# An interesting case of a mucinous tumour of the breast

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## Abstract

We report the case of a mucinous cystadenocarcinoma of the breast in an elderly patient who presented with a large breast mass. Mucinous cystadenocarcinoma is a rare subtype of breast carcinoma. It classically occurs in post-menopausal women and is usually negative for ER, PR and HER2. This tumour may be difficult to differentiate from other similar variants of breast carcinoma and particularly from metastatic mucinous cystadenocarcinomas originating from other organs, such as the ovary and pancreas.

**Keywords** breast carcinoma; breast pathology; mucinous cystadenocarcinoma; mucinous tumour

## Case report

A lady in her eighties presented acutely to hospital with a unilateral breast mass with some associated bleeding from the nipple. The patient had no history of trauma. On subsequent assessment in breast clinic, clinical examination identified a 50 mm unilateral breast mass with a recently formed overlying scab. A breast ultrasound scan showed a 60 mm mixed echotextured lesion with marked vascularity which was indeterminate in nature. Subsequent mammogram showed a 53 mm illdefined mass centrally within the breast. Overall, the radiological picture was suspicious for malignancy (R4). Needle core biopsies were performed and showed a cystic lesion lined by atypical epithelium with some papillary formations and mucinous material. SMM and P63 immunohistochemistry confirmed the absence of a myoepithelial layer beneath the atypical epithelium. The favoured diagnosis was encapsulated papillary carcinoma and a B5a coding was given as no definitive foci of invasion were seen.

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The patient proceeded to mastectomy. Macroscopic assessment of the mastectomy specimen revealed a 65 mm well circumscribed solid cystic mass with areas of haemorrhage and some gelatinous areas (Figure 1).

On microscopy, the tumour was composed of cystic spaces with rounded contours that were lined by tall columnar cells (Figure 2). The cystic spaces were filled with extracellular mucin and there was also abundant intracytoplasmic mucin within the tumour cells (Figure 3). There were areas in which the cystic spaces were lined by a single layer of cells and other areas in which there was some stratification and tufting of the cells, as well as some papillae formation (Figure 4). The degree of cytological atypia was variable, with cytologically bland areas and

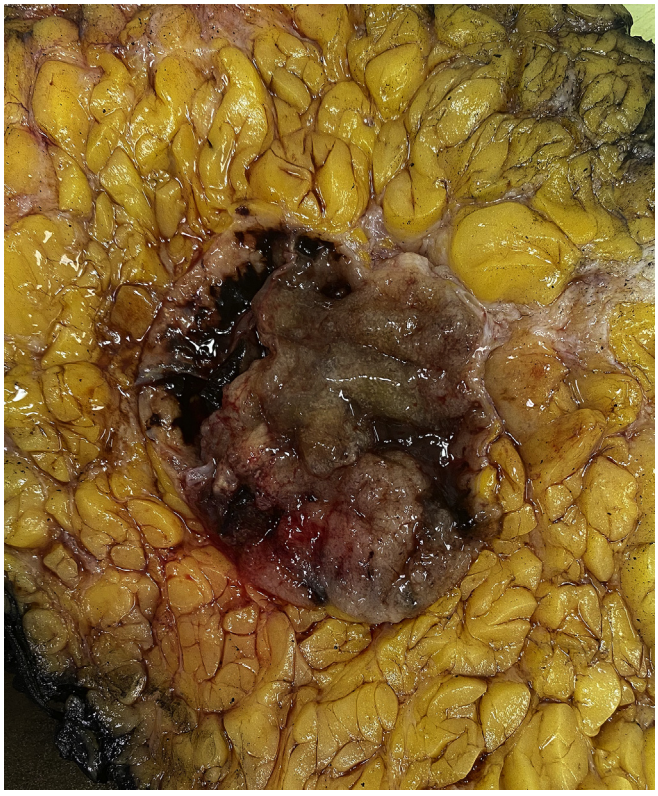

**Figure 1** Macroscopic image of tumour.

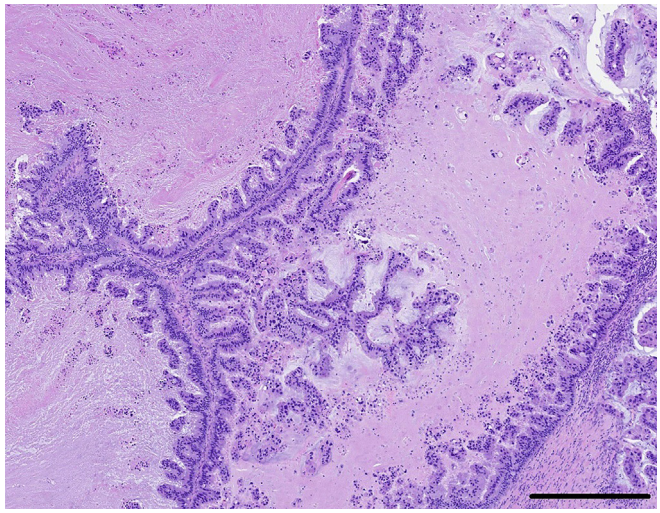

**Figure 2** Cystic spaces within tumour (500um scale).

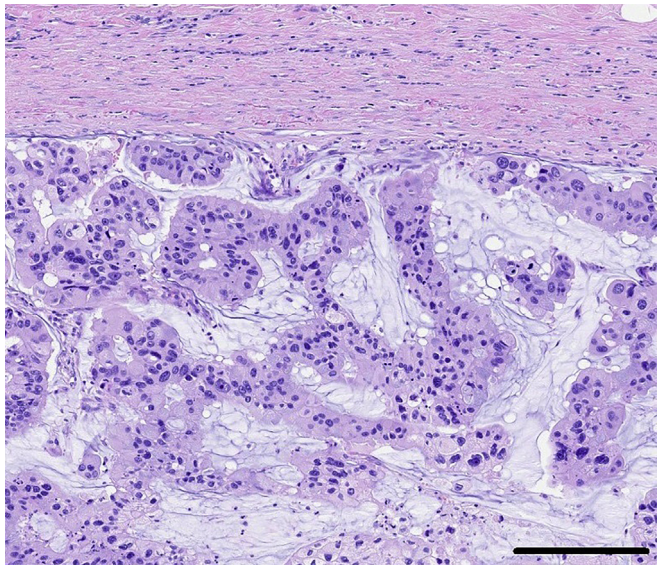

**Figure 3** Intracellular and extracellular mucin (200um scale).

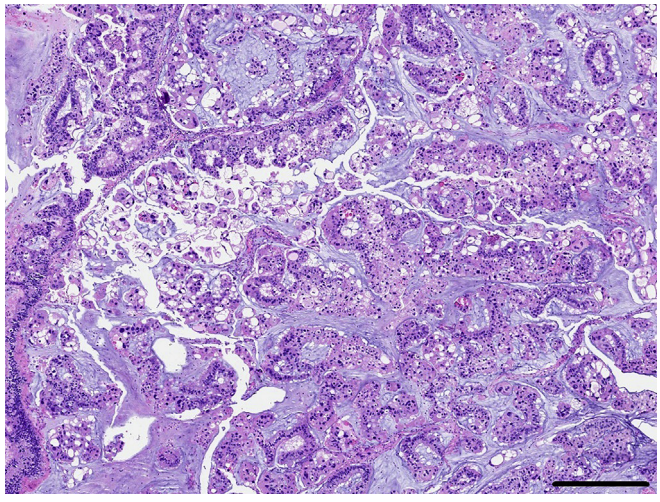

**Figure 4** A range of features seen within mucinous cystadenocarcinoma (500um scale).

areas with more pronounced nuclear pleomorphism (Figure 5). The more cytologically atypical areas also appeared to show some apocrine features in the cells and had a growth pattern which was less cystic, being composed of islands and tumour cells lying in mucin, like that seen in mucinous carcinoma. Focal ductal carcinoma in situ (Figure 6) and lymphovascular invasion were identified at the edge of tumour. SMM and P63 immunohistochemistry confirmed the presence of a myoepithelial layer in the ductal carcinoma in situ and absence in the main tumour. Lymphovascular invasion was confirmed using CD34 immunohistochemistry. The tumour cells expressed BRST2, CK7, GATA-3 and AR. They were negative for CK20, CDX-2, WT1, PAX-8, ER, PR and Her2. The final diagnosis was mucinous cystadenocarcinoma of the breast.

## Discussion and conclusion

Mucinous cystadenocarcinoma is an exceptionally rare primary breast cancer, first described in the literature in 1998[1] and with

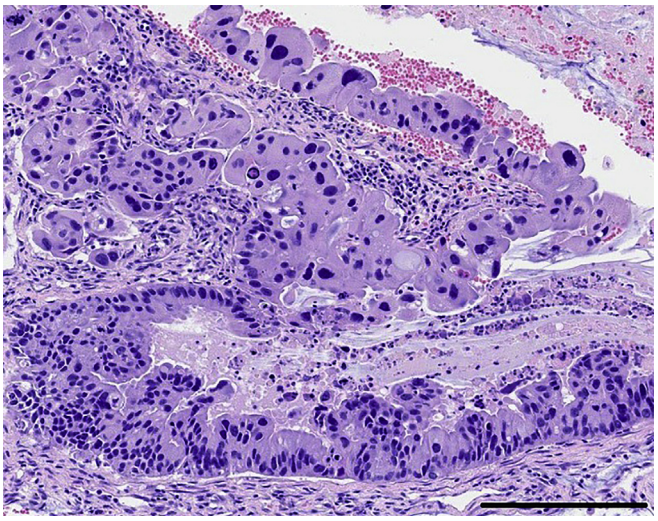

**Figure 5** Variable cytological atypia (200um scale).

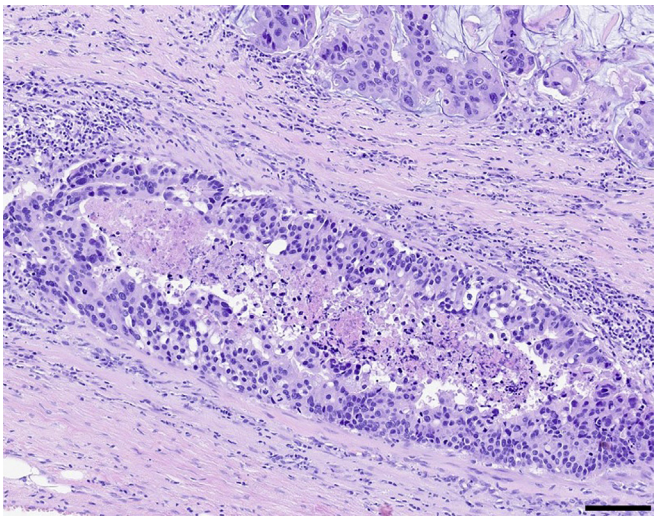

**Figure 6** Area of DCIS (100um scale).

**Comparative morphology of primary breast tumours in the differential diagnosis of mucinous cystadenocarcinoma[2,3]**

| Mucinous cystadenocarcinoma of the breast | Mucinous carcinoma of the breast | Cystic hypersecretory breast carcinoma |
|---|---|---|
| Intracellular and extracellular mucin, columnar cell lined cystic spaces, tufting and formation of papillae | Clusters of tumour cells floating in extracellular mucin | Cystic spaces, eosinophilic secretions and prominent epithelial hyperplasia |

**Table 1**

**Comparative immunoprofile of mucinous cystadenocarcinoma of the breast, and tumours from other organs[2,5]**

| | Mucinous cystadenocarcinoma of the breast | Ovarian mucinous adenocarcinoma | Pancreatic mucinous adenocarcinoma | Colonic adenocarcinoma |
|---|---|---|---|---|
| CK7 | + | + | + | - |
| CK20 | + (focal)/- | + | + | + |
| CDX2 | - | +/+ (focal) | +/+ (focal) | + |

**Table 2**

only about 30 cases reported to date.[2] It typically occurs in post-menopausal women with a median age of 61 years and tends to have a good prognosis, though this is based on a limited number of cases and follow up time.[2–4] It is characterized by cystic spaces filled with mucin and lined by columnar cells with intracytoplasmic mucin. There can be stratification, tufting and papillary formation within the columnar cells.

The differential diagnosies of mucinous cystadenocarcinoma includes other primary breast carcinomas such as mucinous breast carcinoma, encapsulated papillary carcinoma and cystic hypersecretory carcinoma.[3,4] As their names suggest, both mucinous cystadenocarcinoma and mucinous carcinoma have an abundant mucin component, however this tends only to be extracellular in mucinous carcinoma. Mucinous carcinomas are also almost always ER positive whereas mucinous cystadenocarcinomas are usually negative for ER. Mucinous cystadenocarcinomas of the breast are believed to develop independently of oestrogen stimulation and usually have a high proliferative index.[5] Encapsulated papillary carcinoma also lacks intracytoplasmic mucin and tends to be ER positive. The main difficulty with this entity is distinguishing on small amounts of biopsy material between encapsulated papillary carcinoma and mucinous cystadenocarcinoma. The cystic components in both mucinous cystadenocarcinoma and cystic hypersecretory carcinoma may create difficulties when attempting to distinguish between these tumour types. Notably, the cystic component of cystic hypersecretory carcinoma contains eosinophilic material and these tumours do not have the tall columnar cell component that is characteristic of a mucinous cystadenocarcinoma. The comparative morphological features of mucinous cystadenocarcinoma, mucinous carcinoma and cystic hypersecretory carcinoma are summarized in Table 1.

The most important differential diagnosis on a practical level is that of metastatic mucinous cystadenocarcinoma, most notably from the pancreas or ovary, as these can appear morphologically identical.[5] In this setting, immunohistochemistry can be very helpful (see Table 2) though sometimes cannot separate out the different entities and a careful search for an in-situ component is one of the most useful things that the pathologist can do.

In conclusion, mucinous cystadenocarcinoma is an exceptionally rare subtype of breast carcinoma with a distinct morphological appearance. This tumour should be considered in the differential diagnosis for women presenting with a cystic or mucinous breast mass. ◆

## REFERENCES


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## Practice points

- Mucinous cystadenocarcinoma was first described in 1998 and is a rare entity.
- It is most commonly reported in post-menopausal women.
- It can be differentiated from other mucinous tumours of the breast through morphological features and immunohistochemistry.
- Differentiating between mucinous cystadenocarcinoma of the breast and similar tumours from other organs such as the pancreas and ovary can be difficult.
- DCIS may be identified with the tumour which can aid diagnosis.

## Self-assessment questions

**1. Which tumour is LEAST likely to be in the differential diagnosis of a mucinous cystadenocarcinoma of the breast?**

a. Invasive papillary carcinoma of the breast
b. Mucinous cystadenocarcinoma of the ovary
c. Cystic hypersecretory carcinoma of the breast
d. Mucinous carcinoma of the breast
e. Mucinous cystadenocarcinoma of the pancreas

**2. Which morphological features best describe a mucinous cystadenocarcinoma?**

a. Homogenous papillary architecture with areas of necrosis
b. Intracellular and extracellular mucin
c. Clusters of tumour cells located within extracellular mucin
d. Eosinophilic secretions and epithelial hyperplasia
e. Biphasic solid tumour with epithelial and sarcomatoid differentiation

**3. Which immunohistochemical profile best matches that of a mucinous cystadenocarcinoma of the breast?**

a. ER-, PR-, CK7+, CK20+, CDX2+
b. ER+, PR+, HER2+, p53+, CDX2-
c. ER+, PR+, HER2-, MUC2+, CDX2-
d. ER-, PR-, CK7+, CK20-, CDX2-
e. ER-, PR-, CK7-, CK20+, CDX2+

Answers
1 — a
2 — b
3 — d