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2024 Magnetic Resonance Imaging (MRI) Abdomen/ Magnetic Resonance Cholangiopancreatography (MRCP)

Diagnostic Imaging

MRI-Abdomen-HH

Last Review Date: 10/28/2024
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Magnetic Resonance Imaging (MRI) Abdomen

NCD 220.2
See also, **NCD 220.2**: Magnetic Resonance Imaging at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

MRI General Contraindications

MRI may be contraindicated for **ANY** of the following:

- Safety, related to clinical status (body mass index exceeds MRI capability, intravascular stents within recent 6 weeks)
- Safety, related to implanted devices (aneurysm clips, cochlear implant, insulin pump, spinal cord stimulator)[1]

References: [26] [7] [17]

Preamble: Pediatric Diagnostic Imaging

HealthHelp's clinical guidelines for the Diagnostic Imaging program, are intended to apply to both adults and pediatrics (21 years of age or younger), unless otherwise specified within the criteria.

MRI Abdomen Guideline

Magnetic resonance imaging (MRI) of the abdomen is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Cancer is suspected or known and **ANY** of the following:
    a. Abdominal metastasis is suspected, based on signs/symptoms (eg, anorexia, pelvic pain, weight loss) or abnormal lab values (eg, Alpha-fetoprotein [AFP], cancer antigen [CA] 19-9, carcinoembryonic antigen [CEA])
    b. Active cancer treatment within the past 12 months
    c. Lymphoma is suspected with B symptoms (eg, drenching night sweats, fever greater than 101°F, weight loss of more than 10% over 6 months) **AND** CT is non-diagnostic or indeterminate **OR contraindicated or unavailable**.

[1]Some implanted devices that were once absolute contraindications to a MRI may now be accepted, including if the specific MRI is able to accommodate the device or the device itself is deemed safe for MRI.

d. Paraneoplastic syndrome (including dermatomyositis) is suspected when malignancy is suspected **AND AFTER** appropriate work-up (eg, cerebrospinal fluid [CSF] evaluation, imaging [computed tomography [CT], positron emission tomography [PET], serology), is completed.

e. Staging evaluation

f. Surveillance following the NCCN Guidelines recommended schedule (*see **Surveillance** section*):

References: [25] [40] [35]

2. Edema in the lower extremity is diffuse and ultrasound and CT are non-diagnostic or indeterminate **OR** CT is **contraindicated or unavailable**.
Reference: [15]

3. Fistula in the abdomen is known **OR** fistula recurrence is suspected, in the abdomen.
Reference: [27]

4. Hernia is suspected or known and **ANY** of the following:

a. Known hernia with suspected complications (eg, incarceration or strangulation) **AND** onset of new symptoms (eg, diarrhea, guarding, vomiting) (***NOTE**: *CT is preferred.*)

b. Suspected hernia (eg, epigastric, incisional, occult, Spigelian), limited to the abdomen **AND BOTH** abdominal CT and ultrasound are non-diagnostic or indeterminate.

Reference: [14]

5. Iliac artery compression (May-Thurner Syndrome) is suspected and CT is non-diagnostic or indeterminate **OR contraindicated or unavailable**. (***NOTE:** *should include pelvic imaging*)
Reference: [9]

6. Infection or inflammatory disease is suspected or known, CT is **contraindicated or unavailable**, and **ANY** of the following:

a. Diverticulitis, with severe pain or tenderness, **AND** is **NOT** responsive to antibiotic treatment.

b. Fluid collection, limited to the abdomen, **AND** prior imaging is non-diagnostic or indeterminate.

c. Infection is known **AND** an abscess, localized to the abdomen is suspected.

d. Inflammatory bowel disease (eg, Crohn's disease, ulcerative colitis) is suspected **AFTER** complete work-up with **ALL** of the following:

i. Colonoscopy

ii. Laboratory work-up (eg, complete blood count [CBC], c-reactive protein [CRP], erythrocyte sedimentation rate [ESR])

iii. Physical exam

e. Inflammatory bowel disease (eg, Crohn's disease, ulcerative colitis) is known **AND** symptoms are persisting, for treatment evaluation (***NOTE**: *includes MR enterography*

f. Pain is persistent **AND** prior imaging is non-diagnostic or indeterminate.

g. Peritonitis is suspected with abdominal pain and tenderness on palpation and **EITHER** of the following:

i. Palpation demonstrates severe tenderness over the entire abdomen.

ii. Rebound, guarding or rigid abdomen

References: [44] [32] [38] [27] [41] [24] [34] [22]

7. Organ evaluation or organ abnormality is seen on prior imaging and **ANY** of the following:

a. Adrenal gland for **ANY** of the following:

i. Hereditary paraganglioma syndromes, follow-up every 2 to 3 years **AND** whole body MRI is **unavailable**.

ii. Known mass, 4 cm or more, with **NO** history of cancer and **EITHER** of the following:

A. Pre-operative planning

B. **NO** surgery, repeat scan in 6 to 12 months.

iii. Lesion seen on prior imaging is non-diagnostic or indeterminate.

iv. Mass is incidentally discovered, less than 4 cm **AND** benign characteristics (eg, distinct borders, non-spreading, slow growing); 1st follow-up at 6 months, then annually for 2 years, then **NO** further imaging if stable.

v. Tumor or endocrine disorder is suspected, when adrenal source is suspected from clinical and laboratory evidence (eg, 24-hour urine, prolactin, testosterone).

vi. Von Hippel Landau, follow-up at least every other year starting at age 16 years (***NOTE**: *Abdomen and pelvis ultrasound starting at age 8 years old*)

b. Kidneys for **ANY** of the following:

i. Angiomyolipoma (AML) is known and follow-up is **ANY** of the following:

A. Size is 3 cm to 4 cm; follow-up every 2 years

B. Size is greater than 4 cm; follow-up annually

C. Tuberous sclerosis (TSC) is known, with AML; follow-up annually

ii. Genetic mutations are known, for surveillance of **ANY** of the following:

A. BRCA 1 associated protein (BAP-1) tumor predisposition syndrome (TPDS), follow-up every 2 years starting at age 30 years.

B. Birt-Hogg-Dube (BHDS), follow-up every 3 years starting at age 20 years.

C. Hereditary leiomyomatosis and renal cell cancer (HLRCC), follow-up annually starting at age 8 years.

D. Herediatary papillary renal carcinoma (HPRC), follow-up every 1 to 2 years starting at age 30 years.

E. Hereditary paraganglioma/pheochromocytoma (PGL/PCC), follow-up every 4 to 6 years starting at age 12 years.

F. Tuberous sclerosis complex (TSC) WITHOUT acute myeloid leukemia (AML), follow-up every 3 to 5 years starting at age 12 years

G. Von Hippel Landau (VHL) follow-up every 2 years starting at age 15 years.

iii. Magnetic resonance urography (MRU) when ultrasound or CT is non-diagnostic or indeterminate **OR** CT is **contraindicated or unavailable**.

iv. Mass is cystic, indeterminate (**NOT** a simple renal cyst), **AND** surveillance Bosniak score is III or less.

v. Mass seen on prior imaging is non-diagnostic or indeterminate.

vi. Mass is solid and less than 3 cm; follow-up at 6 months and 12 months, then annually.

vii. Polycystic kidney disease (PKD) is known for evaluation of total kidney volume.

c. Liver for **ANY** of the following:

i. Adenoma is suspected; follow-up every 6 to 12 months

ii. Beckwith-Wiedemann syndrome is known, ultrasound is abnormal, non-diagnostic or indeterminate **AND** alpha-feto protein (AFP) is rising.

iii. Evaluation of iron overload in **EITHER** of the following settings:

A. High risk (eg, Gaucher disease, sickle cell anemia, transfusion-dependent thalassemia major), for annual follow-up

B. Liver iron for initial evaluation, in diagnosed hemochromatosis, in lieu of liver biopsy

iv. Focal nodular neoplasia for follow-up; repeat imaging in 6 to 12 months to ensure stability

v. Gaucher disease; at initial diagnosis and then every 12 to 24 months

vi. Hepatic fibrosis staging when elastography with ultrasound is non-diagnostic or indeterminate; annual elastography.

vii. High risk for hepatocellular carcinoma (eg, chronic hepatitis B, known cirrhosis) and **EITHER** of the following:

A. AFP is rising (*__NOTE__: *requires at least a 7 ng/ml increase per month*).

B. Screening when ultrasound is non-diagnostic or indeterminate due to steatosis/fatty liver or nodular liver; every 6 months (*__NOTE__: *The finding of steatosis/fatty liver and/or nodular liver alone on an ultrasound report is insufficient for approval; the report **MUST** specify that those findings prevent adequate visualization of the liver by ultrasound*.)

viii. Jaundice or abnormal liver function tests **AND** ultrasound is non-diagnostic or indeterminate.

ix. Lesion, mass or cyst seen on prior imaging is non-diagnostic or indeterminate.

x. Primary sclerosing cholangiitis; follow-up every 6 to 12 months after age 20 years

d. Pancreas for **ANY** of the following: (*__NOTE__: *Growth or suspicious change on follow-up imaging may require more frequent surveillance*.)

i. Age is greater than 80 years; follow-up for all cysts is every 2 years for 4 years and stops at year 4.

ii. Cyst is incidental, asymptomatic, less than 1.5 cm and **EITHER** of the following:

A. Age is less than 65 years; follow-up annually for 5 years, then every 2 years if stable.

B. Age is 65 years to 79 years; follow-up every 2 years for 5 years, then stop if stable.

iii. Cyst is 1.5 cm to 1.9 cm with main pancreatic duct (MPD) communication; follow-up annually for 5 years, then every 2 years for 4 years, then stop if stable at year 9.

iv. Cyst is 1.5 cm to 2.5 cm with **NO** MPD communication **OR** communication **CANNOT** be determined; follow-up every 6 months for 2 years, then annually for 2 years, then stop if stable at year 10.

v. Cyst is 2 cm to 2.5 cm with MPD communication, surveillance as follows:

   A. Every 6 months for 2 years, then

   B. Annually for 2 years, then

   C. Every 2 years for 6 years, then

   D. Stop if stable at year 10

vi. Cyst is more than 2.5 cm, surveillance as follows:

   A. Every 6 months for 2 years, then

   B. Annually for 2 years, then

   C. Every 2 years for 6 years, then

   D. Stop if stable at year 10

vii. Cyst is seen on prior imaging; for initial characterization

viii. Pancreatic tumor is functional, for localization.

ix. Lifetime risk of developing pancreatic cancer is increased (based on genetic predisposition or family history), for annual surveillance, and **ANY** of the following:

   A. Cyclin-dependent kinase inhibitor 2A (CDKN2A) variant; starting at age 40 years **OR** 10 years younger than the earliest pancreatic cancer diagnoses in the family, whichever is earlier.

   B. Hereditary pancreatitis; starting 20 years after onset of pancreatitis **OR** at age 40 years, whichever is earlier

   C. MEN1 for pancreatic neuroendocrine tumor (PanNET) screening; every 1 to 3 years

   D. Serine/threonine kinase 11 (SKT11) variant (including Peutz-Jeghers); starting at age 30 years **OR** 10 years younger than the earliest pancreatic cancer diagnoses in the family, whichever is earlier.

E. Starting at age 50 **OR** 10 years younger than the earliest pancreatic cancer diagnoses in the family, whichever is earlier, for **ANY** of the following situations:

I. At least 1 familial first- (child, parent, sibling) or second-degree (aunts, double cousins, grandchildren, grandparents, half-siblings, nephews, nieces, uncles) relative from the same side of the family with a history of pancreatic cancer **AND** known mutation in other pancreatic susceptibility gene (eg, ataxia telangiectasia mutated [ATM], breast cancer 1 [BRCA1], tumor protein 53 [TP53])

II. At least 2 familial first-degree (child, parent, sibling) relatives from the same side of the family with a history of pancreatic cancer

III. At least 3 familial first- (child, parent, sibling) and/or second-degree (aunts, double cousins, grandchildren, grandparents, half-siblings, nephews, nieces, uncles) relatives from the same side of the family with a history of pancreatic cancer

e. Spleen for **EITHER** of the following:

i. Gaucher disease for evaluation and monitoring; imaging at initial diagnosis and every 12 to 24 months thereafter

ii. Mass, lesion or cyst is incidentally found and ultrasound or CT is non-diagnostic or indeterminate.

References: [28] [43] [46] [10] [3] [12] [2] [19] [8] [18]

8. Peri-procedural evaluation, to guide planning for an invasive procedure or for post-procedure follow-up care.
Reference: [16]

9. Pheochromocytoma is suspected with clear biochemical evidence (catecholamine excess [adrenaline, epinephrine]), for localization.

10. Prior MRI abdomen imaging is non-diagnostic or indeterminate. (*__NOTE__: *One follow-up is appropriate to evaluate for changes since preceding imaging finding[s]. Further surveillance is appropriate when lesion is specified as "highly suspicious" or there is a change since last exam.*)

11. Symptoms include **ANY** of the following:

a. Fever of unknown origin (FUO) (temperature greater than or equal to 101°F for at least 3 weeks) when prior testing (including CT abdomen) is negative, non-diagnostic or indeterminate **OR** CT is **contraindicated or unavailable**.

b. Pain, abdominal (with or without pelvis) is persistent and severe, and CT is non-diagnostic or indeterminate **OR contraindicated or unavailable**.

c. Weight loss is unintentional and unexplained (eg, at least 5% of body weight in less than 12 months or at least 2% in 1 month)[2] and **EITHER** of the following:

i. Signs/symptoms are suggestive of abdominal cause (diarrhea, nausea, pain) when CT is non-diagnostic or indeterminate **OR contraindicated or unavailable**.

ii. Ongoing, initial work-up is completed **AND** 2nd visit documents further weight loss.

References: [36] [38] [34] [44] [33]

12. Varicocele is new **OR** non-reducible and requires further evaluation.

Combination CT and MRI for Metastases Evaluation Guideline

Combination CT/MRI studies (5 or less concurrent studies, with a CT or MRI appropriate for cancer location: abdomen, brain, cervical spine, chest, lumbar spine, neck, pelvis and/or thoracic spine) for **ANY** of the following situations:

1. Cancer recurrence or metastasis is suspected.
2. Staging evaluation, for baseline pre-therapy
3. Surveillance following the National Comprehensive Cancer Network (NCCN) Guidelines recommended schedule (*See **Surveillance** section*)

LCD 35391
See also, **LCD 35391**: Multiple Imaging in Oncology at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

[2]Generally, weight loss of more than 10% of body weight in 2 months, or more than 5% of body weight in 6 months may be appropriate for evaluation. The individual's unique clinical situation should be taken into consideration when evaluating weight loss.

Magnetic Resonance Cholangiopancreatography (MRCP)

MRCP Guideline

A magnetic resonance cholangiopancreatography (MRCP) is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Gallbladder, biliary or pancreatic pathology is suspected or known and **ANY** of the following:
    a. Biliary strictures evaluation
    b. Choledocholithiasis (gallstones) is suspected and ultrasound is completed.
    c. Choledochal cyst(s) are suspected or known and **ANY** of the following:
        i. Known, for long-term post-operative surveillance
        ii. Suspected after ultrasound, for confirmation
    d. Congenital anomaly of the pancreatobiliary tract (eg, aberrant ducts, pancreas divisum) is suspected.
    e. Endoscopic retrograde cholangiopancreatography (ERCP) is **contraindicated or unavailable**, for post-surgical biliary anatomy and complications evaluation
    f. Pancreatic or biliary tree abnormality is suspected, based on symptoms (eg, fever, nausea, pain) and/or laboratory findings (eg, elevated bilirubin and/or white blood cells), **AND** initial imaging (eg, ERCP, ultrasound) is complete **OR contraindicated or unavailable**.
    g. Pancreatobiliary disease during pregnancy, when ultrasound is completed.
    h. Primary sclerosing cholangitis
    i. Symptoms (eg, nausea, pain, vomiting) are persistent **AND** prior imaging (eg, ultrasound) is abnormal, non-diagnostic or indeterminate.

    References: [19] [37] [36] [20] [21] [39] [11] [4]

2. Pancreatitis is suspected or known and **ANY** of the following:
    a. Acute pancreatitis is suspected with atypical signs/symptoms (eg, afebrile), including amylase and lipase that are non-diagnostic or indeterminate (*see* ***Pancreatitis*** *definition*).
    b. Prior history of pancreatitis (greater than 4 weeks) **OR** pancreatic pseudocyst, abdominal pain is persistent and worsening **OR** re-exacerbation is suspected.

    References: [34] [31]

3. Peri-procedural planning to guide invasive abdominal procedure or post-operative follow-up.

Abdomen Surveillance section

Ampullary Adenocarcinoma Surveillance

NCCN Ampullary Adenocarcinoma Version 2.2025

Ampullary Adenocarcinoma: No imaging surveillance suggested.

Bone Cancer Surveillance

NCCN Bone Cancer Version 2.2025

Bone cancer surveillance includes **ANY** of the following:

1. Chondrosarcoma surveillance for **ANY** of the following:
    a. Atypical cartilaginous tumor surveillance with primary site X-rays and/or cross-sectional imaging (CT +contrast, MRI ± contrast) every 6 to 12 months for 2 years, then annually as clinically indicated
    b. Low-grade, extracompartmental appendicular tumor, grade I axial tumors or high-grade (grade II or III, clear cell or extracompartmental) tumors surveillance with **ALL** of the following:
        i. Chest imaging every 3 to 6 months, may include CT at least every 6 months for 5 years, then annually for at least 10 years, as clinically indicated
        ii. Primary site X-rays and/or cross-sectional imaging MRI (± contrast) or CT (+ contrast) as clinically indicated.
2. Chordoma surveillance with **ALL** of the following:
    a. Chest imaging every 6 months, with CT included, annually for 5 years, then annually thereafter as clinically indicated
    b. Imaging of primary site, timing and modality (eg, MRI ± CT [both + contrast], X-ray) as clinically indicated up to 10 years
3. Ewing Sarcoma after primary treatment completed and stable/improved disease, surveillance with **ALL** of the following:
    a. Chest imaging with X-ray or CT: every 3 months
    b. Primary site imaging with MRI ± CT (both + contrast) and X-ray, increase intervals after 24 months and after 5 years, annually as clinically indicated (indefinitely) (*__NOTE__: *Consider PET/CT [head-to-toe] and/or bone scan.*)

4. Giant cell tumor of the bone surveillance with **ALL** of the following:
    a. Chest imaging every 6 to 12 months for 4 years, then annually thereafter as clinically indicated
    b. Surgical site imaging as clinically indicated (eg, CT and/or MRI, both with contrast, X-ray)
5. Osteosarcoma surveillance with primary site and chest imaging (using same imaging that was done for initial work-up) for **ANY** of the following: (*__NOTE__: *Consider PET/CT [head-to-toe] and/or bone scan*.)
    a. Image every 3 months for years 1 and 2
    b. Image every 4 months for year 3
    c. Image every 6 months for years 4 and 5
    d. Image annually for year 6 and thereafter, as clinically indicated

Colon Cancer Surveillance

NCCN Colon Cancer Version 1.2025

Colon cancer surveillance includes **ANY** of the following: (*__Note__: *Routine CEA monitoring and CT scanning are **NOT** recommended beyond 5 years.*)

1. Stage I disease surveillance: colonoscopy 1 year after surgery; if advanced adenoma, repeat in 1 year; if **NO** advanced adenoma, repeat in 3 years, then every 5 years.
2. Stage II or III disease surveillance includes **BOTH** of the following: (**NOTE**: *PET/CT is **NOT** indicated*.)
    a. CT chest, abdomen and pelvis every 6 to 12 months from date of surgery, for a total of 5 years.
    b. Colonoscopy in 1 year after surgery except if **NO** preoperative colonoscopy due to obstructing lesion, colonoscopy in 3 to 6 months; if advanced adenoma, repeat in 1 year; if **NO** advanced adenoma, repeat in 3 years, then every 5 years.
3. Stage IV disease surveillance includes **BOTH** of the following: (**NOTE**: *PET/CT is **NOT** indicated*.)
    a. CT chest, abdomen and pelvis every 3 to 6 months for 2 years, then every 6 to 12 months for a total of 5 years.
    b. Colonoscopy in 1 year after surgery except if **NO** preoperative colonoscopy due to obstructing lesion, colonoscopy in 3 to 6 months; if advanced adenoma, repeat in 1 year; if **NO** advanced adenoma, repeat in 3 years, then every 5 years.

Esophageal and Esophagogastric Junction Cancer Surveillance

NCCN Esophageal or Esophagogastric Junction Cancers Version 2.2025

Esophageal and esophagogastric junction cancer surveillance includes **ANY** of the following[3]:

1. Adenocarcinoma, squamous cell carcinoma; imaging studies as clinically indicated
2. Tumor classification is Tis (tumor in situ) or T1a (- Barret's esophagus [BE]), after endoscopic resection or ablation, imaging surveillance includes **ALL** of the following[4]:
    a. Upper gastrointestinal endoscopy (EGD) every 3 months for the first year
    b. EGD every 6 months for the second year
    c. EGD annually thereafter (indefinitely)
3. Tumor classification is Tis, T1a, N0, after esophagectomy, imaging surveillance includes **ALL** of the following[5]:
    a. Upper gastrointestinal endoscopy (EGD) every 3 months for the first year
    b. EGD every 6 months for the second year
    c. EGD annually thereafter (indefinitely)
4. Tumor classification T1b[a] (N0 on ultrasound) after endoscopic resection or ablation, imaging surveillance includes **ALL** of the following:
    a. Computed tomography (CT) chest/abdomen (+ contrast, unless **contraindicated**) may be considered every 6 months for the first 2 years and annually for up to 5 years
    b. EGD every 3 months for the first year, every 4 to 6 months for the second year, then annually thereafter (indefinitely)
5. Tumor classification T1b or greater, any N[a] or T1a N+, imaging surveillance includes esophagectomy performed with or **WITHOUT** adjuvant therapy then surveillance includes **ALL** of the following:
    a. Chest/abdomen CT (+ contrast, unless **contraindicated**) every 6 months for the first 2 years and annually for up to 5 years
    b. EGD as clinically indicated **OR** if **NOT** completely resected BE after ablation: EGD every 3 months for the first year, every 6 months for the second year, then annually indefinitely

[3]Routine esophageal/esophagogastic junction cancers are **NOT** recommended for cancer-specific surveillance, for more than 5 years after the end of treatment.

[4]Imaging studies for surveillance are **NOT** recommended.

[5]Imaging studies for surveillance are **NOT** recommended.

6. Tumor classification any T and/or any N, with neoadjuvant chemotherapy **OR** chemoradiotherapy **AND** esophagectomy, with or **WITHOUT** adjuvant treatment, imaging surveillance includes chest/abdomen CT (+ contrast, unless **contraindicated**) every 6 months for up to 2 years, then annually for up to 5 years and EGD as clinically indicated.
7. Tumor classification (pretreatment) N0 to N+, T1b to T4, T4b, with definitive chemoradiation (without esophagectomy), surveillance imaging includes **ALL** of the following:
    a. Chest/abdomen CT (+ contrast unless **contraindicated**) every 3 to 6 months for the first 2 years and annually for up to 5 years
    b. EGD every 3 to 6 months for the first 2 years, then annually for 3 more years

Gastric Cancer Surveillance

NCCN Gastric Cancer Version 1.2025

Gastric cancer surveillance includes **ANY** of the following[6]:

1. Tumor type Tis (successfully treated by endoscopic resection [ER]) surveillance with upper gastrointestinal (GI) endoscopy (EGD) every 6 months for 1 year, then annually for 3 years **AND** chest/abdomen/pelvis CT (+ contrast) as clinically indicated based on symptoms and concern for recurrence.
2. Tumor types: p stage I (T1a [treated by ER] or T1a, T1b, N0 [treated by surgical resection]) imaging surveillance includes **ANY** of the following:
    a. CT chest/abdomen/pelvis (oral **AND** intravenous [IV] contrast preferred) as clinically indicated
    b. If treated by ER, EGD every 6 months for 1 year, then annually for up to 5 years
    c. If treated by surgical resection, EGD as clinically indicated
3. Tumor types: p stage II/III or yp stage I to III (treated with neoadjuvant ± adjuvant therapy) surveillance imaging with chest/abdomen/pelvis CT (oral **AND** IV contrast), every 6 months for the first 2 years then annually up to 5 years **AND** if partial or total gastrectomy, EGD as clinically indicated.

Gastrointestinal Stromal Tumors (GISTs) Surveillance

NCCN Gastrointestinal Stromal Tumors Version 2.2024

Gastrointestinal stromal tumors (GISTs) surveillance includes **ANY** of the following:

1. After treatment for progressive disease, abdominal/pelvic CT or MRI to evaluate therapeutic response (consider PET/CT if CT results are ambiguous).

[6]Routine gastric cancer surveillance is not recommended beyond 5 years.

2. Completely resected primary disease, image with abdominal/pelvic CT every 3 to 6 months for 3 to 5 years, then annually thereafter. (*__NOTE__: *Less frequent imaging surveillance may be acceptable for low-risk or very small tumors [smaller than 2 cm]. More frequent imaging surveillance may be required for individuals with high-risk disease that discontinue TKI therapy.*)
3. **NOT** completely resected disease or discovery of metastatic disease during surgery, image with abdominal/pelvic CT every 3 to 6 months.
4. Progression may be determined by CT or MRI with clinical interpretation; FDG-PET/CT may be used to clarify if CT or MRI is ambiguous.

Hepatocellular Carcinoma Surveillance

NCCN Hepatocellular Carcinoma Version 1.2025

Hepatocellular carcinoma surveillance includes imaging with ultrasound **OR** multiphasic (+ contrast) computed tomography (CT) or magnetic resonance imaging (MRI) if ultrasound is non-diagnostic or indeterminate; every 6 months.

Kidney Cancer Surveillance

NCCN Kidney Cancer Version 2.2025

Kidney cancer surveillance includes **ANY** of the following:

1. Long-term surveillance after 5 years: abdominal imaging follow-up with increasing intervals (due to risk of metachoronous tumors/late recurrences). (*__NOTE__: *For higher stages of disease, consider chest imaging at increasing intervals.*)
2. Relapsed, stage IV and surgically unresectable disease surveillance includes **ALL** of the following:
    a. CT or MRI chest, abdomen and pelvis at baseline pre-treatment and at start of surveillance period with follow-up every 6 to 16 weeks
    b. MRI (preferred) or CT of head at baseline and clinically indicated (*__NOTE__: *Annual surveillance at physician discretion*)
    c. MRI of the spine and bone scan as clinically indicated
3. Stage I kidney cancer surveillance and **ANY** of the following:
    a. Follow-up during active surveillance includes **ALL** of the following;
        i. Abdominal computed tomography (CT) or magnetic resonance imaging (MRI) (± contrast, if **NO** contraindication) within 6 months of starting active surveillance; then CT, MRI or ultrasound (US) at least annually thereafter

ii. Chest X-ray or CT for baseline, then annually to assess for pulmonary metastasis as clinically indicated (consider repeat chest imaging if intervention is planned)

b. Follow-up after ablative techniques includes **ALL** of the following:

i. Abdominal CT or MRI (± contrast, unless contraindicated) **OR** ultrasound (+ contrast) at 1 to 3 months, 6 months and 12 months, then annually thereafter

ii. Chest X-ray or CT annually for 5 years for individuals with biopsy-proven, low-risk pathologic features (**NO** sarcomatoid, low-grade [grade 1 or 2] RCC, non-diagnostic biopsies or **NO** prior biopsy)

c. Follow-up after partial or radical nephrectomy includes **ALL** of the following:

i. Abdominal CT or MRI within 3 to 12 months of surgery, then annually for up to 5 years or longer if clinically indicated (*__NOTE__: *More rigorous imaging schedule can be considered if positive margins or adverse pathologic features [such as sarcomatoid, high-grade [grade 3/4]*)

ii. Chest X-ray or CT annually for at least 5 years, then clinically as indicated. (*__NOTE__: *More rigorous imaging schedule (CT preferred) can be considered if positive margins or adverse pathologic features*)

4. Stage II kidney cancer surveillance, after a partial or radical nephrectomy, and **ANY** of the following:

a. Abdominal CT or MRI (*preferred*) for baseline, every 6 months for 2 years, then annually for up to 5 years or longer as clinically indicated (*__NOTE__: *More rigorous imaging schedule can be considered if positive margins or adverse pathologic features (such as sarcomatoid, high-grade [grade 3/4]*)

b. Chest X-ray or CT annually for 5 years, then as clinically indicated (*__NOTE__: *More rigorous imaging schedule (CT preferred) can be considered if positive margins or adverse pathologic features*)

5. Stage III kidney cancer **OR** follow-up after adjuvant therapy surveillance includes **ALL** of the following:

a. Abdominal CT or MRI for baseline and within 3 to 6 months after surgery, then CT, MRI (preferred) **OR** ultrasound (for category 2B for stage III) every 3 to 6 months for 3 years, then annually up to 5 years and as clinically indicated thereafter

b. Additional imaging (eg, bone scan, brain imaging), clinically as indicated

c. Chest CT for baseline and within 3 to 6 months, followed by continued imaging (CT preferred) every 3 to 6 months for at least 3 years, annually up to 5 years then clinically as indicated

Mesothelioma: Peritoneal Surveillance

NCCN Mesothelioma: Peritoneal Version 2.2025

Mesothelioma: peritoneal surveillance includes CT chest **AND** CT or MRI abdomen/pelvis every 3 to 6 months for 5 years then annually.

Neuroendocrine and Adrenal Tumors Surveillance

NCCN Neuroendocrine and Adrenal Tumors Version 1.2025

Neuroendocrine and adrenal cancer surveillance includes **ANY** of the following[7]:

1. Adrenal gland tumors surveillance imaging includes **ANY** of the following:
    a. Localized disease: chest computed tomography (CT) (± contrast) and abdominal CT or magnetic resonance imaging (MRI) (+ contrast) every 12 weeks to 12 months up to 5 years, then clinically as indicated
    b. Locoregional unresectable or metastatic disease; chest CT (± contrast) and abdominal/pelvic CT or MRI (+ contrast) or FDG positron emission tomography (PET)/CT every 12 weeks to 12 months up to 5 years, then clinically as indicated
2. Carcinoid syndrome surveillance imaging includes **BOTH** of the following:
    a. Abdominal/pelvic multiphasic CT or MRI every 12 weeks to 12 months and chest CT (± contrast) as clinically indicated
    b. Echocardiogram every 1 to 3 years or as clinically indicated **without** known carcinoid heart disease (CHD) and at least annually for patients with established CHD.
3. Gastrointestinal tract (well-differenetiated grade 1/2), lung thymus imaging and **ANY** of the following:
    a. Duodenal, endoscopy every 3 to 12 months for 1 year, then annually thereafter.
    b. Gastric, EGD at 1 year and then every 1 to 3 years thereafter
    c. Lung nodules, multiple or tumorlest, image with chest CT (- contrast) every 12 to 24 months or clinically as indicated.
    d. Rectal tumor is 1 cm to less than 2 cm: endoscopy with rectal MRI or endorectal ultrasound at 6 and 12 months, then clinically as indicated.

[7] **NO** surveillance is indicated for appendiceal tumors 2 cm or smaller without aggressive features.

4. Gastrointestinal (GI) tract (jejunum/ileum/colon, duodenum, rectum), lung and/or thymus neuroendocrine tumor (NET) surveillance includes imaging post-resection with **ANY** of the following:
    a. Jejunum/ilium/colon, duodenum, rectum and thymus, surveillance imaging with abdominal ± pelvic multiphasic CT or MRI according to **ONE** of the following levels of frequency[8]:
        i. Within 12 weeks to 12 months post-operatively
        ii. After 12 months, image every 12 to 24 months for 10 years
        iii. After 10 years as clinically indicated
    b. Lung/thymus tumors surveillance chest CT (± contrast) for primary tumors, (as clinically indicated for primary GI tumors) according to **ONE** of the following levels of frequency:
        i. Within 12 weeks to 12 months post-operatively
        ii. After 12 months, image every 12 to 24 months for 10 years
        iii. After 10 years as clinically indicated
5. Grade 3, well-differentiated neuroendocrine surveillance includes chest CT (± contrast) as clinically indicated for **ANY** of the following:
    a. Locally advanced/metastatic disease with favorable biology (low Ki-67 [eg, less than 55%], positive somastatin receptor [SSTR] based PET imaging) includes abdominal/pelvic MRI (+ contrast) or abdominal/pelvic multiphasic CT for surveillance with **ANY** of the following:
        i. Resectable disease surveillance every 12 weeks to 24 weeks for 2 years, then every 6 to 12 months for up to 10 years and chest CT as clinically indicated
        ii. Unresectable disease surveillance every 12 weeks to 24 weeks (depending on tumor biology) **AND** chest CT (± contrast); as clinically indicated.
    b. Locally advanced/metastatic disease with unfavorable biology (high Ki-67 [eg 55% or higher], rapid growth rate, FDG avid tumors, negative SSTR-based PET imaging), includes surveillance imaging, every 8 weeks to 12 weeks (depending on tumor biology) with **ALL** of the following:
        i. Abdominal/pelvic MRI (+ contrast) or abdominal/pelvic multiphasic CT and FDG PET/CT as clinically indicated

[8]High-grade tumors may be appropriate for more frequent monitoring.

ii. Chest CT (± contrast) as clinically indicated

iii. FDG-PET/CT as clinically indicated

c. Locoregional disease (resectable) abdominal/pelvic MRI (+ contrast) or abdominal/pelvic multiphasic CT with frequency of **ONE** of the following:

i. Every 12 weeks to 24 weeks for 2 years (depending on tumor biology, Ki-67) and chest CT as clinically indicated

ii. Every 6 months to 12 months for up to 10 years (depending on tumor biology, Ki-67) and chest CT as clinically indicated

d. Multiple endocrine neoplasia, type 1 (MEN1) screening surveillance for **ANY** of the following tumor types: (*__NOTE__: *For prolonged surveillance, imaging studies without radiation are preferred.*)

i. Lung/thymic NETs: chest CT or MRI (+ contrast) every 1 to 3 years

ii. PanNET: abdominal/pelvic CT or MRI (+ contrast) every 1 to 3 years and consider serial endoscopic ultrasound (EUS)

iii. Parathyroid: if calcium rises, re-image with neck ultrasound and/or parathyroid sestamibi with single-photon emission computed tomography (SPECT) scan (SPECT-CT preferred) or 4D-CT

iv. Pituitary: pituitary or sella MRI (+ contrast) of the pituitary every 3 to 5 years

e. Poorly differentiated large or small cell carcinoma and/or mixed neuroendocrine/non-neuroendocrine neoplasm or unknown primary, imaging surveillance includes **ALL** of the following:

i. Locoregional unresectable or metastatic disease surveillance imaging includes **EITHER** chest CT (± contrast) with abdominal/pelvic MRI (+ contrast) **OR** chest/abdominal/pelvic multiphasic CT; every 6 weeks to 16 weeks

ii. Resectable surveillance imaging includes **EITHER** chest CT (± contrast) with abdominal/pelvic MRI (+ contrast) **OR** chest/abdominal/pelvic multiphasic CT; every 12 weeks for the 1st year, and every 6 months thereafter

f. Post-operative from potentially curative surgery surveillance for at least 10 years (longer if high-risk)

6. Pancreatic neuroendocrine tumor surveillance imaging, post-resection, includes chest CT (± contrast) as clinically indicated and abdominal multiphasic CT or MRI with imaging frequency of **ONE** of the following[9]:

a. Within 3 to 12 months post-operatively

b. After 12 months, image every 6 to 12 months for 10 years

c. After 10 years as clinically indicated

7. Pheochromocytoma/paraganglioma surveillance imaging and **ANY** of the following:

a. Locally unresectable disease or distant metastases, imaging every 12 weeks for 12 months, includes **ANY** of the following:

i. Chest/abdominal/pelvic CT with contrast

ii. Chest CT (± contrast) and abdominal/pelvic MRI without contrast (if risk for hypertensive episode)

iii. FDG-PET/CT for bone dominant disease

iv. Meta-iodobenzylguanidine (MIBG) with single-photon emission computerized tomography/CT (SPECT) (if previous MIBG-positive or concern for disease progression) prior to considering radionuclide therapy

v. SSTR-PET/CT or SSTR-PET/MRI (if previous SSTR-positive or concern for disease progression) prior to considering radionuclide therapy

b. Resectable disease, post-resection includes chest CT (± contrast) and abdominal/ pelvic CT or MRI (+ contrast), if clinically indicated with imaging frequency of **ONE** of the following:

i. 12 weeks to 12 months after resection

ii. Every 6 to 12 months for the 1st 3 years

iii. Annually from year 4 to 10.

iv. More than 10 years, then as clinically indicated

[9]High-grade tumors may be appropriate for more frequent monitoring.

TIP

NCCN recommends following the surveillance protocols from designated guidelines for the following hereditary endocrine neoplasia syndromes :

- Thyroid cancer guideline, use for: Multiple endocrine neoplasia, type 2 (MEN2) with genetic evaluation of inherited syndromes
- Kidney cancer, use for:
  - Hereditary paraganglioma/pheochromocytoma syndrome
  - Tuberous sclerosis complex (TSC1 and TSC2)
  - von Hippel Lindau syndrome (VHL)
- Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic, use for:
  - Neurofibromatosis type 1 (NF1)
  - Li-Fraumeni syndrome (TP53)
  - Lynch syndrome (MLH1, EPCAM/MSH2, MSH6, PMS2)
- Genetic/Familial High-Risk Assessment: Colorectal, use for:
  - Lynch syndrome (MLH1, EPCAM/MSH2, MSH6, PMS2)
  - Familial adenomatous polyposis (APC)

Occult Primary Cancer Surveillance

NCCN Occult Primary Cancer Version 2.2025

Occult primary cancer surveillance imaging for long-term surveillance includes diagnostic tests based on symptomatology.

Ovarian, Fallopian Tube or Primary Peritoneal Cancers Surveillance

NCCN Ovarian Cancer Including Fallopian Tube Cancer and Primary Peritoneal Cancer Version 1.2025

Ovarian, fallopian tube or primary peritoneal cancer surveillance includes **ALL** of the following:

1. Malignant germ cell/sex cord-stromal tumor surveillance for **ANY** of the following:
   a. Malignant germ cell tumors surveillance with **ALL** of the following:

i. Pelvic ultrasound every 3 months for years 1 and 2, then every 6 months for year 3

ii. Chest/abdomen/pelvis CT every 3 months for years 1 and 2, every 6-12 months for year 3, then clinically as indicated.

iii. Chest X-ray every 6 months for years 4 to 5, then clinically as indicated

b. Malignant sex cord-stromal tumors surveillance when symptomatic, biomarkers are elevated or physical exam demonstrates suspicious findings.

2. Stage I through IV, primary treatment was received; follow-up imaging is clinically as indicated

Pancreatic Adenocarcinoma Surveillance

NCCN Pancreatic Adenocarcinoma Version 2.2025

Pancreatic adenocarcinoma surveillance includes post-operative surveillance imaging with chest CT and abdomen/pelvis CT or MRI (+ contrast) unless **contraindicated**.

Soft Tissue Sarcoma Surveillance

NCCN Soft Tissue Sarcoma Version 5.2024

Soft tissue sarcoma surveillance includes **ANY** of the following: (*__NOTE__: *Contrasted imaging is preferred; for long term surveillance to minimize radiation exposure, X-rays or MRI may be substituted.*)

1. Atypical lipomatous tumor and well-differentiated liposarcoma imaging surveillance includes the primary site, based on loation and estimated risk of locoregional recurrence.
2. Desmoid tumor (aggressive fibromatosis) imaging surveillance includes **ANY** of the following:
    a. CT or MRI every 3 to 6 months for 2 to 3 years, then every 6 to 12 months thereafter
    b. Ultrasound may be considered for select locations (eg, abdominal wall) for long-term follow-up
3. Retroperitoneal/intra-abdominal, after resection imaging surveillance includes CT or MRI (consider PET/CT) every 3 to 6 months for 2 to 3 years, then every 6 months for the next 2 years, then annually.
4. Stage IA/IB tumor surveillance includes **ALL** of the following:
    a. Chest imaging with CT (+contrast) or MRI (± contrast) as clinically indicated
    b. Magnetic resonance imaging (MRI) at baseline and periodically (frequency based on estimated recurrence)

5. Stage II/III/IV resectable with acceptable functional outcomes surveillance includes **ANY** of the following:
    a. Chest imaging and imaging of primary site with CT (+contrast) or MRI (± contrast) as clinically indicated
    b. Imaging of primary site at end of treatment and periodic imaging of primary site (based on estimated risk of locoregional recurrence)
6. Stage II, III or select stage IV (any T, N1, M0), resectable with adverse functional outcomes **OR** unresectable primary disease surveillance imaging includes **ANY** of the following:
    a. Baseline and periodic imaging of primary site as clinically indicated
    b. Chest imaging with CT (+contrast) or MRI (± contrast) as clinically indicated
7. Stage IV synchronous disease imaging surveillance includes **ANY** of the following:
    a. Chest and other known metastatic sites imaging with CT (+contrast) or MRI (± contrast) as clinically indicated
    b. MRI (± contrast) (preferred) and/or CT (+ contrast) at baseline and periodically (frequency based on estimated recurrence)

Wilms Tumor (Nephroblastoma) Surveillance

NCCN Wilms Tumor (Nephroblastoma) Version 1.2025

Wilms tumor (nephroblastoma) surveillance imaging includes chest and abdominal imaging every 3 months for 2 years, then every 6 months for 2 years (*__NOTE__: *Chest X-ray and abdominal ultrasound may be used in place of cross sectional imaging with chest computed tomography [CT] and abdominal CT or magnetic resonance imaging [MRI]*)

Blood/Bone Marrow Cancers Surveillance section

Acute Lymphoblastic Leukemia Surveillance

NCCN Acute Lymphoblastic Leukemia Version 3.2024

Acute lymphoblastic leukemia: No imaging surveillance suggested.

Acute Myeloid Leukemia Surveillance reuse

NCCN Acute Myeloid Leukemia Version 2.2025

Blastic plasmacytoid dendritic cell neoplasm surveillance includes a repeat PET/CT for individuals with prior evidence of extramedullary disease.

Chronic Lymphocytic Leukemia/Small Cell Lymphocytic Lymphoma Surveillance

NCCN Chronic Lymphocytic Leukemia/Small Cell Lymphocytic Lymphoma Version 2.2025

Chronic lymphocytic leukemia/small cell lymphocytic lymphoma: No imaging surveillance suggested.

Chronic Myeloid Leukemia Surveillance

NCCN Chronic Myeloid Leukemia Version 3.2025

Chronic Myeloid Leukemia: No imaging surveillance suggested.

Hairy Cell Leukemia Surveillance

NCCN Hairy Cell Leukemia Version 1.2025

Hairy cell leukemia: No imaging surveillance suggested.

Multiple Myeloma Surveillance

NCCN Multiple Myeloma Version 1.2025

Multiple myeloma surveillance includes **ANY** of the following:

1. Multiple myeloma, surveillance imaging as clinically indicated with **ANY** of the following:
    a. CT scan, low dose
    b. FDG PET/CT
    c. MRI without contrast, whole-body
2. Smoldering myeloma, surveillance imaging annually (or more often as indicated) with **ANY** of the following:
    a. CT scan, low dose
    b. FDG PET/CT
    c. MRI (without contrast, whole body

MRI Abomen/MRCP Procedure Codes

Table 1. MRI Abdomen Associated Procedure Codes

CODE	DESCRIPTION
74181	Magnetic resonance (eg, proton) imaging, abdomen; without contrast material(s)
S8037	Magnetic resonance cholangiopancreatography (MRCP)

CODE	DESCRIPTION
74182	Magnetic resonance (eg, proton) imaging, abdomen; with contrast material(s)
74183	Magnetic resonance (eg, proton) imaging, abdomen; without contrast material(s), followed by with contrast material(s) and further sequences
0649T	Quantitative magnetic resonance for analysis of tissue composition (eg, fat, iron, water content), including multiparametric data acquisition, data preparation and transmission, interpretation and report, obtained with diagnostic MRI examination of the same anatomy (eg, organ, gland, tissue, target structure); single organ

MRI Abdomen Summary of Changes

MRI Abdomen guideline had the following version changes from 2023 to 2024:

- Added the following to keep in line with current research:
  - "Active treatment" indication under "Cancer"
  - Under "Adrenal mass"
    - Indications under "Known mass"
    - "Lesion seen"
    - "Tumor or endocrine disorders"
  - Under "Kidney"
    - "Angiomyolipoma"
    - "Magnetic resonance urography"
    - "Mass is cystic"
    - "Mass is seen"
    - "Mass is solid"
    - "Polycystic Kidney Disease"
  - Under "Liver mass"
    - "Beckwith-Wiedemann syndrome"
    - "Focal nodular neoplasia"
    - "Gaucher disease"
    - "Hepatic fibrosis"
    - "High risk for hepatocellular carcinoma"
    - "Jaundice"
    - "Lesion seen on prior imaging"

    - "Primary sclerosing cholangitis"
  - Under MRCP
    - "ERCP is contraindicated"
    - "Pancreatic or biliary tree abnormality"
    - "Peri-procedural care"
    - "Symptoms"
  - Under "Pancreatic mass"
    - "Age is greater than 80"
    - "Cyst is 1.5 cm to 1.9 cm
    - "Cyst is 1.5cm to 2.5 cm"
    - "Cyst is 2 cm to 2.5 cm"
    - "Cyst is more than 2.5 cm"
    - "Cyst is incidental"
    - "Cyst is seen on prior imaging"
    - "Lifetime risk"
    - "Pancreatic tumor is functioning"
  - "Spleen" under "Organ evaluation"
- Removed the following as current research does not support the indication:
  - "History of malignancy" under "Adrenal mass"
  - "Infection or inflammatory disease is known"
  - "Mass, lesion"
  - "Pancreatic disease" under "Symptoms
  - "Retroperitoneal fibrosis"
  - Under "Liver mass"
    - "Lesion greater than"
    - "Lesion less than"
  - Under MRCP
    - "Pancreatitis is suspected" under "Pancreatitis"

        - "Pain in the left or right"
    - Under "Pancreatic mass"
        - "Cyst, incidental"
        - "Cyst, 5mm to 1cm"
        - "Cyst, 1cm to 2 cm"
        - "Lesions greater than"
- Mid-cycle update: added Pediatric Preamble and pediatric indications
- 12/10/2024 Mid-cycle update
    - Rearranged infection/inflammation indications to be in line with current evidence

MRI Abdomen/MRCP Definitions

24-hour urinalysis is a timed urine collection used in the metabolic evaluation of urinary stone disease, proteinuria evaluation, and estimation of renal function via creatinine clearance, estimating residual renal function in end stage renal disease with urea and creatinine clearance.
Aberrant is a deviation from the normal, usual or natural type.
Abscess is a swollen area within body tissue, containing an accumulation of pus.
Adenoma describes a benign tumor or a glandular structure or of glandular origin.
Adrenal glands, also known as suprarenal glands, are small, triangular-shaped glands located on top of both kidneys. Adrenal glands produce hormones that help regulate your metabolism, immune system, blood pressure, response to stress and other essential functions.
Alanine Transaminase (ALT) is an enzyme which promotes transfer of an amino group from glutamic acid to pyruvic acid and when present in abnormally high levels in the blood is a diagnostic indication of liver disease or damage.
Alkaline phosphatase (ALP) refers to any of the phosphatases that are optimally active in alkaline medium and occur in especially high concentrations in bone, the liver, the kidneys and the placenta. It is commonly used to diagnose liver damage or bone disorders.
Alpha-fetoprotein (AFP) is a fetal blood protein present abnormally in adults with some cancers (as of the liver) and normally in the amniotic fluid of pregnant women with high or low levels tending to be associated with certain birth defects (such as spina bifida or Down syndrome).
Amylase is an enzyme, or special protein, that helps digest carbohydrates. Most of the amylase in the body is made by the pancreas and salivary glands. A small amount of amylase in the blood and urine is normal.
Angiomyolipoma is a benign (noncancer) tumor of fat and muscle tissue that usually is found in the kidney. Angiomyolipomas rarely cause symptoms, but may bleed or grow large enough to be painful or cause kidney failure.

Anorexia is a prolonged loss of appetite.
Ataxia Telangiectasia Mutated (ATM) gene refer to changes in a gene that causes a rare neurodegenerative, autosomal recessive disorder characterized by chromosome instability, radiosensitivity, immunodeficiency and a predisposition for cancer.
BRCA1-associated protein 1 (BAP1) is a tumor suppressor gene that is located on chromosome 3p21. BAP1 is a deubiquitinating enzyme that regulates other cellular events, such as: cell-cycle control, transcription, chromatin modification, DNA damage response.
Beckwith-Wiedemann syndrome (BWS) is an inherited disease that is present at birth and is characterized especially by abdominal wall defects, increased birth weight, enlarged tongue, hypoglycemia, tumors usually of embryonic origin and enlargement of internal organs.
Bilirubin is a yellowish pigment that is produced when red blood cells break down. It is an important metabolite of heme, which coordinates iron in proteins.
Biochemical profile is a series of blood tests used to evaluate the functional capacity of several critical organs and systems, such as the liver and kidneys.
Birt Hogg Dube syndrome is an autosomal dominant genodermatosis, usually manifesting in the third decade of life with multiple fibrofolliculomas, trichodiscomas, and acrochordons. Patients with this syndrome have an increased susceptibility to develop renal cell carcinoma, lung cysts, and spontaneous pneumothorax.
Bosniak Classification System is a system for classifying renal cystic masses based on imaging characteristics on contrast-enhanced computed tomography (CT). The classification system helps predict a risk of malignancy and suggests either follow up or treatment.
The Bosniak classification system divides renal cystic masses into five categories:

- Bosniak I:
  - Simple, benign cyst with imperceptible, rounded wall
  - ~0% malignant
  - **NO** follow-up required
- Bosniak 2:
  - Minimally complex
    - Few thin septa or calcifications
    - Non-enhancing attenuation
    - Renal lesions less than 3 cm
    - Well marginated
  - ~0% malignant
  - **NO** follow-up required

- Bosniak 2F:
  - Minimally complex
    - Hyperdense cyst greater than 3 cm diameter, mostly intrarenal (less than 25% of wall visible); no enhancement
    - Increased number of septa, minimally thickened with nodular or thick calcifications
    - Perceived (but not measurable) enhancement of a hairline-thins, mooth septa
  - ~5% malignant
  - Ultrasound/CT follow-up at 6 months
- Bosniak 3: Considered to have a malignancy risk greater than 80% and surgical excision is recommended in able-bodied patients.
  - Indeterminate with thick, nodular multiple septa or wall with measurable enhancement, hyperdenseon CT
  - ~55% malignant
  - Partial nephrectomy or radiofrequency ablation in elderly or poor surgical candidates
- Bosniak 4: Defined by their degree of complexity
  - Clearly malignant; solid mass with large cystic or necrotic component
  - ~100% malignant
  - Partial or total nephrectomy

BRCA1-associated protein 1 (BAP1) is a tumor suppressor gene that is located on chromosome 3p21. BAP1 is a deubiquitinating enzyme that regulates other cellular events, such as: cell-cycle control, transcription, chromatin modification, DNA damage response.
BReast CAncer gene (BRCA 1 or 2) are sometimes called tumor suppressor genes that change into harmful mutations resulting in cancer, notably breast and ovarian cancers.
B symptoms refer to systemic symptoms of fever, night sweats, and weight loss which can be associated with both Hodgkin lymphoma and some non-Hodgkin lymphomas. The presence of B symptoms is a prognostic factor for some lymphomas.
Cancer Antigen (CA) 19-9 is a tumor marker that can indicate advanced pancreatic cancer. It's also associated with cancers in the colon, stomach, and bile duct.
Carcinoembryonic antigen (CEA) is a glycoprotein present in fetal digestive-tract tissues and in peripheral blood of people with some forms of cancer.
Catecholamines are hormones that act as neurotransmitters. They are produced by the body in the brain, nerve tissues, and adrenal glands. The main types of catecholamines are dopamine,

norepinephrine, and epinephrine. Catecholamines are important in stress responses. They are released into the body in response to physical or emotional stress.

Choledochal means related to, being or occurring in the common bile duct.

Choledochal cyst is a congenital or acquired anomaly that affects the biliary tree. It's a cystic dilation of the bile duct, which is the tube that carries bile from the liver to the small intestine and gallbladder.

Choledocholithiasis is a condition where gallstones are present in the common bile duct. The gallstones can be made of cholesterol, calcium, or bile pigments.

Cirrhosis is a condition in which the liver is scarred and permanently damaged. Scar tissue replaces healthy liver tissue and prevents the liver from working normally. Scar tissue also partly blocks the flow of blood through the liver. As cirrhosis gets worse, the liver begins to fail.

Colonoscopy is an endoscopic examination of the part of the large intestine that extends from the cecum to the rectum.

Computed tomography (CT) refers to a computerized X-ray imaging procedure in which a three-dimensional image of a body structure is revealed through a series of cross-sectional images or "slices."

Computed tomography urography (CTU) is a imaging exam that evaluates the urinary tract system using contrast medium.

Congenital is a condition or trait present from birth.

C-reactive protein (CRP) is a pentameric protein synthesized by the liver, whose level rises in response to inflammation.

Crohn's disease is chronic inflammation that typically involves the lower portion of the ileum, often spreads to the colon, and is characterized by diarrhea, cramping, loss of appetite and weight and the development of abscesses and scarring.

Cyclin-dependent kinase inhibitor (CKI) is a protein that prevents kinase activity by binding to a cyclin-CDK complex.

Cyst is a closed sac having a distinct membrane and developing abnormally in a cavity or structure of the body.

Dermatomyositis is a rare disease that causes muscle inflammation and skin rash. Symptoms include a red or purple rash on sun exposed skin and eyelids, calcium deposits under the skin, muscle weakness, and trouble talking or swallowing.

Diverticulitis is inflammation of an abnormal pouch or sac opening from a hollow organ (such as the intestine or bladder).

Edema an abnormal infiltration and excess accumulation of serous fluid in connective tissue or in a serous cavity.

Elastography is a non-invasive medical imaging technique that helps determine the stiffness of organs and other structures in your body.

Endoscopic retrograde cholangiopancreatography (ERCP) is a procedure that diagnoses and treats problems in the pancreas, gallbladder, liver, and bile ducts. It combines X-ray and an endoscope, which is a long, flexible, lighted tube.

Epigastric hernia occurs when fat or part of the intestines pushes through a weakness in the wall of the abdomen. The bulge can be caused by body tissue bulging through the surrounding muscle in the stomach area.

Erythrocyte sedimentation rate (ESR) is a commonly performed hematology test that may indicate and monitor an increase in inflammatory activity within the body caused by one or more conditions such as autoimmune disease, infections or tumors.

Fever of unknown origin is defined as a temperature of 101 degrees Fahrenheit (38.3 degrees Centigrade) or higher with a minimum duration of three weeks without an established diagnosis.

Fibrosis is thickening or scarring of the tissue.

Fistula is an abnormal connection that leads from an abscess, hollow organ or part to the body surface, or from one hollow organ or part to another, and may be surgically created to permit passage of fluids or secretions.

Focal nodular hyperplasia (FNH) is a benign tumor or lesion that forms in the liver.

Gaucher's disease is a rare hereditary disorder of lipid metabolism caused by an enzyme deficiency and characterized by enlargement of the spleen and liver, bone lesions and sometimes neurological impairment.

Hemochromatosis is a hereditary disorder of metabolism involving the deposition of iron-containing pigments in the tissues that is characterized by joint or abdominal pain, weakness and fatigue and may lead to bronzing of the skin, arthritis, diabetes, cirrhosis or heart disease if untreated.

Hepatitis is inflammation of the liver.

Hepatocellular carcinoma is cancer involving the epithelial parenchymatous cells of the liver.

Hepatoma is a usually malignant tumor of the liver.

Hepatomegaly is enlargement of the liver.

Hereditary leiomyomatosis and renal cell cancer (HLRCC) is a rare, inherited disorder that causes benign tumors to form in the skin and uterus, and increases the risk of kidney cancer.

Hereditary papillary renal carcinoma (HPRC) is a rare, inherited disorder that increases the risk of developing a type of kidney cancer called papillary renal cell carcinoma (RCC). HPRC is caused by mutations in the MET gene, which helps control cell growth in the kidneys.

Hereditary paraganglioma syndrome is a group of familial cancer syndromes. It's characterized by the presence of paragangliomas (PGL), which are tumors that arise from neuroendocrine tissues. These tumors are distributed symmetrically along the spine from the base of the skull to the pelvis.

Hernia is a gap in the muscular wall that allows the contents inside the abdomen to protrude outward.

Iliac artery compression is a clinical syndrome of unilateral lower extremity swelling and pain due to venous hypertension caused by an iliac artery compressing an overlying iliac vein.
Incarcerated (also referred to as irreducible) is used to describe herniae, in which their contents are unable to pass back through the hernial opening to their anatomical site of origin. Incarceration is a risk factor for bowel obstruction and strangulation, and therefore usually necessitates urgent surgery.
Incisional hernia is a hernia that develops along a prior surgical incision in the abdomen.
Indeterminate findings are inconclusive or insufficient for treatment planning.
Inflammatory bowel disease is an autoimmune disorder that is characterized by chronic inflammation of the gastrointestinal (GI) tract.
Intraductal papillary mucinous neoplasm (IPMN) are cystic tumors of the pancreas that grow within the pancreatic ducts and produce mucin.
Jaundice is the yellowish pigmentation of the skin, tissues and body fluids caused by the deposition of bile pigments and indicates increased production or impaired excretion.
Lipase is a digestive enzyme that breaks down fats during digestion. It is produced in the pancreas, mouth, and stomach.
Lymphoma is a type of blood cancer that affects the immune system. Lymphoma occurs when abnormal white blood cells, called lymphocytes, grow in the lymphatic system.
Magnetic resonance cholangiopancreatography (MRCP) is a type of MRI scan that uses computer software to create images of the pancreatic and bile ducts. It can also be used to see pancreatic cysts and blockages in the ducts.
Magnetic resonance enterography (MRE) is a type of magnetic resonance imaging (MRI) that uses a contrast material to produce detailed images of the small intestine and bowel.
Magnetic resonance imaging (MRI) is a non-invasive diagnostic technique that produces computerized images of internal body tissues and is based on nuclear magnetic resonance of atoms within the body induced by the application of radio waves.
Magnetic resonance urography (MRU) is a radiation-free MRI exam that uses magnetic waves and contrast material to create detailed images of the urinary tract. The images can show the structure and function of the kidneys, ureters, and bladder.
May-Thurner syndrome (iliac vein compression syndrome) is a clinical syndrome of unilateral lower extremity swelling and pain due to venous hypertension caused by an iliac artery compressing an overlying iliac vein.
Metastases is the spread of a disease-producing agency (such as cancer cells) from the initial or primary site of disease to another part of the body.
Mucinous cystic neoplasm (MCN) is a usually large uni- or multilocular thick-walled cyst, most often filled with mucinous fluid, but may also have a hemorrhagic or serous content.
Multiple endocrine neoplasia type 1 (MEN1) is a rare endocrine tumor syndrome with high penetrance. This syndrome is also known as Wermer syndrome. It primarily causes neoplasia

of the parathyroid glands, the anterior pituitary gland, and the neuroendocrine tissue of gastro-entero-pancreatic organ systems.

Non-diagnostic is a result that does not lead to a confirmed diagnosis.

Occult means the problem was hidden, not immediately apparent, or cannot be detected with clinical methods alone.

Occult hernia or hidden hernia, also commonly referred to as an occult inguinal hernia, is an undetectable mass of herniated tissue.

Pancreas divisum is a congenital defect of the pancreas. It occurs when the ventral and dorsal buds of the pancreas do not fuse together during development. This results in a smaller opening for the main pancreatic duct to drain through.

Pancreatitis is inflammation of the large lobulated gland of vertebrates that secretes digestive enzymes and the hormones insulin and glucagon. Symptoms include: fever, nausea, vomiting, severe abdominal pain, tachycardia, abdominal swelling. hypotension. elevated pancreatic enzymes and jaundce.

Paraneoplastic syndrome is a group of rare disorders that are triggered by an abnormal immune system response to a cancerous tumors.

Pediatric approximate ages are defined by the US Department of Health (USDH), the Food and Drug Administration (FDA), and the American Academy of Pediatrics (AAP) as the following:

- Infancy, between birth and 2 years of age
- Childhood, from 2 to 12 years of age
- Adolescence, from 12 to 21 years of age, further defined by the AAP into:
    1. Early (ages 11–14 years)
    2. Middle (ages 15–17 years),
    3. Late (ages 18–21 years)
    4. Older ages may be appropriate for children with special healthcare needs.

Peritonitis is inflammation of the smooth transparent serous membrane that lines the cavity of the abdomen of a mammal and is folded inward over the abdominal and pelvic viscera.

Peutz-Jeghers syndrome (PJS) is a familial polyposis inherited as an autosomal dominant trait that is characterized by numerous polyps in the stomach, small intestine and colon along with melanin-containing spots on the skin and mucous membranes especially the lips and gums.

Pheochromocytoma is a small vascular tumor of the adrenal medulla, causing irregular secretions of epinephrine and norepinephrine, leading to attacks of raised blood pressure, palpitations and headaches.

Polycystic kidney disease (PKD) is a genetic disorder that causes fluid-filled cysts to grow in the kidneys. The cysts can grow very large and cause the kidneys to enlarge and lose function. PKD cysts can reduce kidney function and lead to kidney failure.

Primary sclerosing cholangitis (PSC) is a chronic liver disease in which the bile ducts inside and outside the liver become inflamed and scarred, and are eventually narrowed or blocked. When the bile ducts are narrowed or blocked, bile builds up in the liver and causes further liver damage.
Prolactin (also known as lactotropin and PRL) is a hormone that's responsible for lactation, certain breast tissue development and contributes to hundreds of other bodily processes. Prolactin levels are normally low in people assigned male at birth (AMAB) and non-lactating and non-pregnant people.
Pseudocyst is a fluid-filled cavity resembling a cyst but lacking a wall or lining.
Recurrence is a new occurrence of something that happened or appeared before.
Retroperitoneal describes the area behind the smooth transparent serous membrane that lines the cavity of the abdomen.
Retroperitoneal fibrosis (RPF) occurs when extra fibrous tissue forms in the area behind the stomach and intestines. The tissue forms a mass (or masses) or tough fibrotic tissue. It can block the tubes that carry urine from the kidney to the bladder. The cause of this problem is mostly unknown.
Screening does not diagnose the illness. The goal is early detection and lifestyle changes or surveillance, to reduce the risk of disease, or to detect it early enough to treat it most effectively.
Serine/threonine kinase 11 (STK11) is a tumor suppressor enzyme that helps prevent cells from growing and dividing too quickly or in an uncontrolled way.
Sickle cell disease is a chronic anemia that occurs in individuals who are homozygous for the gene controlling hemoglobin S (eg, African or Mediterranean descent). It is characterized by destruction of red blood cells and by episodic blocking of blood vessels by the adherence of sickle cells to the vascular endothelium. This causes the serious complications of the disease (such as organ failure).
Spigelian hernia is a rare ventral hernia that is defined as herniation of abdominal contents or peritoneum through a defect, namely the Spigelian fascia which is comprised of the transversus abdominis and the internal oblique aponeuroses.
Staging in cancer is the process of determining how much cancer is within the body (tumor size) and if it has metastasized (spread).
Steatosis is the first stage of nonalcoholic fatty liver disease (NAFLD). It's a condition where fat builds up in liver cells, but there's no inflammation or scarring at this stage.
Strangulated hernia occurs when the hernia contents are ischemic due to a compromised blood supply. This phenomenon occurs most commonly when there is a small opening in the musculature and a significant quantity of contents within the hernia itself.
Stricture is a narrowing or constriction of the lumen of a tube, duct or hollow organ such as the esophagus, ureter or urethra.
Surveillance in cancer is the ongoing, timely and systematic collection and analysis of information on new cancer cases, extent of disease, screening tests, treatment, survival and cancer deaths.

Syncope is loss of consciousness resulting from insufficient blood flow to the brain.
Total Kidney Volume (TKV) is the sum of the volume of the left and right kidneys. It is the primary measure of kidney growth and can provide information on disease status and progression.
Transfusion dependent thalassemia major is a disease that causes the early breakdown of red blood cells, requiring regular red blood cell transfusions to survive.
Transient elastography (TE) is a non-invasive ultrasound exam that measures liver stiffness. It's also known as ultrasound elastography.
Tuberous sclerosis is a genetic disorder of the skin and nervous system that is characterized by the formation of small benign tumors in various organs (such as the brain, kidney, eye and heart), is accompanied by variable symptoms including seizures, developmental delay or intellectual disability, skin lesions (as hypopigmented macules of the trunk and limbs or telangiectatic facial papules), and is inherited as an autosomal dominant trait or results from spontaneous mutation.
Tumor protein 53 (TP53) is a gene that instructs cells to produce a protein called tumor protein p53. The p53 protein acts as a tumor suppressor and is also known as the "guardian of the genome".
Ulcerative colitis (UC) is a nonspecific inflammatory disease of the colon of unknown cause characterized by diarrhea with discharge of mucus and blood, cramping abdominal pain, inflammation and edema of the mucous membrane with patches of ulceration.
Ultrasound is the diagnostic or therapeutic use of ultrasound and especially a noninvasive technique involving the formation of images used for the examination and measurement of internal body structures and the detection of bodily abnormalities.
Umbilical hernia occurs when part of your intestine bulges through the opening in your abdominal muscles near your navel.
Varicocele is abnormal dilation and enlargement of the scrotal venous pampiniform plexus which drains blood from each testicle.
Von Hippel-Lindau disease is a rare genetic disease that is characterized by hemangiomas of the retina and cerebellum, cysts or tumors of the central nervous system, pancreas, kidneys, adrenals and reproductive organs that is typically inherited as an autosomal dominant trait.

MRI Abdomen/MRCP References

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