Cancer can growth without angiogenesis. A new field opened in cancer biology

The word cancer derives from the Greek “karkinos “which means “crab”. According to the legend reported by Paul of Aegina in the 7th Century AD, this name was chosen because this disease "has the veins stretched on all sides as the animal the crab has its feet, whence it derives its name". The relation between cancer and blood vessels has therefore captured the attention of physician including Hippocrates and Galen for many centuries.

In the second half of the 20th century was accepted as a fact the hypothesis of Judah Folkman that a tumour can only growth if it is able to induce production of new vessels sprouting from the surrounding normal tissue. According to this idea, no cancer could become larger than a few millimeters, or metastases could develop, if new vessels were not produced. The stimulation of these new vessels by cancer cells is called “angiogenesis”. The induction of angiogenesis was considered to be mandatory for all the tumours and was therefore regarded as one of the fundamental Hallmarks of Cancer.

This idea lead than to the conviction that by blocking the growth of these new vessels all the cancers would have been kept under control, it if not cured. Indeed in 1998 the Nobel Prize winner James Watson stated 'Judah (Folkman) is going to cure cancer in two years'. However the use of these drugs did not produced the expected results.

The main reason behind these failure was that actually it is not true that tumours need to induce new vessels to growth. They can also expand in absence of angiogenesis: these tumours are called “non-angiogenic”. It has now also discovered that, once that a tumour becomes angiogenic can, later on, switch to growth in a non agiogenic fashion.

The study of these non-angiogenic tumors has opened a new vast field in cancer biology, but so far we have only just scratched the surface. So what now are the most pressing questions?

The first set of questions is why these tumours do not induce new vessels formation and still manage to growth and what are the mechanisms that allow a cancer cell to change from angiogenic to non-angiogenic and viceversa.

Second, how do the cancer cells interact with the pre-existing vessels and exploit them instead of infiltrate and destroy them, as the other tumours do.

Finally, we cannot be as optimistic as James Watson was in 1998, however as we start to better understand how these tumours work and we are getting more information on the interaction between cancer cells and blood vessels, it is likely that we will be able to find yet more ways to treat cancer.

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Publication

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