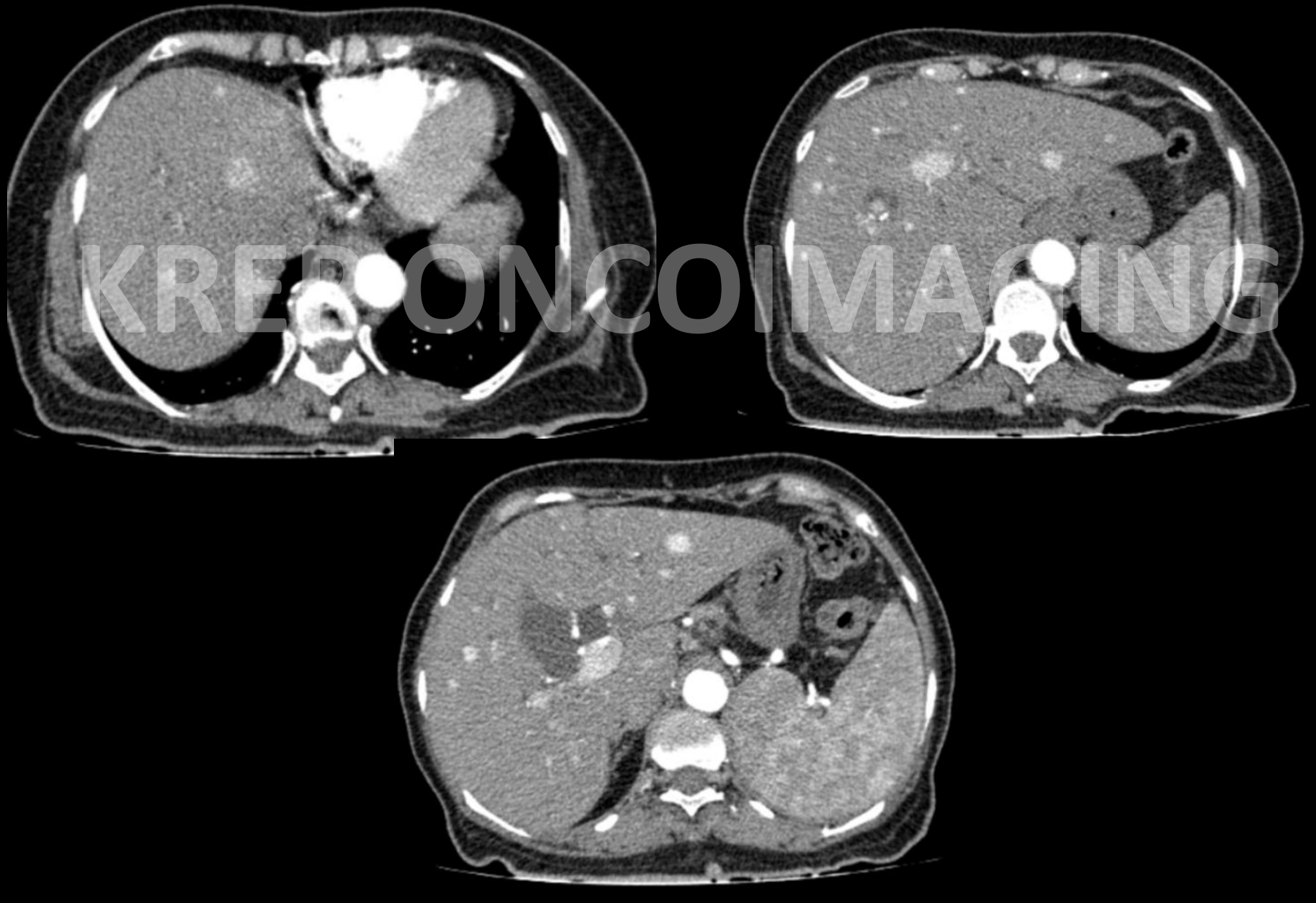
2025

KARNATAKA RADIOLOGY EDUCATION PROGRAM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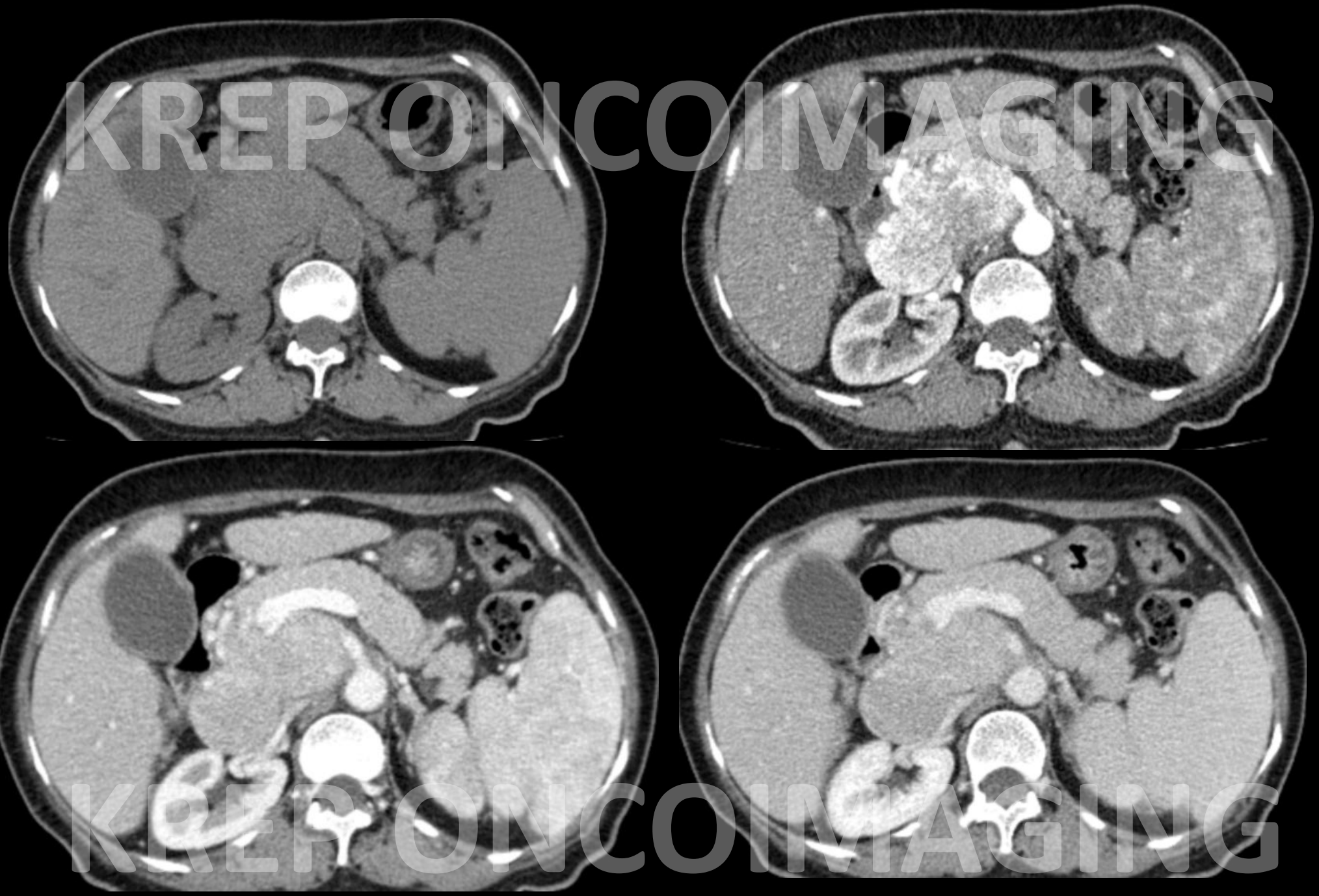
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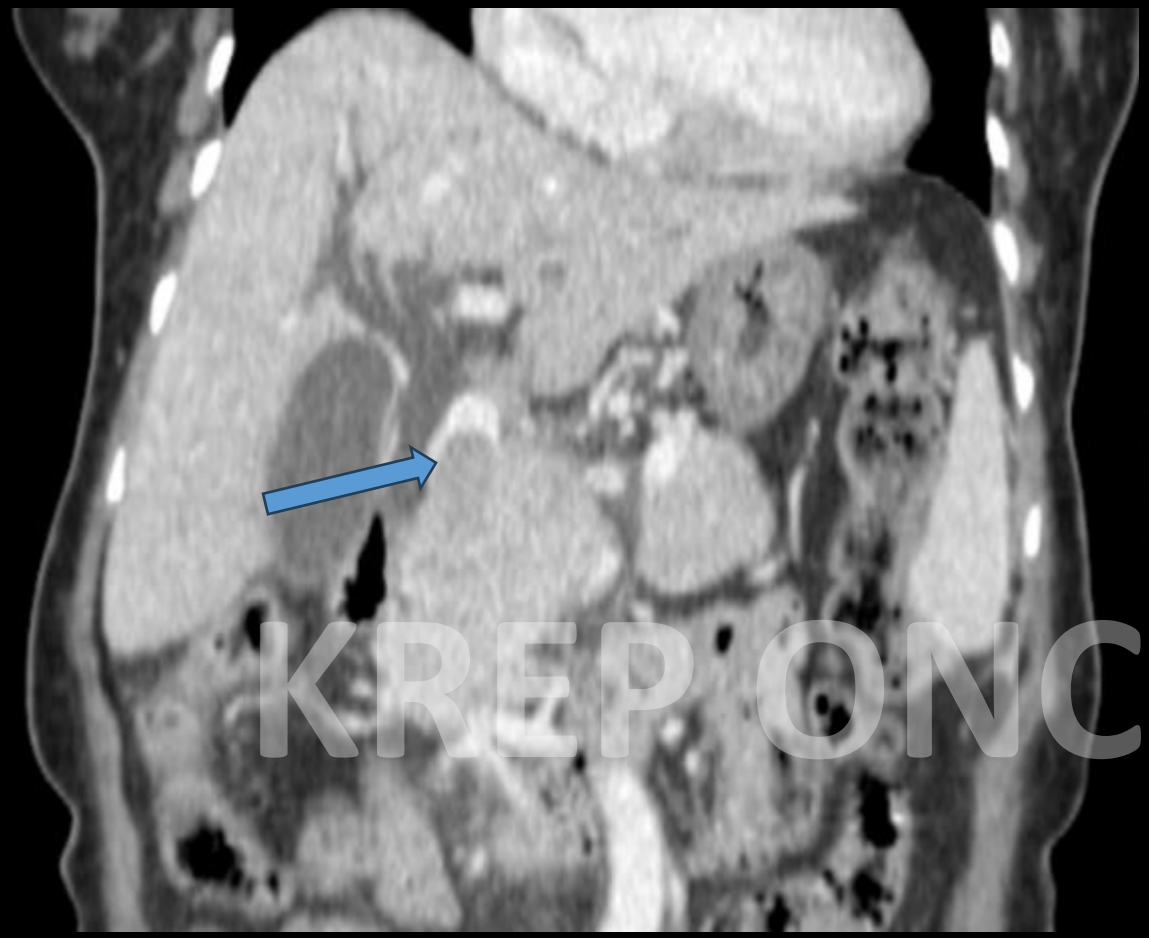

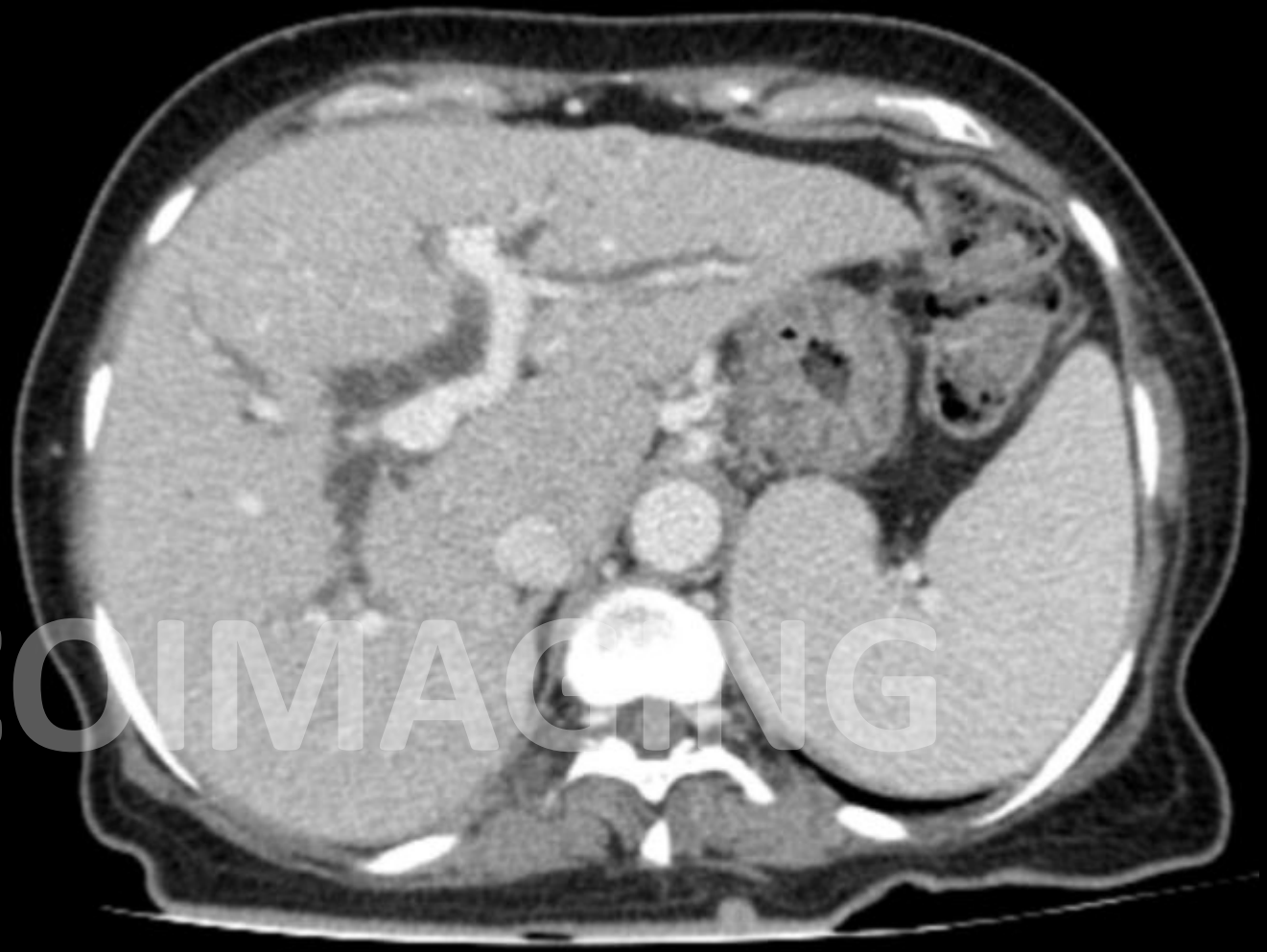

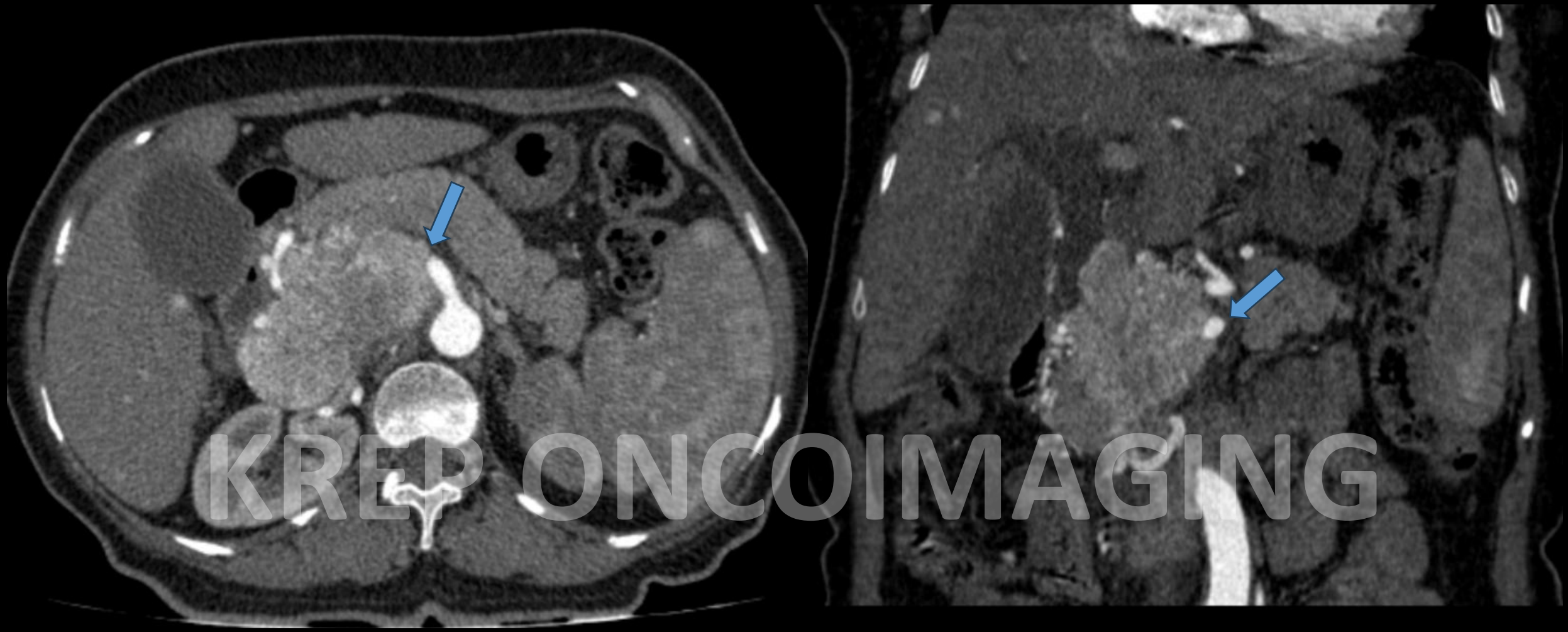
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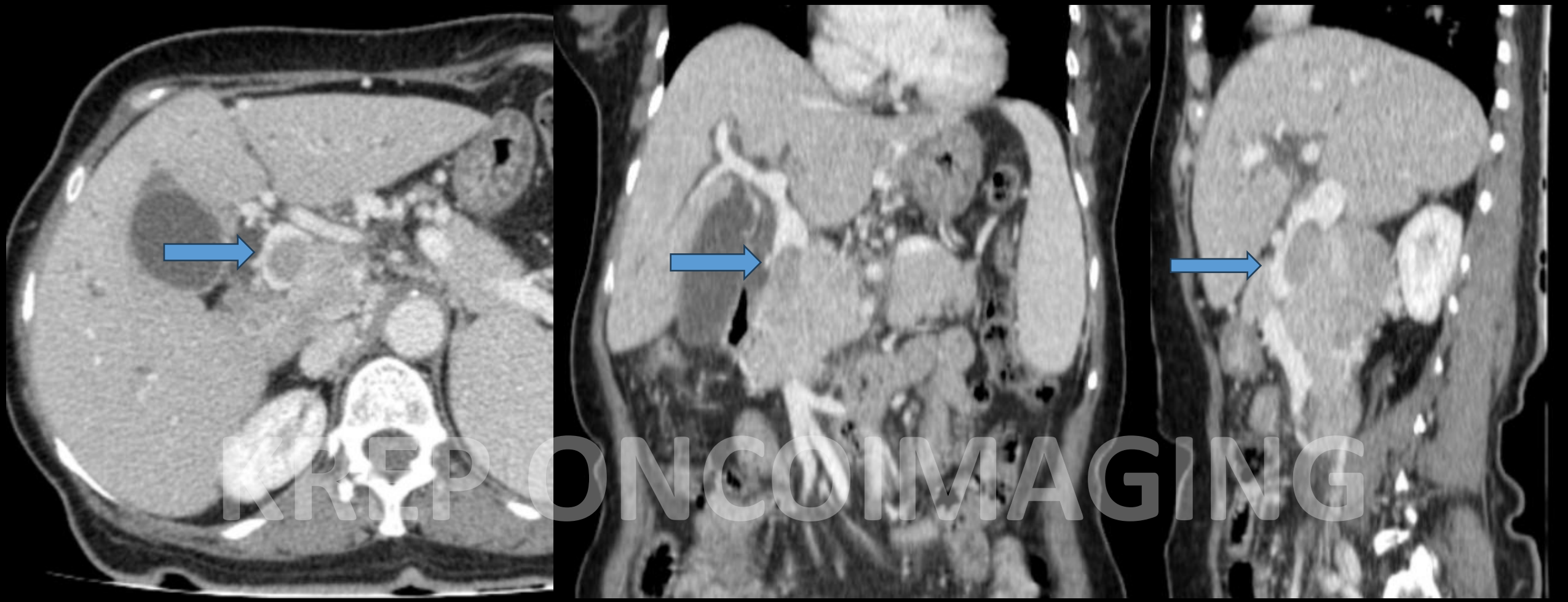
KRISP ONCOIMAGING

- Lobulated mass in posterior to head of pancreas measuring 3.5 x 7 x 3 cm (AP x TS x CC) showing intense early arterial phase hyperenhancement with washout on early portal / late arterial and venous phases. There are multiple arterial feeders from celiac axis.
- There is a large tumor thrombus in the main portal vein causing significant occlusion.
- SMA is encased with an arc of contact of about 180 degrees.
- There is moderate communicating IHBRD due to mass effect from the lesion.
- Multiple arterial phase hyperenhancing lesions are noted in both lobes of the liver, suggestive of hypervascular hepatic metastases.
  - **Features are suggestive of malignant NET (neuroendocrine tumor) with portal vein tumour thrombus and multiple hepatic metastasis with moderate communicating IHBRD.**

1. **Pathology & Origin:**
   - **Neuroendocrine tumors** arising from **paraganglia** of the sympathetic or parasympathetic chain **outside the adrenal medulla**.
   - Sympathetic paragangliomas (abdomen/pelvis) are usually **functional (catecholamine-secreting)**; parasympathetic (head/neck) are usually **non-functional**.
2. **Common Locations:**
   - **Retroperitoneum along the aorta**, organ of Zuckerkandl (aortobifurcation), **para-aortic chain**, carotid space (carotid body tumor), **jugulotympanic region**, mediastinum, and bladder wall.
   - Extra-adrenal sites account for ~10–15% of all pheochromocytoma/paraganglioma spectrum tumors.
3. **Clinical Presentation:**
   - **Functional tumors:** episodic **hypertension, palpitations, headache, diaphoresis**, and **tachycardia**.
   - **Non-functional tumors:** mass effect symptoms (pain, hoarseness, dysphagia), or incidentally discovered.
4. **CT/MRI Morphology (Key Imaging Hallmarks):**
   - **Well-defined, hypervascular soft-tissue mass** with strong **arterial enhancement**.
   - **MRI:**
     - **T1:** iso- to hypointense
     - **T2: markedly hyperintense** ("**light-bulb bright**" in many cases)
     - **Post-contrast:** avid, heterogeneous enhancement
   - Large lesions may show **necrosis, hemorrhage, or cystic change**.

5. **Functional Molecular Imaging:**
    - **68Ga-DOTATATE PET/CT** is **preferred** (somatostatin receptor imaging) — highest sensitivity for **multifocal and metastatic disease**.
    - **FDG-PET/CT** is useful in **SDHB mutation-associated tumors** (more aggressive).
    - **MIBG scintigraphy** used when considering **MIBG therapy**.
6. **Genetic Associations (Very Important Clinically):**
    - **Up to 30–40% are hereditary.**
    - Strongest association: **SDHB mutation**, which confers **high metastatic risk**.
    - Others: **VHL, RET (MEN2), NF1, SDHD, SDHC**.
    - **Genetic testing is recommended in all patients**, especially if <45 years or multifocal/metastatic.
7. **Patterns of Spread & Malignant Potential:**
    - **No histologic feature reliably distinguishes benign from malignant — malignancy is defined by metastasis** (lymph nodes, bone, lung, liver).
    - **SDHB-associated** tumors are more likely to metastasize.
8. **Oncoradiologist Reporting Priorities:**
    - **Exact anatomic origin and relation to major vessels/nerve plexuses**.
    - **Local invasion vs displacement**.
    - **Multifocality** (scan from skull base → pelvis).
    - **Functional imaging avidity** (DOTATATE vs FDG) → helps determine **therapy route**.
    - Suggest **biochemical correlation (plasma metanephrines)** and **genetic counseling**.

Metastases

Although the majority of liver metastases are hypodense and enhance less than the surrounding liver, metastases from certain primaries demonstrate an increase in the number of vessels, resulting in a hyperechoic ultrasound appearance, and arterial phase hyperenhancement on CT or MRI which washes out on delayed scan (cf. hemangioma which does not show washout). The primaries typically include:

- renal cell carcinoma (RCC)
- thyroid carcinoma
- neuroendocrine tumor (NETs)
  - gastrointestinal NETs
  - islet cell tumors
  - pheochromocytoma
- leiomyosarcoma
- choriocarcinoma
- melanoma
- breast cancer
- colonic carcinoma [5]
- ovarian cystadenocarcinoma [5]

Contributors

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