WHITEPAPER

Characterizing Cancers: Utilizing IHC Panels to Identify Tumors of Unknown Primary Sites

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Characterizing Cancers: Utilizing IHC Panels to Identify Tumors of Unknown Primary Sites

Immunohistochemistry (IHC) on tissue samples can be a cornerstone of cancer diagnosis. However, in some cases, the cellular morphology can be ambiguous, hindering the identification of the primary tumor site. Certain antibodies that target specific protein markers expressed by different tissues can be used by pathologists to identify the origin of some tumors. Physicians across multiple specialties work together to learn more about a patient's potential diagnosis and ultimately assist them with prognosis and treatment.

A curated selection of antibodies, called IHC panels, can target proteins that have characteristics of distinct cell lineages. By analyzing the staining pattern of these markers within the tumor cells, pathologists may gain valuable insights into the potential origin of the cancer. Here's a breakdown of some commonly employed IHC panels:

Cytokeratin Panel	This panel is often the first line of investigation as it can identify cells of epithelial origin, a common source of many cancers. Examples of markers in this panel include **AE1/AE3,1 CK7, CK20, CAM5.2, EMA, BerEP4**, and **MOC31**.
Lymphoma Panel	This panel can help differentiate lymphatic cells arising from different cell types. Common markers may include **CD20** (B-cells), **CD3** (T-cells), and **Leukocyte Common Antigen (LCA)**
Gastrointestinal (GI) Panel	This panel aids in identifying cells inside or outside of the GI tract and can also help differentiate certain GI tumors. These markers can include **CK7, CK20, CDX2, CDH17,** and **SATB2**
Neuroendocrine Panel	This panel can target markers that may be indicative of neuroendocrine tumors, which can arise from various organs. Examples include **INSM1, Chromogranin A** and **Synaptophysin.**[2]
Lung Panel	This panel can help identify cells of lung origin and may differentiate small cell lung cancers (SCLC) from other carcinomas. Examples include **TTF-1, Napsin A, P63,** and **CK5/6**
Breast and GYN Panel	This panel includes multiple markers that can help in not only identifying cells of breast or GYN origin, but also aid in differentiating between them. Some examples include **ER, PR, GATA-3**, and **E-Cadherin** for breast[3], and **ER, PR, P16, CA-125**, and **PAX-8** for GYN.[4]
Melanoma Panel	This panel can help to differentiate cells of melanocytic origin. Markers include **MelanA, S100, HMB45,** and **PRAME.**[5]

While individual markers offer initial clues, the true strength of IHC lies in the combined analysis of multiple markers within a panel. Pathologists can use these panels in different tissue types within the anatomic pathology laboratory, including those from frozen sections, fine needle aspirations, cytology smears, and tumors excised from surgery. These tissues may have different IHC panels applied that can help pathologists further identify the atypical cells present in each respective sample. These can be an asset in diagnostic utility for tumors of unknown origin in formalin-fixed and fresh tissue.

By harnessing the targeted approach of IHC, pathologists may gain crucial insights into the potential primary site of cancer aiding in accurate diagnosis, treatment planning, and patient prognosis. More information about Biocare Medical's commitment to quality products in different disease states, to be used and interpreted by pathologists and laboratories, can be found at the link below.

https://biocare.net/key-antibodies/

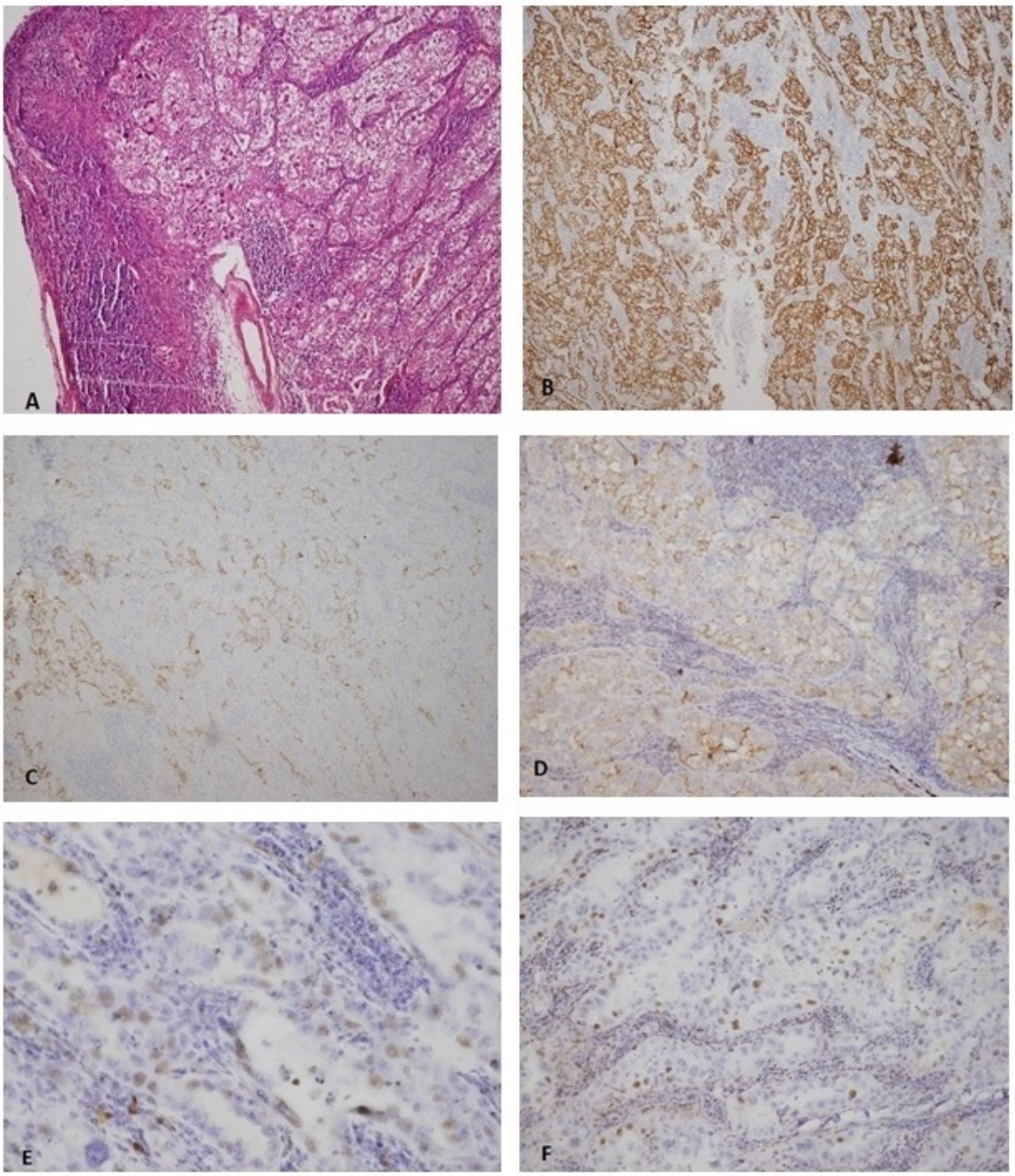
Immunohistochemistry (IHC) tumour staining patterns in the differential diagnosis of carcinomas of unknown primary site expressing CK7+/CK20-.

Primary Site of Origin	Immunostaining Profile
Breast	ER+/PgR+, GATA3+, GCDFP15–/+, MGB+/–, TFF1–
Ovary (serous)	PAX8+, ER+, WT1+, TTF1–, TFF3–, GATA3–
Ovary (clear cell)	pVHL+, HNF-1β+, Napsin A+, AFP–, WT1–, ER–, GPC3–
Endometrium	ER+, PAX8+, Vimentin+
Uterine cervix	p16+, HPV+, CEA+, PR–, PAX2–, PAX8+/–
Lung	TTF1+, Napsin A+, GATA3–
Thyroid (papillary/follicular)	TTF1+, Thyroglobulin+, PAX8+
Thyroid (medullary)	TTF1+, Calcitonin+, CEA+
Stomach	CEA+, CDX2–/+, MUC1–/+, MUC5AC–/+, CDH17+/–, TTF1–
Esophagus	CDX2+/–, CEA+, CDH17+, MUC1–/+, MUC5AC–/+, SATB2–
Pancreas	DPC4–/+, CK17+/–, pVHL–, Maspin+, S100P+, MUC5AC+
Urinary bladder	GATA3+, p63+, CK5/6+, p40+, S100P+, CK903+, UPII+/–
Thymus	CD5+/–, p63+/–, PAX8+/–, CD117+/–, Glut1+/–
Salivary (ductal)	GATA3+, AR+, GCDFP-15+
Mesothelioma	Calretinin+, WT1+, CK5/6+, TTF1–, CEA–, BerP4–

Abbreviations: AR, androgen receptor; calretinin; AFP, α-fetoprotein; CD5, cluster of differentiation 5; CDH17, cadherin-17; CDX2, caudal type homeobox 2; CEA, carcinoembryonic antigen; CK, cytokeratin; D2-40, podoplanin; DPC4, SMAD family member 4; ER, oestrogen receptor; GATA3, GATA binding protein 3; GCDFP-15, gross cystic disease fluid protein 15; HNF-1b, hepatocyte nuclear factor 1b; HPV, human papillomavirus; MGB, mammaglobin; MUC, mucin; PAX, paired box gene; CEA, carcinoembryonic antigen; PgR, progesterone receptor; pVHL, von Hippel-Lindau tumour suppressor; S100P, placental S100; TFF, trefoil factor; TFF3, trefoil factor 3; TM, thrombomodulin; TTF1, thyroid transcription factor 1; UPII, uroplakin II; WT1, Wilms tumour 1.[6]

Figure 4. Case 3.

Inguinal Lymph Nodes Biopsy with Metastatic Ovarian Carcinoma (A) H&E, (B) CK7+, (C) CA125+, (D) CEA+, (E) WT1+ and (F) PR+. (Original magnification: A-B-D-F X20,C X10, E X40).[7]



To learn more about the markers listed above, please visit our website at biocare.net or call 1-800-799-9499, option #3

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