

# 58M with chronic liver disease, SOB, hypoxia

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UCHC-JWF

RT ANT LT PE LT POST RT P RT RAO LT PE LT LPO RT PE

P RT LAT A P A LLAT P PER LT RPO RT PE RT LAO LT PE

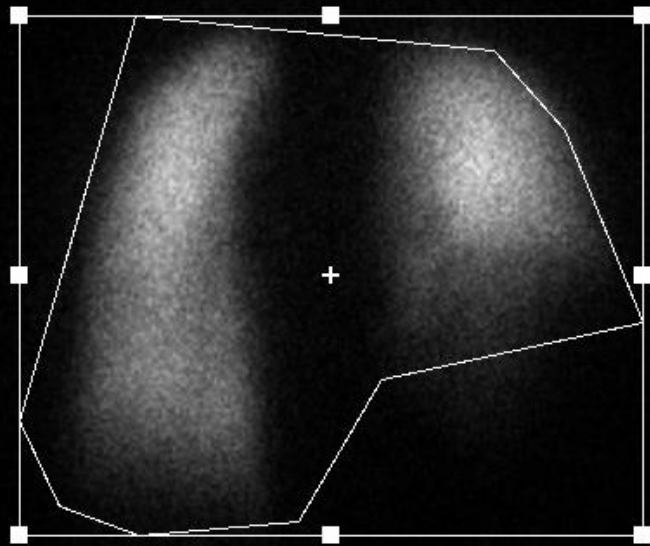
ANT ABDOMEN  
Lung Perf 4.2 mCi MAA

POST ABDOMEN

LLAT

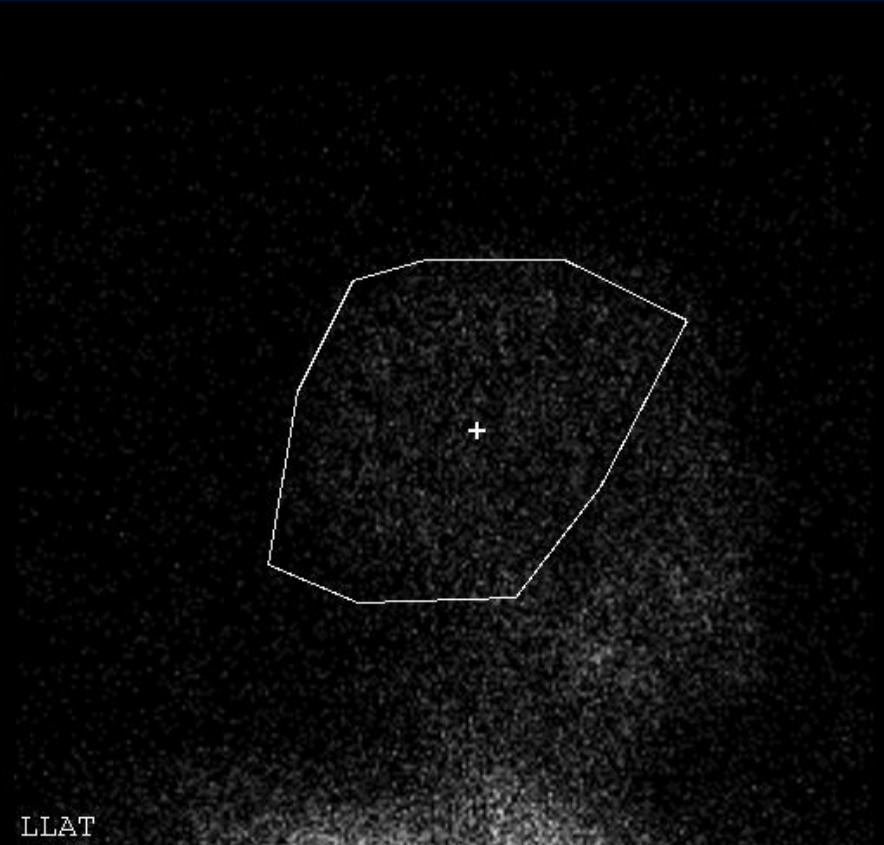
RLAT

4.2 mCi Tc-99m MAA IV



LUNG ROI 446635 CTS

LT POST RT P



LLAT

BRAIN ROI 5224 CTS

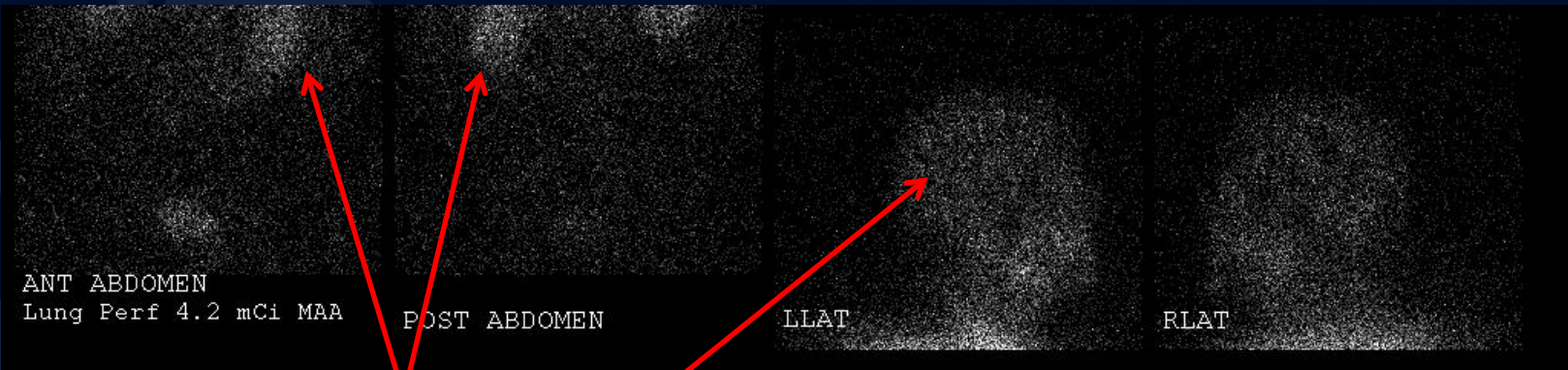
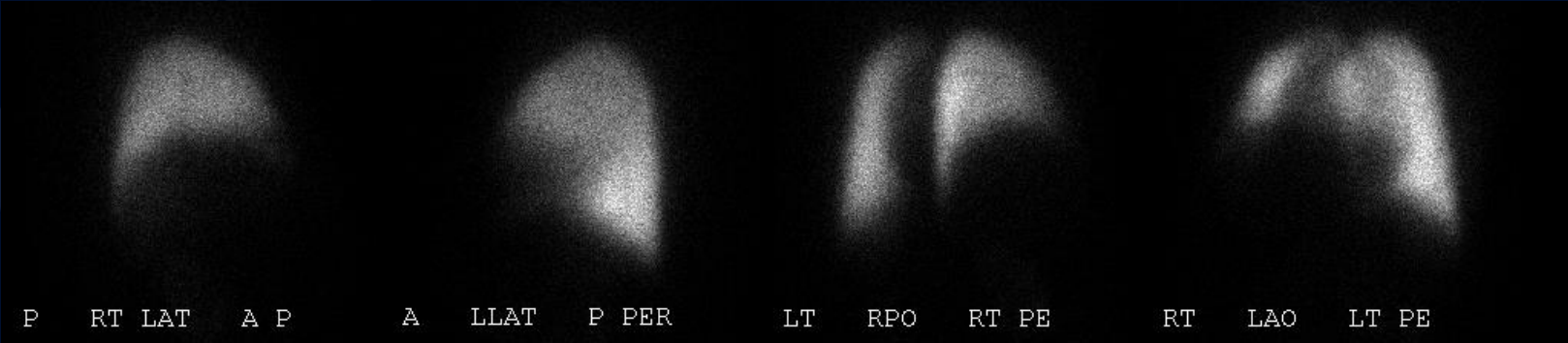
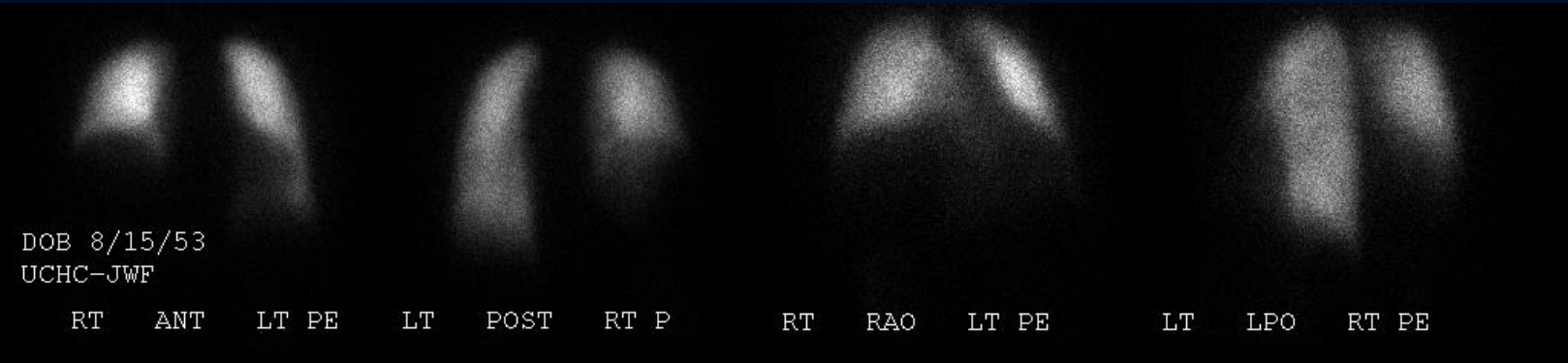
A large, stylized oak leaf graphic in a dark blue color, positioned on the left side of the slide. It features detailed vein patterns and a lobed edge.

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# Hepatopulmonary Syndrome (pulmonary-to-systemic shunting)

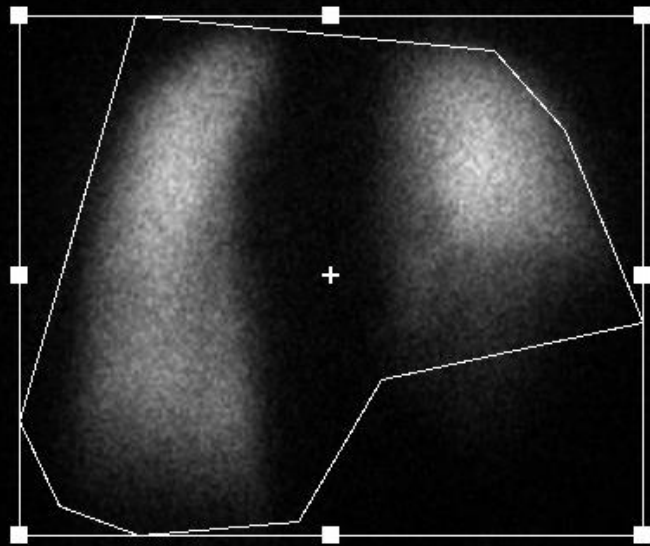


Normal lung perfusion



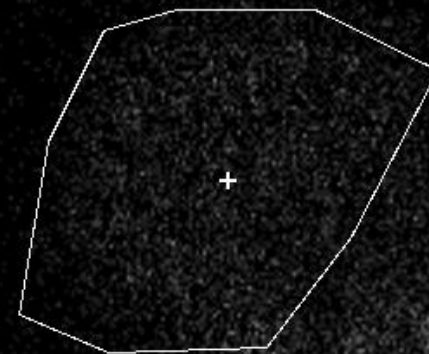
Uptake of radionuclide in the kidneys, brain, or both suggests shunting through the lung caused by an intrapulmonary shunt

Tc-99m MAA, 4.2 mCi, IV



LUNG ROI 446635 CTS

LT POST RT P



LLAT

BRAIN ROI 5224 CTS

Using total lung radioactivity, correct for percentage of systemic circulation to the brain (20%)

~ 5% pulmonary-to-systemic shunting.

# Hepatopulmonary Syndrome

Diagnosis facilitated by  $^{99m}\text{Tc}$ -MAA lung scan lung perfusion and brain uptake quantification:

- particles are efficiently trapped by the pulmonary capillaries such that normally only about 3% of the activity is seen outside the lungs
- Brain or kidney uptake indicates arteriovenous shunt (R-L shunt)
- R-L shunts develop in the lungs secondary to portal hypertension
  - \*Probably due to increased levels of circulating vasodilators, likely nitric oxide
  - \*Dilated precapillary and capillary vessels; pleural/pulmonary arteriovenous shunts, portopulmonary anastomoses
- Percentage R-L shunt is expressed as the fraction of perfusion reaching the body outside the lungs to the total body perfusion including the lungs
  - \*Percentage brain uptake  $\geq 6\%$  is considered abnormal and suggestive of presence of an anatomic shunt in the lungs



# Hepatopulmonary Syndrome

- Hepatopulmonary syndrome (HPS) triad:
  1. hepatic dysfunction (cirrhosis)
  2. hypoxemia (alveolar-arterial O<sub>2</sub> gradient of >15 mmHg; >20 mmHg in >64 years old patients)
  3. peripheral pulmonary arterial dilatation (due to right to left micro-shunts)
- Presentation: progressive dyspnea, cyanosis, clubbing in a patient with established cirrhosis
- Rx:
  - Mild to moderate: Observation ± oxygen
  - Severe HPS: Oxygen, liver transplantation

# References

1. MacDonald A, Burrell S. Infrequently performed studies in nuclear medicine: Part 1. J Nucl Med Technol. 2008 Sep;36(3):132-43; quiz 145. [doi: 10.2967/jnmt.108.051383](https://doi.org/10.2967/jnmt.108.051383). Epub 2008 Aug 14.
2. Gerard P, Patel B, Ahmad N. "Head shunting": Nuclear medicine evaluation of hepatopulmonary syndrome: Diagnosis, evaluation and review. [J Nucl Med May 2013 54:1246](#)
3. Statdx