of cancer research because each Hallmark contributes to the development of a number of different cancers. We can therefore expect that by unlocking the secrets of each Hallmark, we will gain new insights that we all hope can be applied to the prevention, diagnosis and treatment across several distinct types of cancer.

As described in detail in each article within this series, the 10 Hallmarks represent features that enable cancer cells to gain a competitive advantage over normal cells. These features allow cancer cells to grow

uncontrollably without the requirement for normal cues and by ignoring signals that would trigger the death of normal cells. Cancer cells are also exceptionally adaptable, through their ability to use new forms of energy, to escape detection by the immune system (that would normally destroy disease-causing cells or invading pathogens), and to survive in parts of the body where they don't belong. The adaptability of cancer cells is also evident in their ability to evolve rapidly to develop resistance to drugs that were effective during initial rounds of cancer treatment. While these characteristics provide several advantages for cancer cells, they also expose vulnerabilities that in some cases are already proving to be effective new targets for therapeutic intervention. Each of the articles in this series has highlighted research that has already yielded advances, or the potential for future advances, in cancer prevention, diagnosis or treatment.

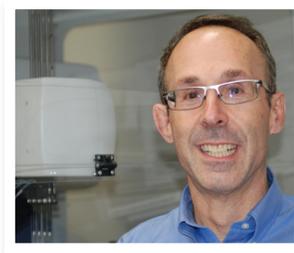
In looking to the future, it is important to recognize that the identification of the Hallmarks of Cancer has been accompanied by striking advances in technology that are yielding new insights about cancer at unprecedented rates. Many of these advances are truly remarkable. For example, while it took more than a decade and nearly \$3 billion to complete the first draft sequence of the human genome a little more than a decade ago, entire genomes from individual tumours can now be sequenced within days at a cost of a few thousand dollars. Based on these advances, publically accessible databases such as the cBioPortal (<http://www.cbioportal.org>) now provide access to information from the genomes of thousands of tumours. This has permitted the identification of many previously unrecognized genes that are associated with individual forms of cancer. These advances are being accompanied by the development of new targeted therapies directed at the

underlying causes of individual forms of cancer as well as innovative strategies to awaken or re-engage the immune system to destroy malignant cells. New, more sensitive, diagnostic imaging technologies are also being deployed to improve the detection of tumors in patients at early stages, when these tumours can be more effectively treated. Overall, while advances for some forms of cancer are still limited, it is evident that there are promising developments on many fronts for many cancer types.

In closing, while it is daunting to consider that cancer represents a collection of more than 200 distinct diseases that continue to impact the lives of individuals everywhere, it is somewhat reassuring to know that the features that distinguish cancer cells from normal cells can be characterized by a set of 10 Hallmarks. Guided by these Hallmarks of Cancer, research teams in our own community and across the world are

working together to understand the underlying basis of cancer and translate this new knowledge into improvements in prevention, diagnosis and treatment.

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“Happy Holidays from the volunteer Research Information Outreach Team (RIOT) of the Canadian Cancer Society. Best wishes health and happiness. We thank you for your support over 2015 and look forward to bringing you research discovery highlights of the past 5 years impacting the progress in the fight against cancer today and in the future. A very special thanks to The Londoner for their support in ensuring these messages of promise and progress comes to you every month. Come follow us on a journey of promise and progress in 2016 right here at The Londoner!