

Purpose/Background

Ga-68 DOTATATE is a positron-emitting radiotracer with high affinity for the somatostatin receptor subtype 2 (SSTR2) and is widely used for imaging well-differentiated neuroendocrine tumors (NETs). Compared with In-111 octreotide scintigraphy, Ga-68 DOTATATE PET/CT offers superior spatial resolution and sensitivity. However, accurate interpretation requires thorough understanding of normal physiologic biodistribution, expected variants, and benign conditions that may demonstrate tracer uptake. Misinterpretation is particularly common in skeletal lesions, leading to potential false-positive diagnoses.

Methods

This educational exhibit reviews the radiopharmaceutical properties and mechanism of Ga-68 DOTATATE uptake, normal physiologic biodistribution, and abnormal uptake patterns using illustrative PET/CT examples. Common pitfalls and artifacts are highlighted, with a focused discussion on benign and inflammatory causes of uptake, including vertebral hemangiomas and other benign bone lesions. Imaging features are correlated with CT morphology to aid accurate interpretation and differential diagnosis.

Results

Normal physiologic uptake is consistently seen in the spleen, adrenal glands, pituitary gland, kidneys, liver, salivary glands, thyroid, pancreatic uncinus process, bowel, and sympathetic ganglia. Pathologic uptake typically presents as focal, asymmetric activity exceeding liver uptake and correlating with structural abnormalities on CT. While neuroendocrine neoplasms represent the most common cause of abnormal Ga-68 DOTATATE uptake, several benign entities—including inflammatory lymph nodes, granulomatous disease, healing fractures, degenerative bone disease, splenosis, and vertebral hemangiomas—can demonstrate mild to moderate uptake. Recognition of these patterns and correlation with CT findings significantly reduces false-positive interpretations.

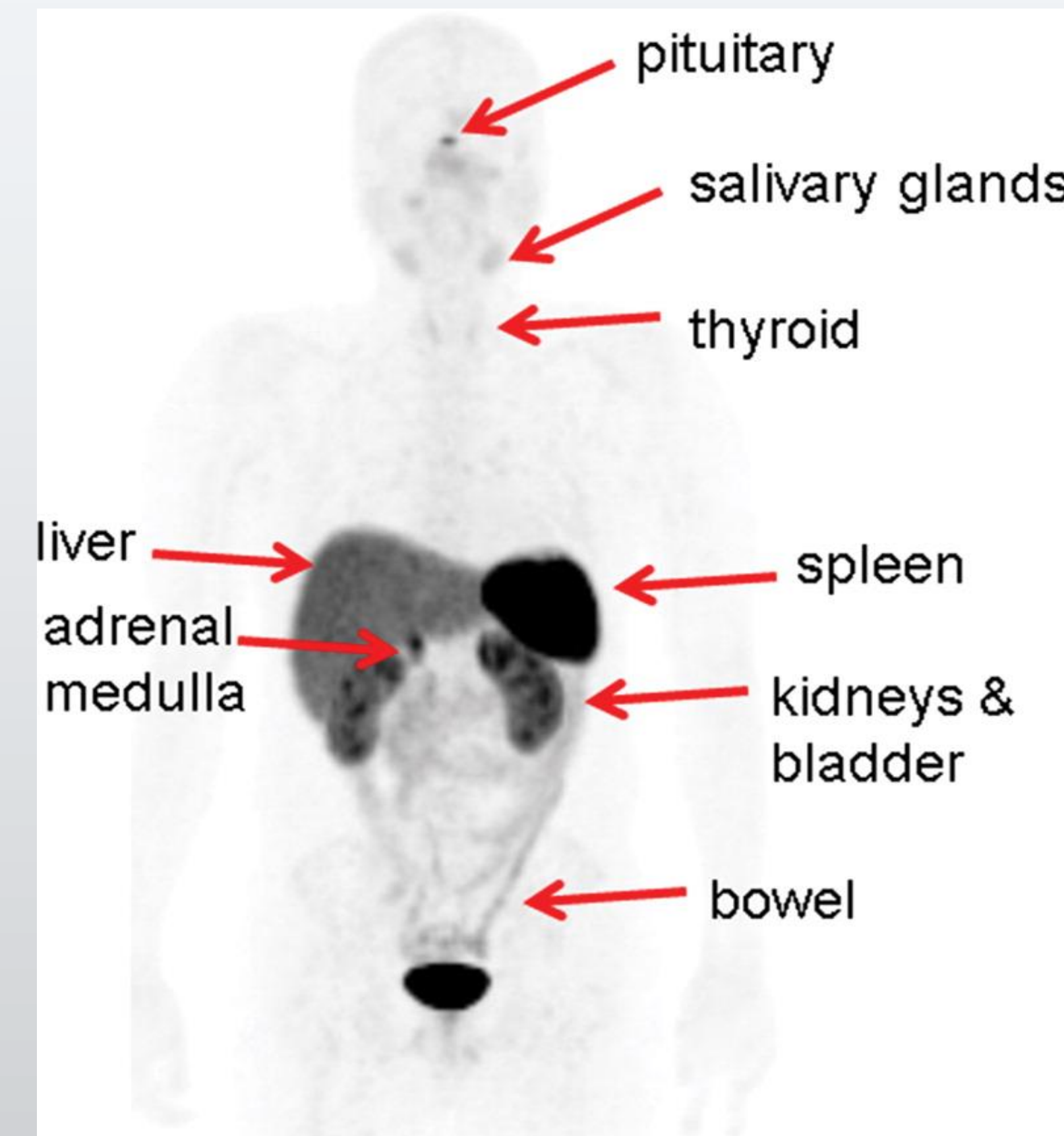


Figure 1: Normal Physiologic Biodistribution

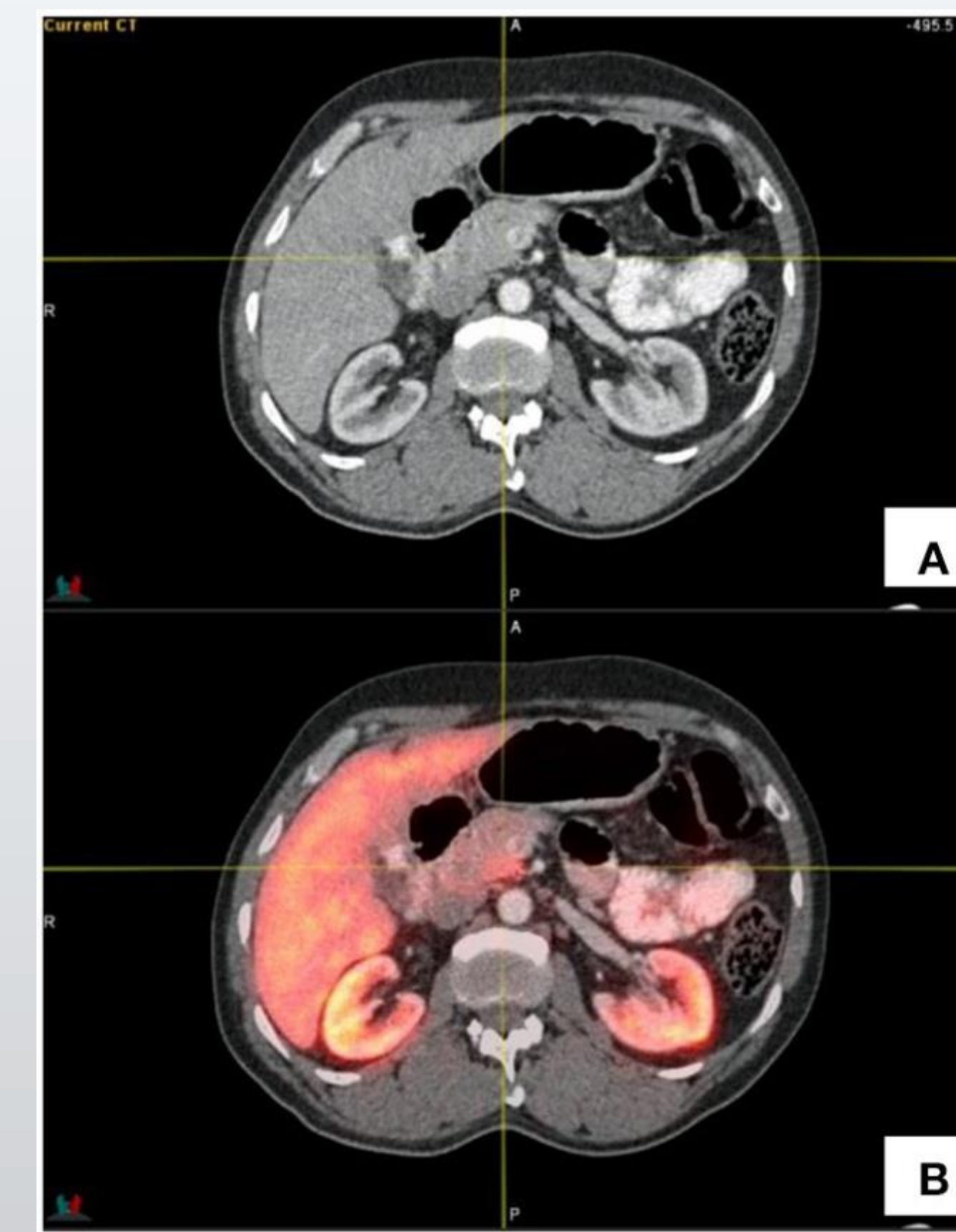


Figure 2: Pancreatic Uncinate Uptake (Pitfall)

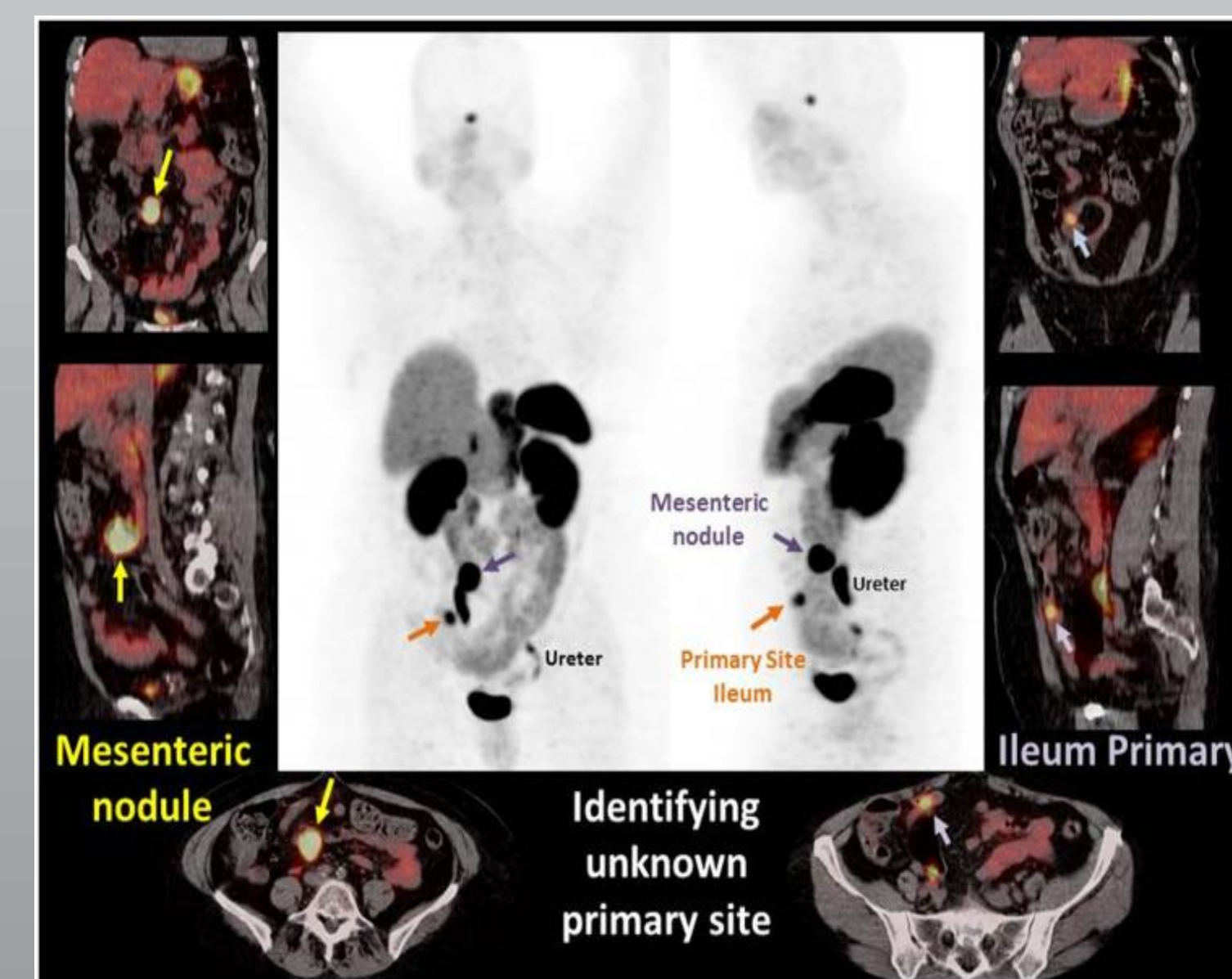


Figure 3: Small Bowel Neuroendocrine Tumor with Mesenteric Metastasis

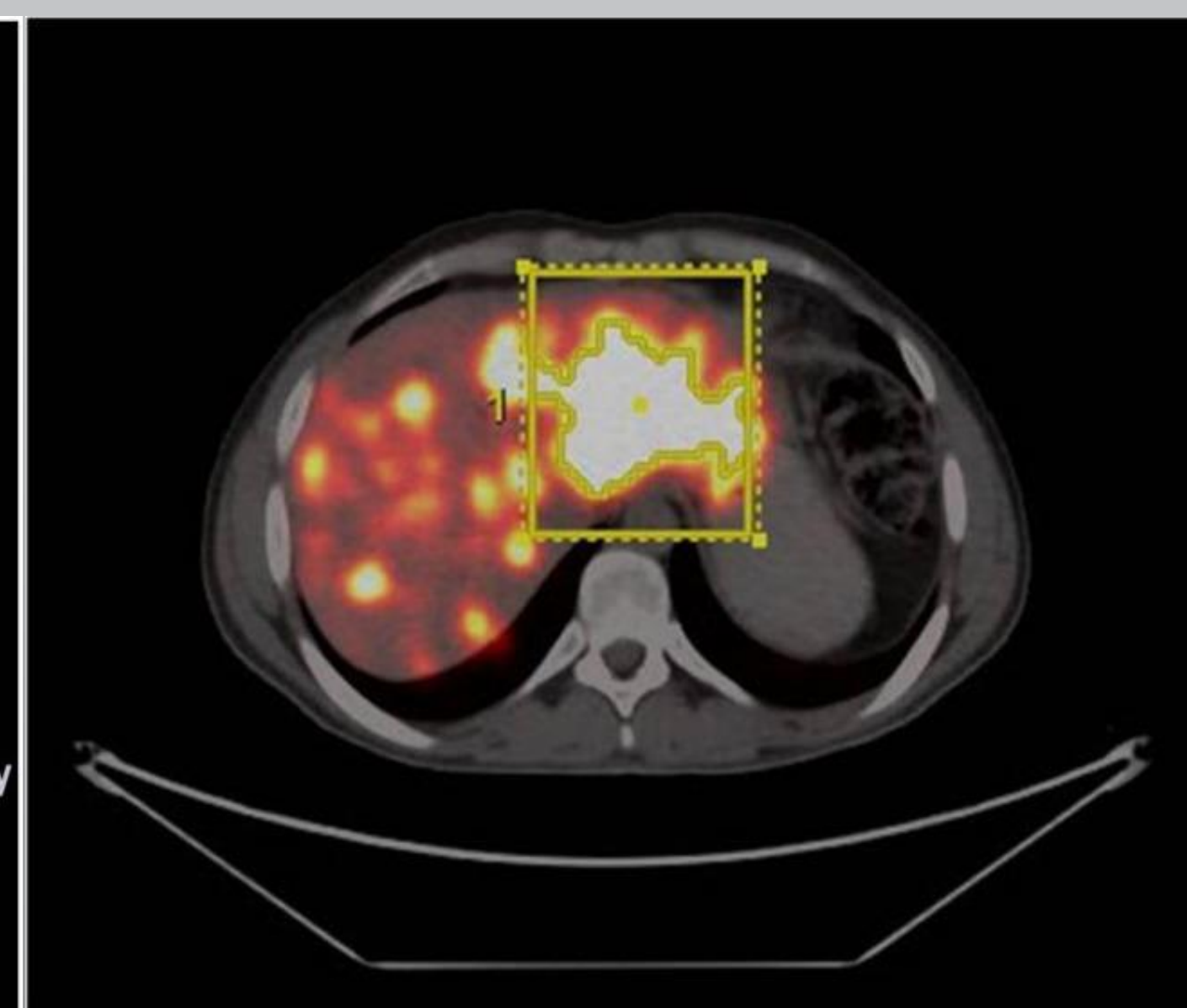


Figure 4: DOTATATE-Avid Hepatic Metastasis

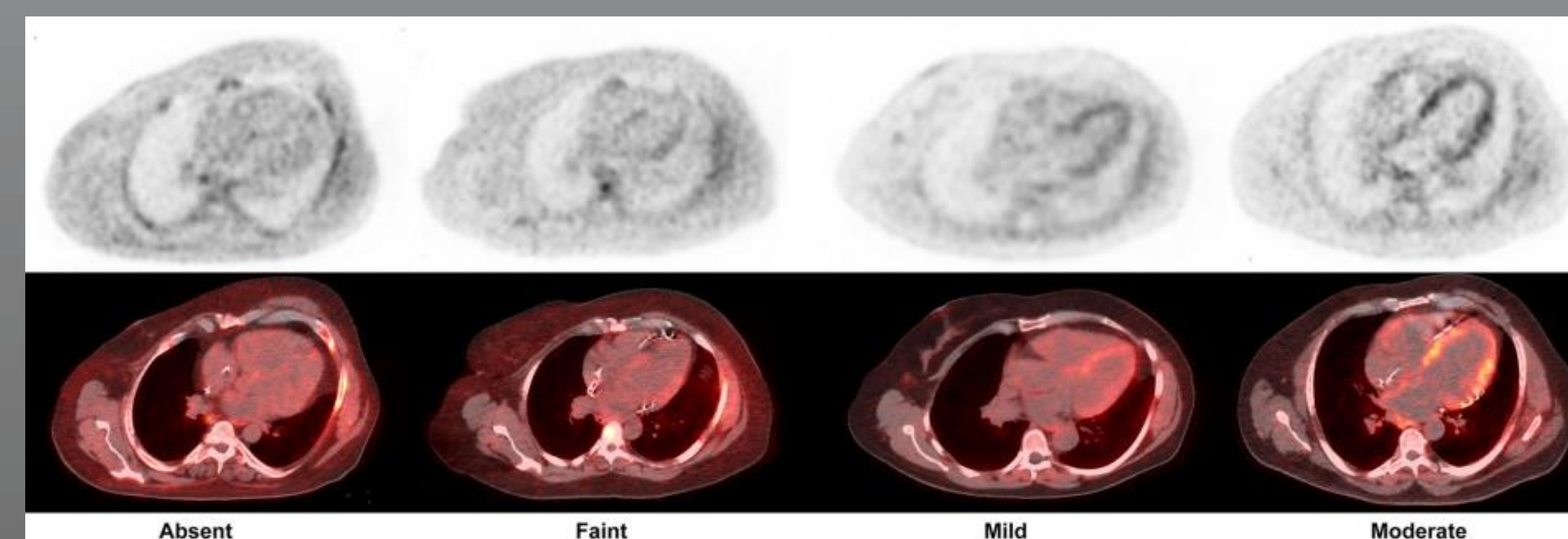


Figure 5: False Positive: Sarcoidosis

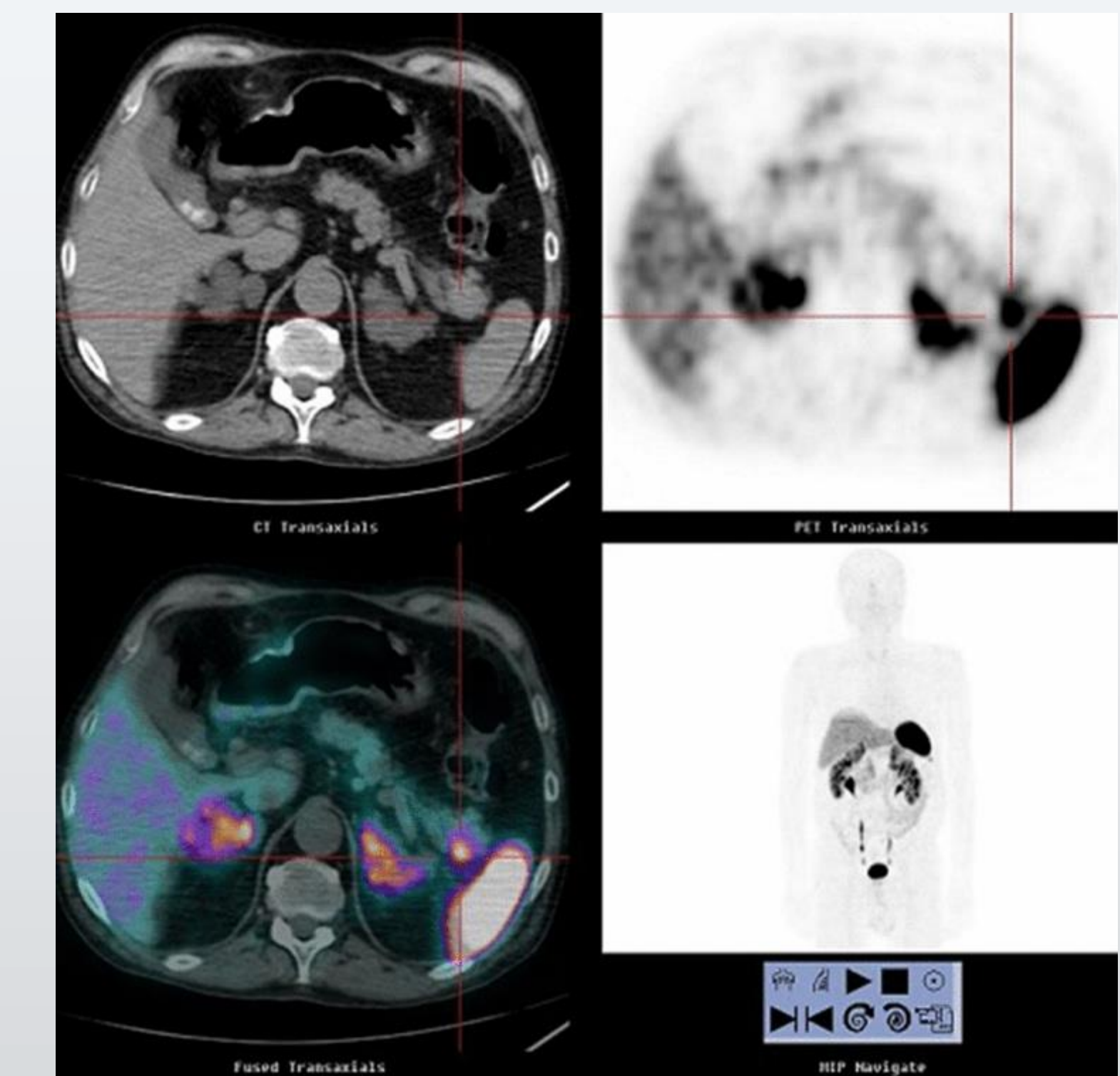


Figure 6: Splenosis Mimicking Metastatic Disease

Conclusion

Normal physiologic uptake is consistently seen in the spleen, adrenal glands, pituitary gland, kidneys, liver, salivary glands, thyroid, pancreatic uncinus process, bowel, and sympathetic ganglia. Pathologic uptake typically presents as focal, asymmetric activity exceeding liver uptake and correlating with structural abnormalities on CT. While neuroendocrine neoplasms represent the most common cause of abnormal Ga-68 DOTATATE uptake, several benign entities—including inflammatory lymph nodes, granulomatous disease, healing fractures, degenerative bone disease, splenosis, and vertebral hemangiomas—can demonstrate mild to moderate uptake. Recognition of these patterns and correlation with CT findings significantly reduces false-positive interpretations.

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