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| **Supplementary Table 1**. **Summary of new and emerging markers for diagnostic evaluation in the setting of metastatic disease \* 11, 23-30** | |
| **Breast** | **ER**, **GCDFP-15**, **mammaglobin**, **HER**-**2** **neu**, **GATA3** |
| **Lung** | **TTF1**, **Napsin**-**A** |
| **Kidney** | **PAX2**, **PAX8**, **RCC**, **CD10** |
| **Upper gastrointestinal tract** | **CDH17**, **CDX2**, **CK20** |
| **Lower gastrointestinal tract** | **SATB2**, **CDX2**, **CK20** |
| **Thymus** | **p63**, **CD5**, **PAX**-**8** |
| **Prostate** | **PSA, PSAP, ERG**, **NKX3.1** |
| **Müllerian ovarian tumors** | **PAX-8**, **ER**, **WT1** |
| **Ovarian clear cell carcinoma** | **PAX-8, HNF-1B**, **Napsin**-**A**, **pVHL**, **KIM-1** |
| **Ovarian sex cord-stromal tumors** | **SF-1**, **inhibin**-**a**, **calretinin**, **FOXL2** |
| **Endometrial endometrioid adenocarcinoma** | **PAX-8**, **PAX-2**, **ER**/**PR**, **vimentin** |
| **Endocervical adenocarcinoma** | **PAX-8**, **p16**, **CEA** &loss of **PAX-2**  **In situ hybridization** for **HR**-**HPV** |
| **Urothelial carcinoma** | **GATA3**, **uroplakin II/III**, **thrombomodulin**, **S100P**, **p40**, **p63**, **CK5/6**, **CK20** |
| **Squamous cell carcinoma** | **p40**, **p63**, **CK5/6**  **p16**/**In situ hybridization** for **HR**-**HPV** (**oropharyngeal squamous cell carcinoma**) |
| **Neuroendocrine carcinoma** | **Chromogranin-A**, **synaptophysin**, **CD56**  **OTP** (**lung**), **PAX6/Islet1/PR** (**pancreas**), diffuse **CDX2** (**jejunum/ileum**), **SATB2** (**rectum**), **CDX2**/**SATB2** (**appendix**), **p16**/ **In situ hybridization** for **HR**-**HPV** (**cervix**, **anus**, **oropharynx** and **sinonasal tract**) |
| **Merkel cell carcinoma** | Perinuclear dot **CK20**, **Merkel Cell Polyomavirus Large T Antigen** |
| **Salivary duct carcinoma** | **AR, GATA3, GCDFP-15**, **HER-2 neu** |
| **Hepatocellular carcinoma** | **Hep Par**-**1**, **Arginase**-**1**, **Glypican 3**  canalicular **pCEA**, **CD10**, **CD13**, **BSEP** |
| **Intrahepatic Cholangiocarcinoma** | **pVHL**, **carbonic anhydrase IX** |
| **Pancreatic Adenocarcinoma** | **MUC5AC**, **CK17**, **S100P**, **IMP3**, **maspin** |
| **Melanoma** | **S100**, **HMB-45**, **Melan-A**, **MiTF**, **SOX10** |
| **Mesothelioma** | **Calretinin**, **WT1**, **D2**-**40**, **CK5/6**, **CK7**  Loss of **BAP1** by IHC/ deletion of **p16** by FISH  Neg for **Ber**-**EP4**, **CEA**, **MOC**-**31** |
| **Meningioma** | **EMA**, **SSR2**, **vimentin** |
| **Germ cell tumor** | **SALL4**, **OCT3/4**, **PLAP**, **CD30** \*, **AFP/ glypican-3/ CDX2/GATA3 \*\***, beta **HCG/GATA3 \*\*\*** |

HR-HPV; high risk human papillomavirus; IHC; immunohistochemistry

\* embryonal carcinoma \*\* yolk sac tumor \*\*\* choriocarcinoma