

■ by *Domenico Bergero, Cynthia Préfontaine*

**I**n Italy, tumors are the most frequent cause of death for people, and they are rightly known and feared by everyone. Things are different for horses. The chances of a horse being struck by this disease are very low and, when that happens, the news is sensational.

In actual fact, sadly, our horses are also affected by various types of tumors, and their frequency is probably underestimated.

### **WHAT ARE TUMORS?**

A tumor or neoplasm (from the Greek *neo* = new and *plasm* = formation) is a disease characterized by an uncontrolled growth of some cells, which stop responding to the normal control mechanism due to damages to their genetic material. All cancer and pre-cancer cells present widespread abnormalities in their genetic material: the number of chromosomes in their nucleus is altered and the chromosomes themselves are damaged, multiple or missing.

The genetic alteration of tumor cells is so striking and widespread that it provides evidence that in every case of tumor, all cancer cells derive from just one single mutated mother cell. All these cells share exactly the same form of alteration, so complex that it makes the chance of two different mother cells having mutated in the same way highly unlikely. Not all the alterations of the genetic material cause tumors, however; in order for a tumor to develop, some specific genes involved in DNA repair must be altered. These genes are those that ensure genetic stability, because if other genes are mutated due to the effects of carcinogenics, they repair the DNA before these mutations become stable. The random genetic disorder characterizing tumor cells explains why many known forms of cancer vary significantly in terms of appearance, effects, symptoms and prognosis. Cancer can affect individuals of every age, but

elderly people are more frequently affected because genetic damages tend to accumulate over time.

### **BENIGN AND MALIGNANT TUMORS**

Tumors can be split into “benign” and “malignant”. The former are represented by cells partially maintaining their initial characteristics, even though they multiply excessively and independently. They are characterized by a so-called proliferation phase, during which they compress nearby tissues without destroying them. For example, benign tumors of glandular origin (adenomas) are often wrapped in a capsule of fibrous tissue, which clearly separates them from nearby tissues.

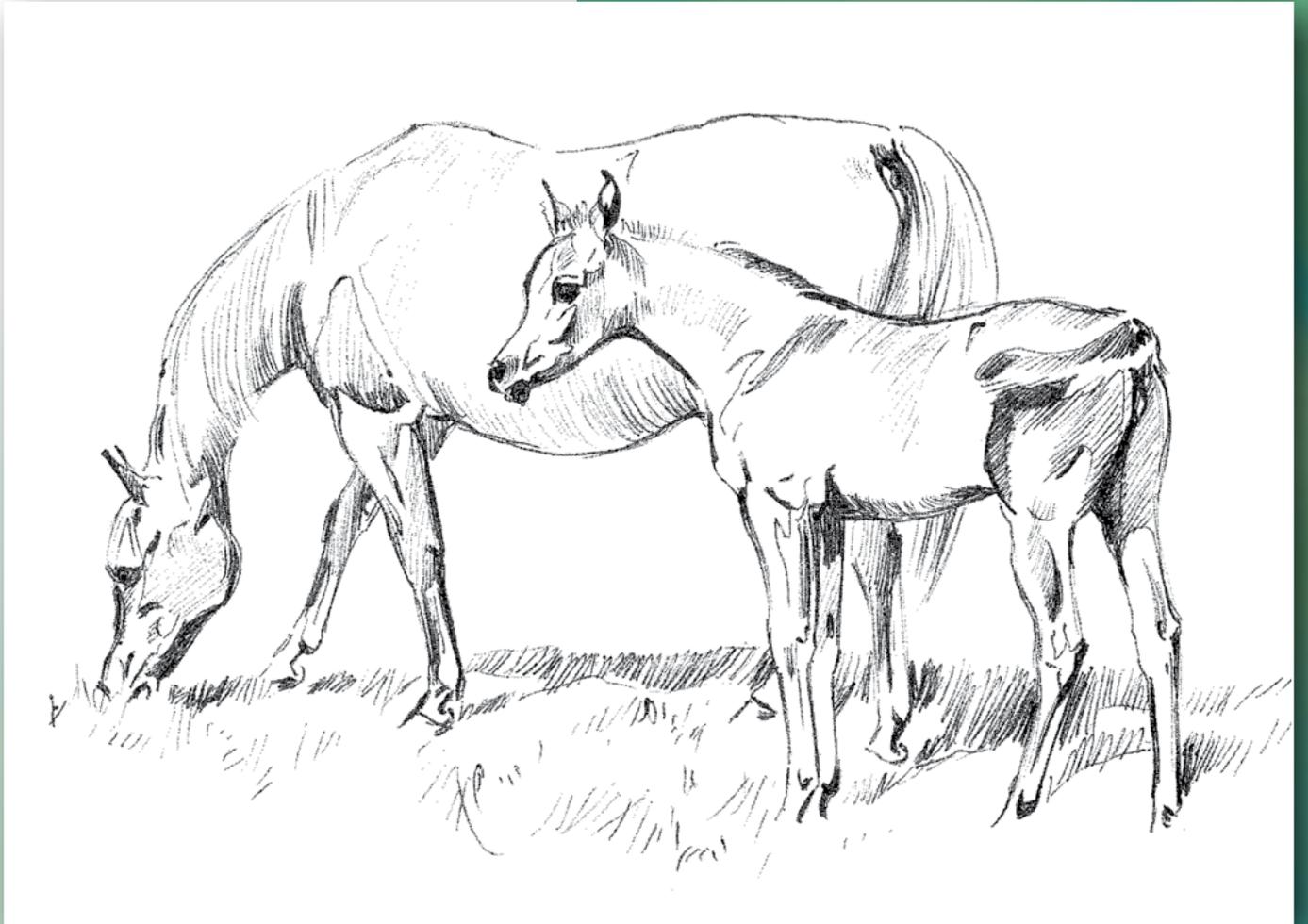
Malignant tumors, on the other hand, are made up by cells that appear very different from their normal equivalents. This diversity, which is all the more visible the more the tumor is undifferentiated, manifests itself in the inconsistent size and shape of the cells and their constituents, especially the nucleus, which is often in the process of reproduction. Tissues near the malignant tumor are regularly attacked and destroyed by tumor cells, which replace the normal ones – a phenomenon known as “neoplastic invasiveness” that is typical of malignancy.

In some cases, tumors represent an intermediate process between malignancy and benignity (borderline tumors) or cannot be classified (tumors with an uncertain biological behavior). In these cases, the frequency of metastases is generally very low and the course is slow.

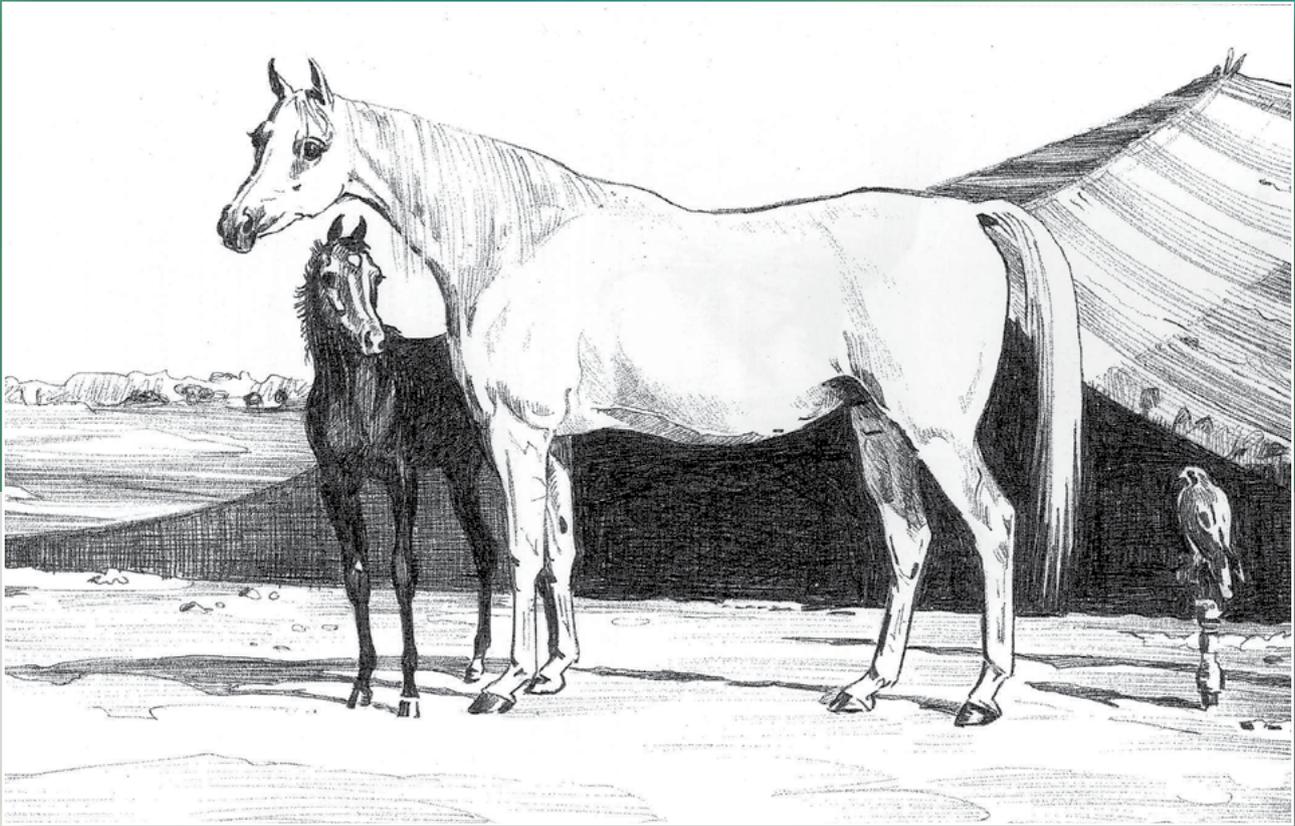
### **TUMOR DIAGNOSIS**

Usually, the nature of tumors and their extension in the organism is initially diagnosed through clinical tests, integrated by laboratory data and medical imaging (scans, traditional X-ray tests or computerized versions (CAT), scintigraphy with radioisotopes, magnetic resonance imaging (MRI) and

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positron emission tomography, PET). The confirmation of the nature, degree of malignancy and extension of tumors is provided by the histological tests of the tissues, which is increasingly often integrated by other techniques (identification of antigens or molecular biology techniques aimed at studying nucleic acid (genomics) or proteins (proteomics).

### TUMORS IN HORSES

As already mentioned, horses are also, sadly, affected by various types of tumors. In a study carried out in the last couple of years by researchers from the University of Turin, 54 tumors were identified, which had affected horses aged between 2 and 24 years, mostly male. At times, the tumors were found in working horses, others were located at the slaughterhouse, others were observed during an autopsy.

Of all these tumors, roughly half of them were malignant. This already gives us something to ponder upon, even though other studies have shown a clear prevalence of benign tumors. Most of them were skin tumors, followed by tumors affecting male genitals, eyelids, eyes, thyroid, hypophysis, kidneys and liver.

Without going too much into the various types of cancer, the most frequent forms that have been diagnosed are papillomas (benign tumors which, however, in some cases can contain malignant cells and can develop on the skin or on mucosal areas, especially larynx and bladder) and sarcoids (a skin tumor particularly frequent in horses, mules and donkeys). The results of other studies can be compared. Tumors in hor-

ses accounts for approximately 5–10% of diseases requiring surgical treatment, but it is worth highlighting that in many cases the tumor can be seen (for instance, in the case of skin tumors) but is not always treated, especially if malignant.

### MELANOMA

A particular type of tumor is represented by melanoma, which affects gray horses.

As known, when gray horses are born their coat is black, but the hairs start already to gray in their first year of life. The process is usually completed between their sixth and eighth year of life, but the skin remains pigmented (i.e. gray). Even though this graying seems similar to what happens to men, in these horses this process takes a very short time, compared to the appearance of gray hair in people.

The graying of hairs is the result of a particular genetic mutation. Unfortunately, this mutation seems to increase the risk of melanoma: approximately 75% of gray horses over 15 years of age present a benign form of melanoma, which in some cases may turn into a malignant melanoma.

Therefore, equine melanoma is a very common form of cancer that affects predominantly (though not exclusively) gray horses aged more than 8. Most of the lesions are at skin level, but internal organs are usually affected too.

Nearly all melanomas found in gray horses are benign, but the tumors affecting horses of colors other than gray have a stronger tendency to malignancy. Only in very few gray horses are the tumors highly malignant.

The perineum (the region underneath the tail and around the anus) is the most common areas, but actual melanomas can be found also somewhere else. When a horse presents melanomas, there are few chances of getting it treated. Recently, cimetidina was used with some encouraging results, albeit not leading to a complete recovery. In any case, this treatment is not dangerous even if the hoped-for effect is not obtained.

### **SARCOIDS**

Equine sarcoids can be defined as skin tumors not originating from particular cells (fibroblasts), especially frequent in horses, mules and donkeys. Even though it is not life-threatening, depending on its position it can cause aesthetic and functional damages, which undermines the use of the horse and decrease its market value.

Currently, unfortunately, no treatment is available that can completely and safely remove sarcoids. After treatment, relapses are frequent or new tumors develop in nearby tissues, and these are more aggressive than the original one. Prognosis, as well as the choice and response to therapy, varies depending on the size, the number, the position and the type of lesions. □

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