12-year-old, male castrated, European shorthair cat with history of lameness and swelling/ulceration of multiple digits.

Which of the following is the most likely association between the digital and the pulmonary lesions?

1. Digital metastasis of a pulmonary carcinosarcoma CORRECT
2. Multiple eccrine carcinoma with pulmonary adenocarcinoma
3. Digital metastasis of a pulmonary fibrosarcoma
4. Multiple eccrine carcinoma with pulmonary carcinomasarcoma
5. Digital metastasis of a pulmonary adenocarcinoma

Signalment: 12-year-old, male castrated, European shorthair cat.

History: The cat was presented for investigation with a history of lameness and swelling/ulceration of multiple digits. Nails were lost or easy to remove. No respiratory signs were present. A biopsy from one affected digit was performed and after the results of histopathological examination and collateral investigations, the cat was euthanized.

Histopathologic Description: On histopathological examination of the digit biopsy a multifocal to coalescing, non-encapsulated, infiltrative growing mass was noted in the mid and deep dermis. The mass was composed of nests, packets and cords of epithelial cells, sometimes forming central cavities containing degenerated and desquamated cells (pseudo-acini). Anisocytosis and anisokaryosis were marked, karyomegaly as well as multinucleated cells were noted and mitotic figures were common, with atypical mitoses being observed (Fig. 1). At necropsy, the gross examination of the cadaver confirmed the involvement of multiple digits. After epilation of one distal limb, numerous swellings and deformities of the phalanx bones were noted (Fig. 2). A lung mass was noted in the left caudal lobe in association with smaller masses in the mesenterium, spleen and kidney (Fig. 3). The lung mass consisted of both neoplastic epithelial (papillary adenocarcinoma) and mesenchymal cells rather than an epithelial malignancy with a desmoplastic stroma. The biphasic nature of the neoplastic tissue was confirmed by the immunohistochemical examination using a panel of antibodies for epithelial and mesenchymal cells (Fig. 4). In the metastases (mesenterium, spleen and kidney) only the epithelial component was observed (Fig. 5).

Morphologic diagnosis: Pulmonary carcinosarcoma with digital, splenic, mesenterial and renal metastases.

Name of the disease: Feline lung digit syndrome (with primary pulmonary carcinosarcoma)

Comment: Feline 'lung-digit syndrome' is a term used to describe metastasis to one or more digits of primary lung tumors in the cat. The most common feline primary lung tumors are of epithelial origin, with adenocarcinoma being the most reported one, followed by anaplastic carcinoma, squamous cell carcinoma, sarcoma, malignant fibrous histiocytoma, adenoma and, rarely, lymphoma. Affected animals have a mean age of 12 years with no predisposition of sex or age. Among the primary lung tumors, bronchial and bronchoalveolar carcinomas are the most commonly reported to metastatize to the digits. Metastatic emboli are thought to reach the digits through arterial blood supply and the weight bearing footpads and digits are most commonly affected. In many cases, involvement of multiple digits or limbs is described. Signs as swelling of the digits, ulceration, purulent discharge and lameness are often the earliest clinical signs detected and prompt the veterinarian to perform further clinical analyses (X-ray) to confirm the presence of a lung tumor. X ray can also demonstrate lysis of the adjacent phalanx or metatarsal bone, which is often present due to bone invasion by the tumor. A paraneoplastic syndrome with hypercalcemia was also associated in some reports. Depending on the case studies, neoplastic diseases represent up 74% of diagnostic laboratories submissions of conditions affecting the digits of cats and metastases of a
A suspected primary pulmonary neoplasm represent up to 20% of these cases. Differential diagnoses for multiple-digit disease in a cat are infectious diseases (Nocardia, mycobacteria, fungi), immune-mediated diseases and other metastatic tumors. Other differential diagnosis, especially of one digit is affected, are primary neoplasms of the digit. Histopathological examination of digital metastases often reveals the presence of ciliated epithelial cells and goblet cells. PAS positive cytoplasmic vacuoles suggestive of secretory activity (adenocarcinoma) are also seen. This case of the month is uncommon because the primary lung tumor had a mixture of epithelial and mesenchymal components, both showing atypical features and therefore was classified as a pulmonary carcinosarcoma. Metastases in distant organs (spleen, kidney and mesentery) were characterized by the epithelial component only, whereas the mesenchymal component was absent. Pulmonary carcinosarcomas are rare in human medicine and are defined as tumors having a mixture of malignant epithelial and mesenchymal elements. The epithelial component can be represented by a squamous cell carcinoma, adenocarcinoma, large cell carcinoma or, rarely, a small cell carcinoma whereas the mesenchymal component is most often a poorly differentiated spindle cell sarcoma with or without areas of rhabdomyosarcomatous, osteosarcomatous and chondrosarcomatous differentiation. The metastatic lesions in these tumors are more often only carcinomatous, less commonly only sarcomatous and only in a small percentage of cases are both components recognizable in the metastases. In the present case of the month, the cat had a lung tumor with an epithelial component represented by a papillary adenocarcinoma and the mesenchymal component represented by a poorly differentiated spindle cell sarcoma. No muscular, osseous or cartilaginous differentiation were noted. The metastases showed only the epithelial component.

<table>
<thead>
<tr>
<th>HISTOLOGIC FINDINGS</th>
<th>RELATIONSHIP WITH EPIDERMS</th>
<th>DIGITS</th>
<th>LUNG</th>
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</thead>
<tbody>
<tr>
<td><strong>PRIMARY DIGITAL CARCINOMA</strong></td>
<td></td>
<td></td>
<td>no lung tumors</td>
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<tr>
<td>Squamous cell carcinoma</td>
<td>tumor connected with the epidermis</td>
<td>one or more digits</td>
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<tr>
<td>Apocrine/eccrine gland carcinoma:</td>
<td>generally no connection with the epidermis</td>
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<td>no corneification and necrosis, no</td>
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<td>PAS+ cells</td>
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<tr>
<td><strong>METASTATIC LUNG TUMORS</strong></td>
<td>no association with epidermis or adnexa</td>
<td>one or more digits</td>
<td>primary pulmonary carcinoma, +/--metastasis</td>
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<td>+/- goblet cells, ciliated cells,</td>
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<tr>
<td>PAS+ cells, no corneification</td>
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<tr>
<td><strong>THIS CASE</strong></td>
<td>no association with epidermis or adnexa</td>
<td>more digits</td>
<td>primary pulmonary carcinosarcoma with carcinomatous metastasis</td>
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</tbody>
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References:


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Figure 1. 12-year-old, male, European short-haired cat. Histopathological examination of the biopsy from one of the affected footpads revealed a non-encapsulated, multifocal, infiltrative growing mass. The neoplastic cells formed islands and nests separated by a variable amount of fibrovascular stroma. Anisocytosis and anisokaryosis were mild to moderate and mitotic figures were up to 4 per HPF. Sometimes the cells were arranged in tubular structures and in the center of them often necrotic cells were present, resulting in a pseudoglandular appearance.
Figure 2. 12-year-old, male, European short-haired cat. At necropsy, multiple digits were swollen and showed ulcerations. Nails were lost or easy to remove.
Figure 3. 12-year-old, male, European short-haired cat. At necropsy, a lung mass was noted in the left caudal lobe. The mass was measuring 4 x 4 x 3 cm, whitish, with irregular borders and firm consistency. Several smaller nodules of similar appearance were present in the spleen, on the mesentery and in the kidney.
Figure 4. 12-year-old, male, European short-haired cat. The lung mass consisted of two components: an epithelial one, with the features of a papillary adenocarcinoma, and a mesenchymal one. Both populations of cells showed marked anisocytosis and anisokaryosis and a high mitotic rate. The biphasic nature of the neoplastic tissue was confirmed with an immunohistochemical examination using antibodies for cytokeratin and vimentin.
Figure 5. 12-year-old, male, European short-haired cat. In the metastases (lymph node, mesenterium, spleen and kidney) only the epithelial component was observed, as demonstrated by the positivity to cytokeratin and negativity to vimentin.