COMPANION ANIMAL
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What to do with the results of the histopathology report of a tumour: clinical interpretation

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One of the most important specialties clinicians with oncologic patients have to cooperate with is pathology. A good interaction between the clinician and the pathologist is vital for an adequate management of the patient. Apart from a mere histological diagnosis there is so much more a pathologist can do to help the clinician to optimize treatment and help to give a correct prognosis.

Pathologists usually give lengthy reports of the biopsy or specimen they have investigated. Clinicians usually only read the part of the pathology report in which the diagnosis is given and think that this is the absolute truth. They do not realize that this is the conclusion of a think process in which the pathologist is considering several possibilities and in the end selects one of them as the diagnosis. How sure they are can often already be read in the microscopy section of the report. However, it starts with the description of the macroscopy and the quality of the biopsy/section. In the microscopy section the think process how the pathologist came to his diagnosis is described. Tissue origin and aspects of malignancy are important aspects. If many aspects of malignancy are listed here than the reliability of the diagnosis cancer may be much higher, depending on the tissue origin, than if only few or no malignancy criteria are listed. One should realize that a pathologist can come to a wrong interpretation of the histological features of the tissue for instance due to the fact that the biopsy is not representative of the underlying lesion, or they can just make a mistake. If a diagnosis is completely different from what the clinician was expecting than the pathologist should be contacted and the case should be discussed. A good relationship between the two of them is therefore very important.

Routinely slides are stained with HE stain. Often the pathologist can establish the tissue origin based on this stain. Sometimes a pathologist is not sure of the tissue origin of the neoplasm and he reports this in his final conclusion. It is important to know that additional information can be obtained with special staining of the slides or even polymerase chain reaction (PCR) tests. Differentiation between epithelial and mesenchymal tissues is possible using immunohistochemical stains like cytokeratins and vimentin, respectively.

To know if the tumour was completely resected is another very important piece of information. Often this is reported in the conclusion of the pathology report. But also here the reliability of this conclusion can only be evaluated if one reads the total report. In the macroscopic section it is described whether a complete tumour was send in or only a fragment (which of course will than not be a guarantee of complete resection). In the microscopic section the distances between the border of the tumour and the margin of the resection is mentioned. The wider the neoplasm free margin, the more reliable the conclusion. A pathologist will only look histologically at a relatively small part of the surgical margins of the tumour and has to select an area of the whole specimen to make his sections for histological evaluation. The clinician can help him by inking interesting areas after resecting the tumour and before putting it into the fixative.

In order to have an idea about the prognosis apart from the already mentioned completeness of resection several malignancy aspects can be found in the pathology report. When lymph nodes are also send in, information on the presence of tumour cells or suspect tumour cells in this lymph node is important. Other malignancy criteria are growth pattern, including aspects of infiltrating growth, presence or absence of encapsulation, cellular morphology and differentiation, and signs of proliferation of the tumour cells (mitosis index, proliferation markers). If the tumour is infiltrating lymph or blood vessels there is a high likelihood of the presence of metastases. Signs of a high proliferation of cancer cells are mitoses, but sometimes also areas of necrosis might be associated with a high growth rate, as a high proliferation and a high cell death are often linked. For some tumours, like the mast cell tumour, additional information about the proliferation can be obtained and have been evaluated to be of prognostic significance. Proliferation markers like Ki67, PCNA, and the AgNORs can be used on paraffin embedded slides. The pathologist usually reports a percentage of tumour cells that stain positive and which indicate cell proliferation. For each tumour type cut-off values are given for low and high values.

Sometimes different markers can help to characterize malignancy of the tumour. A nice example is the immunostaining for the KIT receptor (not to be confused with the present of a mutation in the c-KIT gene) in mast cell tumours. Three different staining patterns can be recognised, which are related to prognosis. For many tumours all this information leads to a conclusion of the pathologist on the malignancy grade of the tumour.

Sometimes additional information is needed from the pathologist. In the treatment of lymphomas prognosis is depending not only on the malignancy grade, but also on the immunophenotype. In dogs high grade B-cell lymphomas do better on chemotherapy that T-cell lymphomas. In the near future, the treatment of B-cell and T-cell lymphomas will be different. Therefore correct characterization of these tumours with special tumour markers (CD3 for T-cell lymphomas and CD79a, CD20 or PAX5 for B-cell lymphomas) can be vital.

Although immunohistochemistry can be a valuable tool for the pathologist it is important to realize that characteristics of the neoplasm like poor differentiation or necrosis, and aspects of tissue preservation like autolysis and over fixation can lead to false negative or false positive immunoreactivity of the neoplastic cells.

In conclusion, much more information can be obtained from a histology report than just reading the final conclusion on tumour type. A good and frequent contact with the pathologist will pay off in the clinic when treating cancer patients. But also the pathologist can only perform optimal if an adequate description of the case by the clinician is given and a good biopsy is delivered. Like Victor Perman already mentioned decades ago: *Carbage in, Carbage out*!