INTRODUCTION

After submission of a manuscript dealing with the histopathology of a harbor seal stranded on the coast of Toyama Bay, Sea of Japan, an adenocarcinomatous proliferation was unexpectedly detected in the gastric lymph nodes of the specimen. Previous findings included a signet ring cell carcinoma associated with scirrhous cancer in the stomach, cortical adenoma in the kidney, and extensive proliferation of macrophages in the gastric lymph nodes. In order to determine whether or not metastasis had occurred, the examination focused on adjacent organs, including the gastric lymph nodes. As a result, a carcinomatous growth was found in the gastric lymph nodes, which had been overlooked previously.

MATERIAL AND METHODS

We have already reported elsewhere the histopathological studies of several organs of an apparently young but seriously emaciated harbor seal, Phoca largha, found stranded on the coast of Toyama Bay in March 1998. Routine histological procedures on the visceral organs, such as the stomach, intestine, kidney, and lymph nodes, already outlined in the previous paper, are also applied in the present report.

RESULTS

In the medullary region of the gastric lymph nodes, a framework that was constructed from the centrally-positioned medullary cords in association with capillaries and masses of well-developed glandular cells were recognized (Fig. 1).

The medullary sinus comprised scattered masses of small lymphocytes and a considerable number of macrophages, which have been described elsewhere (Fig. 2). In the marginal zone of the medulla, a marked tumorous growth was observed. Hematoxylin-eosin (HE) staining revealed many glandular cavities of various sizes (Fig. 3). Occasionally, material in the cavities was stained very weakly by the hematoxylin. In contrast, aldehyde fuchsin (AF)–Masson-Goldner (MG) stain consistently showed strongly AF-positive mucoids, which were produced by the tumorous cells, present in the cavities (Fig. 4). A considerable number of cells that had collapsed and liquefied also showed an AF-positive reaction, and small masses of lymphoid cells were sporadically seen in the mucoid sub-
Adenocarcinoma in a harbor seal

**Fig. 1** Section of a gastric lymph node from a harbor seal showing masses of glandular cells (g) and lymphoid cells (lc) (hematoxylin-eosin stain; ×70).

**Fig. 2** Section of a gastric lymph node from a harbor seal, with a strong proliferation of active phagocytic macrophages (m) and masses of lymphocytes (l) (hematoxylin-eosin stain; ×70).

**Fig. 3** Section of a gastric lymph node from a harbor seal, showing many glandular cavities (c) and vacuoles (v) (hematoxylin-eosin stain; ×350).

**Fig. 4** AF-positive mucoid substance (arrow) in the glandular cavities (Fig. 3) of a gastric lymph node from a harbor seal. [Aldehyde fuchsin (AF)–Masson-Goldner (MG) stain; ×350].

...stain (Fig. 5). However, the staining procedures failed to clearly demonstrate reticular cells.

Most of the cells, cuboidal to low columnar in shape, and usually in a row, had gathered to form a mass. The centrally-positioned nucleus was surrounded by a deeply-stained nuclear membrane, and had distinct chromatin masses and a large prominent nucleolus (Fig. 6). Occasionally, large, pale, long ovoid cells were apparent. Eosinophilic colloid droplets were occasionally detected in the vacuole or lacuna. Several cells that had migrated toward the lacuna had gathered to form a pancreatic acinus-like structure. In some places, the histological preparations revealed an architecture that was similar to adipose tissue (Fig. 3).

A large amount of mucoid substance was detected near the marginal sinuses (stained by AF–MG). During that staining procedure, it was noted that the nuclei were deeply stained by ponceau (Fig. 4). Low columnar cells arranged in a glandular formation were recognized in several places (Fig. 6). Moreover, follicle-like structures, comprising inflated cells, were seen. Notably, mitotic figures were very rarely seen in the tumorous cells (Fig. 7).

On the other hand, the initial symptoms of adenocarcinomatous change that were observed in the cortical (i.e. peripheral) region were lymphoid cells having correspondingly decreased in number. The number of clumps of melanin granules in the cortex was much greater than that in the medulla. Moreover, in the malignant portion, a small amount of interstitial tissue, but a large amount of carcinomatous tissue, was apparent (Fig. 1).

**DISCUSSION**

The histological characteristics described in the present paper were diagnosed as adenocarcinoma, having glandular cavities consisting of cells with a precise nucleus and distinct nucleolus. Lingeman et al. and Lingeman and Garner reviewed the infrequent occurrences of gastric and intestinal adenocarcinomas found in vertebrates (excluding amphibians and fish), particularly dogs (Carnivora). They reported canine gastric carcinomas to correspond closely to the human diffused type, with the incidence of canine gastric carcinomas to be more frequent in males. Similar findings were later reported by Patnaik et al.

It is probable that the carcinomatous cells in the male harbor seal of the present study originated from the stomach cancer, which was described previously as signet ring cell carcinoma (diffuse type) associated with scirrhouus cancer. The carcinomatous cells may have transferred via vascular canals to the marginal sinuses of the gastric lymph nodes. Hence, further tumorous growths were suc-
cessively established in the lymph nodes and kidney (diagnosed as adenoma). To our knowledge, prior to the present report, cases of adenocarcinoma (of epithelial cell origin) in the gastric lymph nodes of marine mammals have not been reported in papers documenting the lymphoid organs of mammals.6–11

Cowan surveyed the pathological conditions of the spleen of pilot whales, noting granulomatous nodules in three individuals and amyloid-like material in the follicles of four individuals among a total of 55 individuals examined. He further described edematous alteration, lymphatic and inflammatory changes, and tiny foci with multinucleated giant cells. In the latter case, it is likely that the cells indicated by Cowan6 and Honma et al.1 are equivalent to the multiplicate macrophages documented in the present study. Moreover, although many specimens were examined, the reports by Schumacher et al. on hundreds of harbor seals8 and Cowan and Smith on 50 stranded bottlenose dolphins9 both failed to demonstrate adenocarcinoma in the lymph nodes.

Accordingly, the present study appears to be the first to document adenocarcinoma of the lymphoid organs among pinnipeds, although Lingeman CH, Garner FM, Taylor DON. Spontaneous gastric adenocarcinomas of dogs: a review. J. Natl Cancer Inst. 1971; 47: 137–153.

REFERENCES

