

Metastases: the role of saturated fats

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A study has shown that the metastases from several different types of cancers are derived from subpopulations of tumor cells which express the fatty acid receptor CD36 at their cell surface. The activation of this receptor by a saturated fat that is ubiquitous in modern diets (palmitate) stimulates the formation of these metastases, suggesting that an excess of saturated fats in the diet could play an important role in the evolution of cancer.

Nearly **90% of the deaths** associated with cancer are directly caused by the presence of cancer cells which have migrated away from the principal tumor and colonized other organs in the form of metastases.

Preventing the formation of these metastases thus represents a necessary target for improving the effectiveness of anti-cancer treatments and, consequently, the survival rates for cancers which are diagnosed at an advanced stage. This is, however, an enormous challenge because little is understood about the mechanisms involved in the formation of these metastases nor about the factors which push some cancer cells to detach from the principal tumor in order to relocate to different locations in the organism.

METASTATIC SIGNATURE

Results recently published in the prestigious journal *Nature* shed new light on this phenomenon and could revolutionize our way of understanding and treating metastases.

By analyzing tumor cells removed from patients suffering from oral cancer, a team of Spanish scientists showed that the metastases were derived exclusively from a subpopulation of cancer cells which express several genes involved in the metabolism of fats, such as the protein CD36, a receptor which specifically binds fatty acids¹.

The presence of this protein seems to be absolutely essential for the development of metastases because the simple act of artificially expressing it in non-metastatic cancer cells is sufficient to trigger this process in animal models. This participation of the protein CD36 in the metastatic process seems to be a common characteristic for several types of cancers (ovarian, bladder, lung, melanoma and breast) and, clinically, scientists have observed that the presence of cells expressing CD36 was correlated with highly aggressive tumors and with poor prognosis.

These results thus suggest that the protein CD36 is a “signature” for cells which have the potential to form metastases, which could finally permit scientists to specifically study these cells in order to better understand the mechanisms which allow them to form colonies within the organism.



Along similar lines, it is encouraging to note that the authors have already observed that an antibody which specifically blocks the protein CD36 led to complete inhibition of the formation of metastases in mice, and it will be very interesting to see if this approach could eventually be applied to the treatment of human cancers.

A QUESTION OF FAT

Given that the function of the protein CD36 is to bind fatty acids, the specific presence of this protein in a subpopulation of metastatic cells suggests that these common dietary fats could influence the formation of metastases. That is exactly what the researchers observed; in mice fed a diet rich in fat, the number and size of metastases present in the ganglia were drastically increased and this phenomenon could be reproduced by simply administering palmitate, one of the principal saturated fatty acids in foods.

It seems that excessive consumption of saturated fats can promote the evolution of cancer in the form of metastases, which could contribute to the increased level of mortality observed in patients who consume a “Western” diet, which is often enriched in these fats.

The substitution of saturated fatty acids present in processed foods and in foods of animal origin (red meats, deli meats and dairy products) by unsaturated fatty acids could allow us to correct this disequilibrium and to prevent the tumor cells from becoming able to migrate within the organism.

In this sense, it is interesting to note that the consumption of omega-3 polyunsaturated fatty acids of animal origin (from salmon and other oily fish) is associated with a marked diminution (40%) in mortality for people suffering from colorectal cancer².

- ⁽¹⁾ Pascual G et al. Targeting metastasis-initiating cells through the fatty acid receptor CD36. *Nature* 2017; 541:41-45.
- ⁽²⁾ Song M et al. Marine ω -3 polyunsaturated fatty acid intake and survival after colorectal cancer diagnosis. *Gut*, published online 19 July 2016.