

IMAGIOLOGIA DAS GLÂNDULAS SUPRARRENAIS

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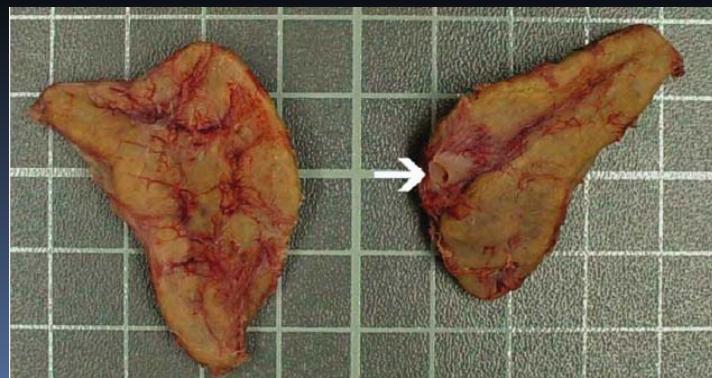
Moderador : Dr. Artur Correia Costa

OBJECTIVOS

- A glândula SR normal
- Alterações morfológicas minor
- O incidentaloma – Benigno ou Maligno?
- Disfunção das SRs
- Outras lesões das SRs

A Glândula Suprarrenal Normal

- 5 g de peso
- Forma de T, Y ou V
- Examinada muito frequente/
- Clinicamente silenciosa
- Função endócrina



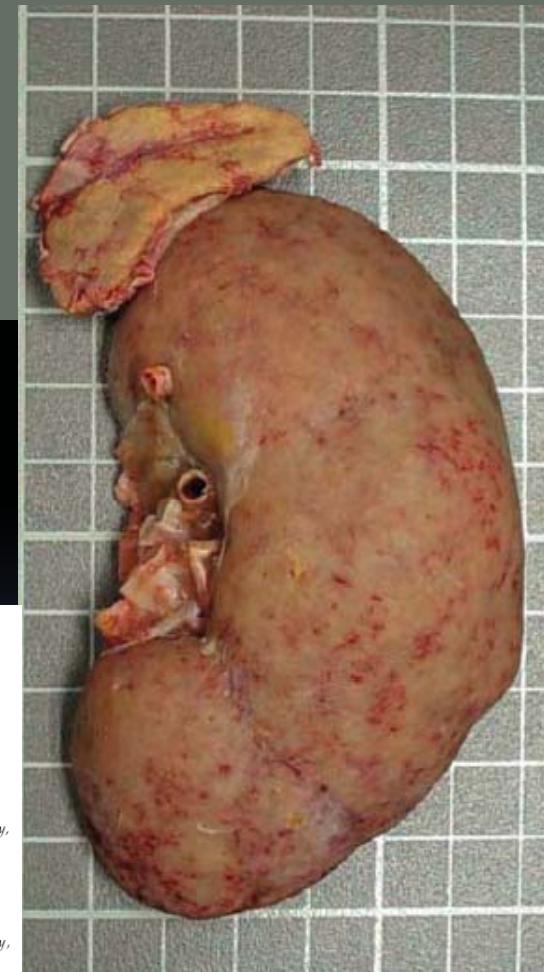
Adrenal Imaging

Edited by

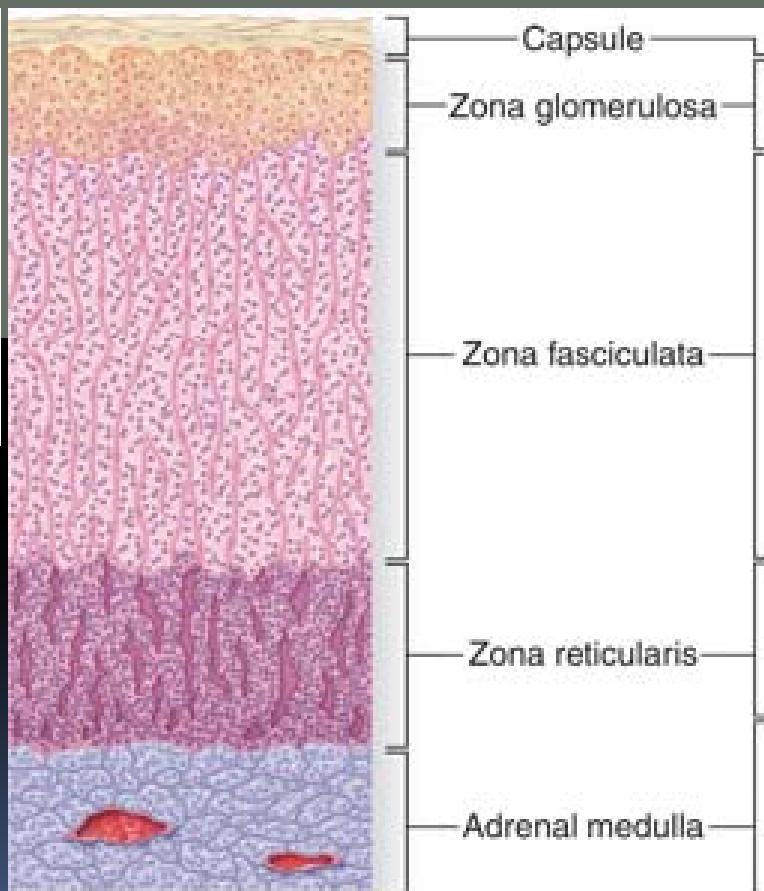
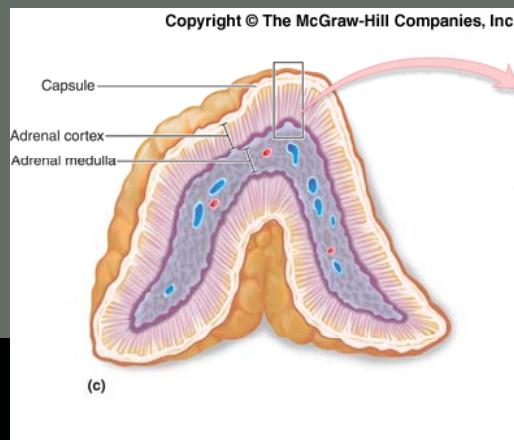
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A Glândula Suprarrenal Normal



Capsule

Zona glomerulosa

Zona fasciculata

Zona reticularis

Adrenal medulla

Mineralocorticóides

Glucocorticóides

Androgénios

Catecolaminas

A Glândula Suprarrenal Normal

Espessura

< 3 mm → Quase sp normal

> 5 mm → Anormal (?)

≤ pilar do diafragma



Alterações Minor das Glds SRs

O aumento regular ou nodular do volume das suprarrenais (aspecto “lumpy-bumpy”) foi encontrado em 36% de 197 doentes com cancro do pulmão, não estando associado ao subsequente desenvolvimento de Mx¹

¹ Nicole Benitah, BS et al; “Minor Morphologic Abnormalities of Adrenal Glands at CT: Prognostic Importance in Patients with Lung Cancer” Radiology 2005

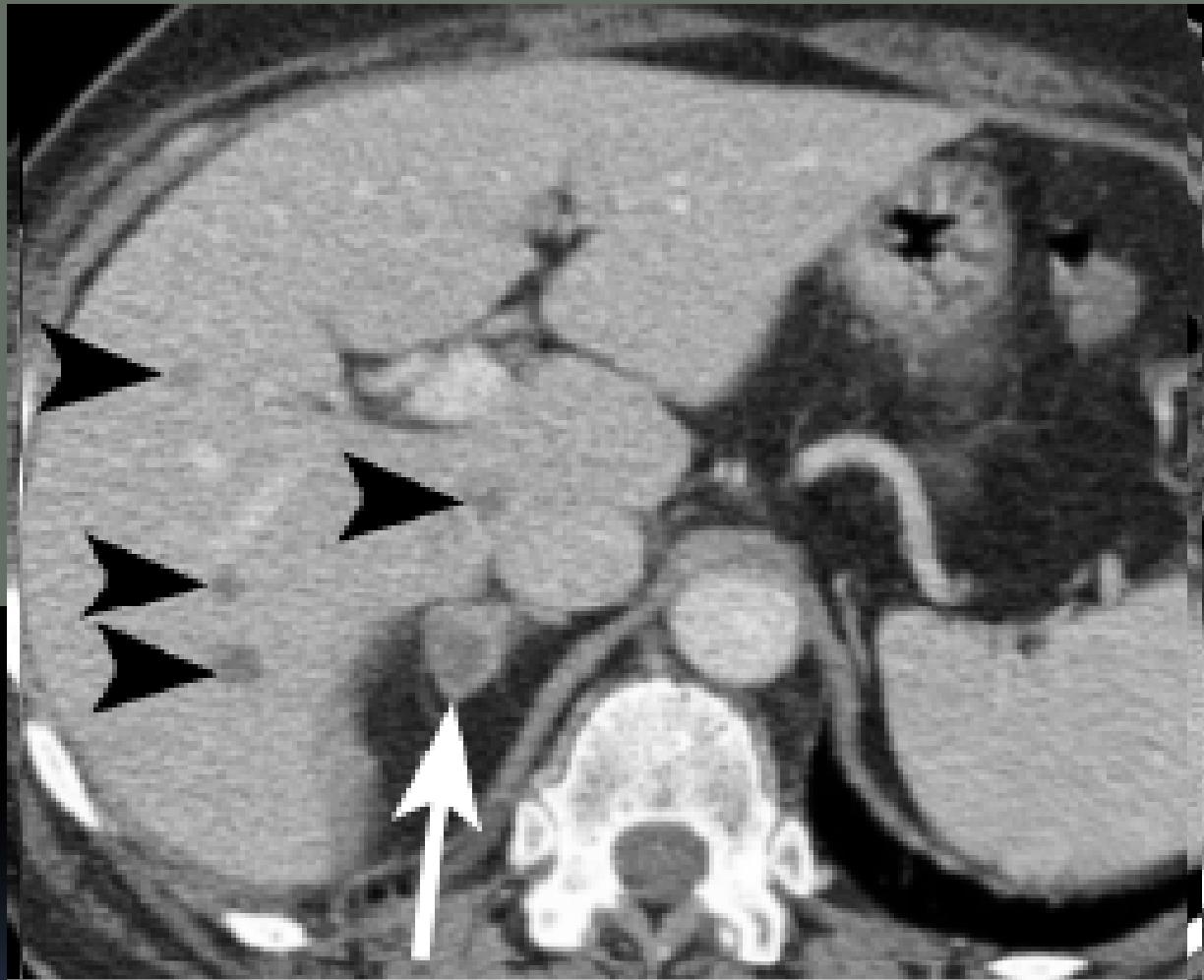


Figure 2. Transverse contrast material-enhanced CT images obtained in 57-year-old woman with stage IIIB non-small cell bronchogenic carcinoma. (a, b) At baseline CT, both readers classified (a) the right adrenal gland (arrow) as normal and (b) the left adrenal gland (arrowhead) as nodular. (c) Follow-up scan obtained 2 years later shows a heterogeneously enhancing metastasis has developed in the superior portion of the right adrenal gland (arrow) in association with new hypoattenuating hepatic metastases (arrowheads). (d) Two-year follow-up scan obtained more inferiorly shows unchanged nodularity of the left adrenal gland (white arrowhead), as well as an additional hepatic metastasis (black arrowhead).

Alterações Minor das Glgs SRs

- Em doentes sem patologia endócrina conhecida, poderão representar
 - Pequenas extrusões corticais da camada glomerulosa
 - Nódulos corticais acessórios
- Encontrados mais frequente/ nos idosos
- Possivelmente associados a doenças crónicas debilitantes, como o cancro do pulmão¹

¹ Nicole Benitah, BS et al; "Minor Morphologic Abnormalities of Adrenal Glands at CT: Prognostic Importance in Patients with Lung Cancer" Radiology 2005

O INCIDENTALOMA

- 9% das SR têm patologia
- Só cerca de 5% das SR apresentam alterações nos exames de imagem
- A grande maioria das lesões encontradas são benignas

O INCIDENTALOMA

- Sugerem malignidade:

- Crescimento

- Crescimento num período de 6 meses¹

- Tamanho > 4 cm

- 70% das lesões > 4 cm
 - 85% das lesões > 6 cm

} são malignas¹

- Contornos indefinidos e heterogeneidade¹

¹ Giles W. L. Boland, MD et al; "Incidental Adrenal Lesions: Principles, Techniques, and Algorithms for Imaging Characterization" Radiology 2008

O INCIDENTALOMA

- Nenhum de 1.049 incidentalomas avaliados por TC em 973 doentes sem neoplasia conhecida era de natureza maligna ¹
- 87% Dx Imagiológico ¹
- 62% Dx na 1^a TC ¹

TABLE 2: Pathology Results for All Adrenal Lesions

Diagnosis	No. (%) of Lesions
Adenoma	788 (75)
Myelolipoma	68 (6)
Hematoma	47 (4)
Cyst	13 (1)
Pheochromocytoma	3 (0.3)
Macronodular hyperplasia	1 (0.1)
Adrenal cortical neoplasm, unknown malignant potential	1 (0.1)
Presumed benign by imaging or clinical stability	128 (12)
Total	1,049 (100)

¹ Julie H. Song et al; "The Incidental Adrenal Mass on CT: Prevalence of Adrenal Disease in 1.049 Consecutive Adrenal Masses in Patients with No Known Malignancy" AJR 2008

ADENOMA

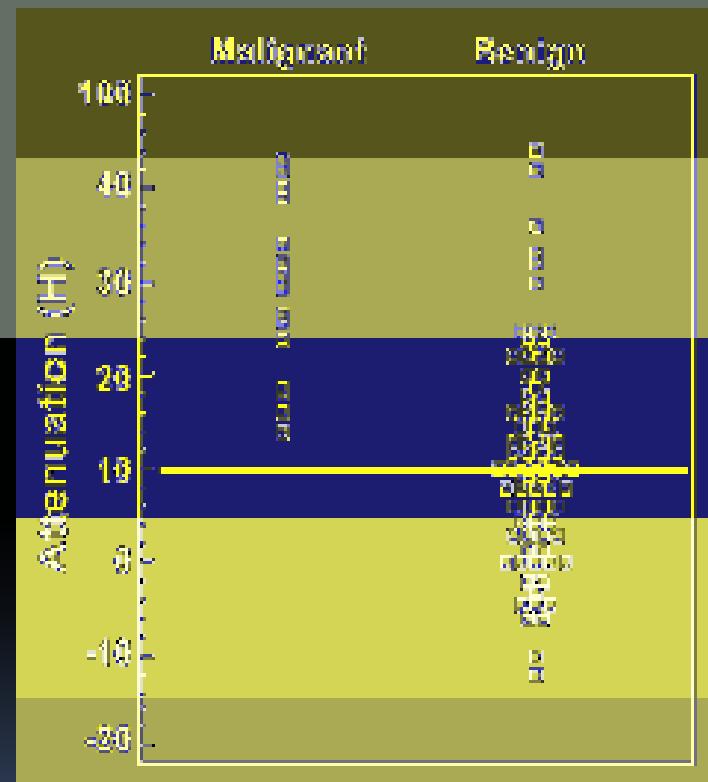
- Prevalência de 3%
- Grande maioria não funcionantes
- Quando funcionantes:
 - S. Cushing ACTH – Independente
 - S .Conn (hiperaldosteronismo primário)
 - S. Adrenogenital
 - S. Mistos
- Distinção imagiológica impossível

INCIDENTALOMA

- DX Diferencial Benigno/Maligno
 - Conteúdo lipídico intracelular
 - Comportamento dinâmico

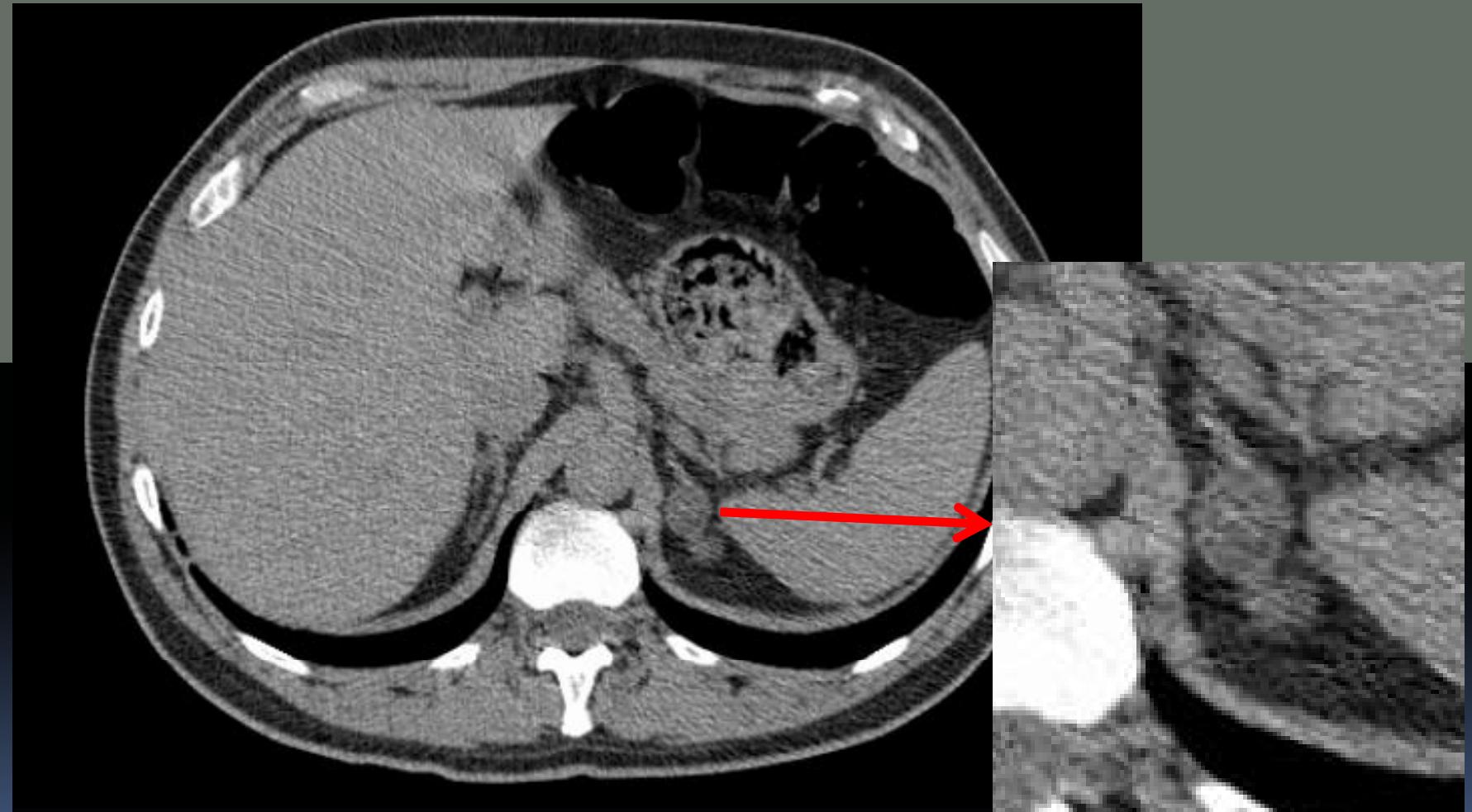
INCIDENTALOMA - TC sem Contraste

- Excluindo os feocromocitomas, quistos e mielolipomas, todas as lesões (112) com atenuação < 10 UH eram adenomas¹
- Lesões com > 10 UH correspondiam a adenomas pobres em lípidos ou lesões malignas¹
- Sensibilidade 71% e especificidade de 98%¹



¹ Michael A. Blake, FFR (RCSI), FRCR et al; "Distinguishing Benign from Malignant Adrenal Masses: Multi-Detector Row CT Protocol with 10-Minute Delay" Radiology 2006

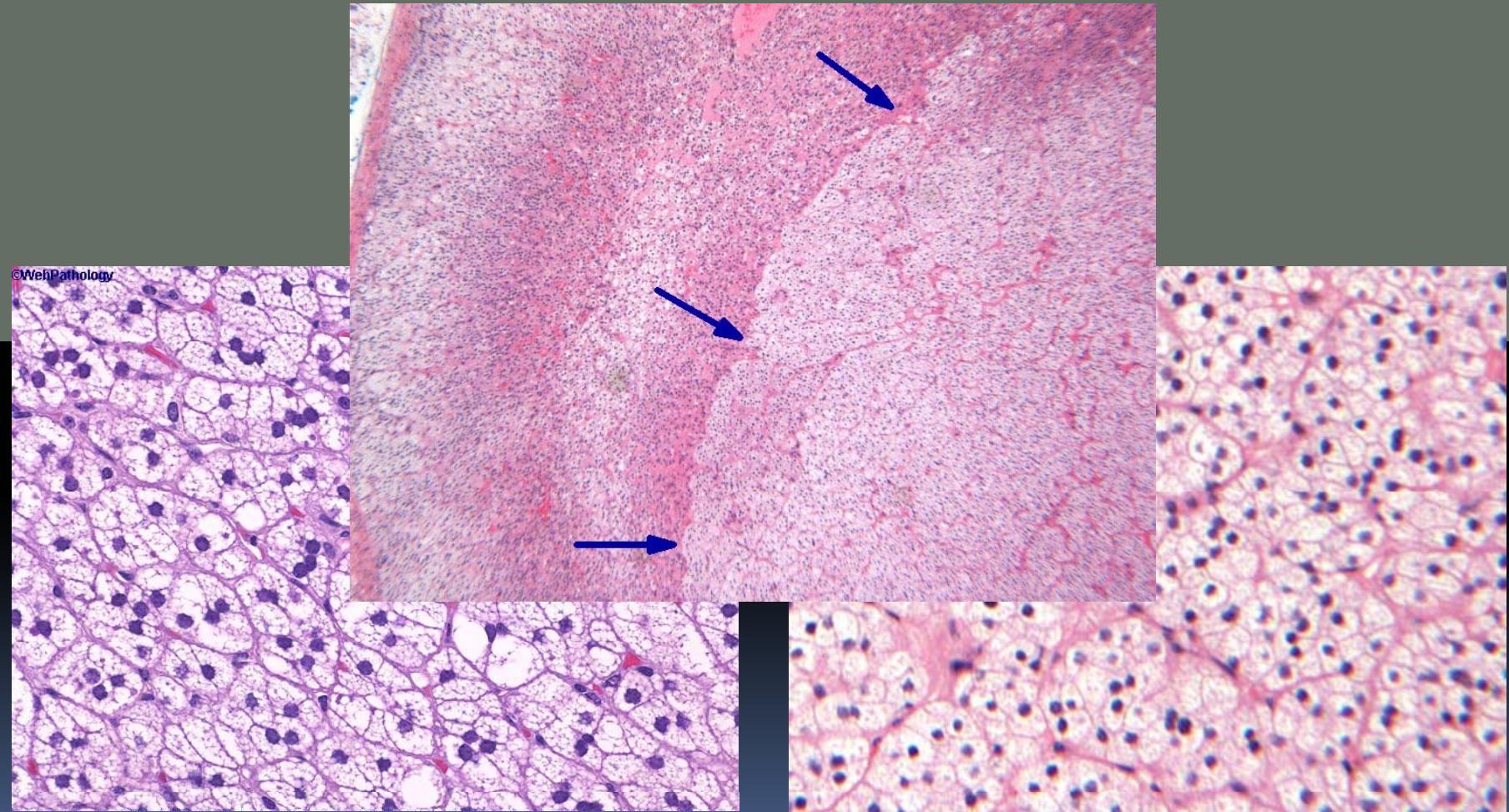
INCIDENTALOMA - TC sem Contraste



INCIDENTALOMA- TC com Contraste

- As glândulas endócrinas
 - não têm ductos
 - Dispõem de uma extensa rede capilar com endotélio fenestrado, que permite uma resposta endócrina rápida
 - Têm quase todas as células endócrinas na proximidade de um capilar
- A histologia dos adenomas é semelhante à do tecido cortical normal das SR

INCIDENTALOMA- TC com Contraste

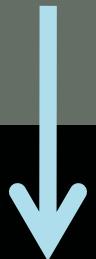


webpathology.com/image.asp?case=78&n=3

http://www.imagingpathways.health.wa.gov.au/includes/DIPMenu/ad_mass/image.html

INCIDENTALOMA- TC com Contraste

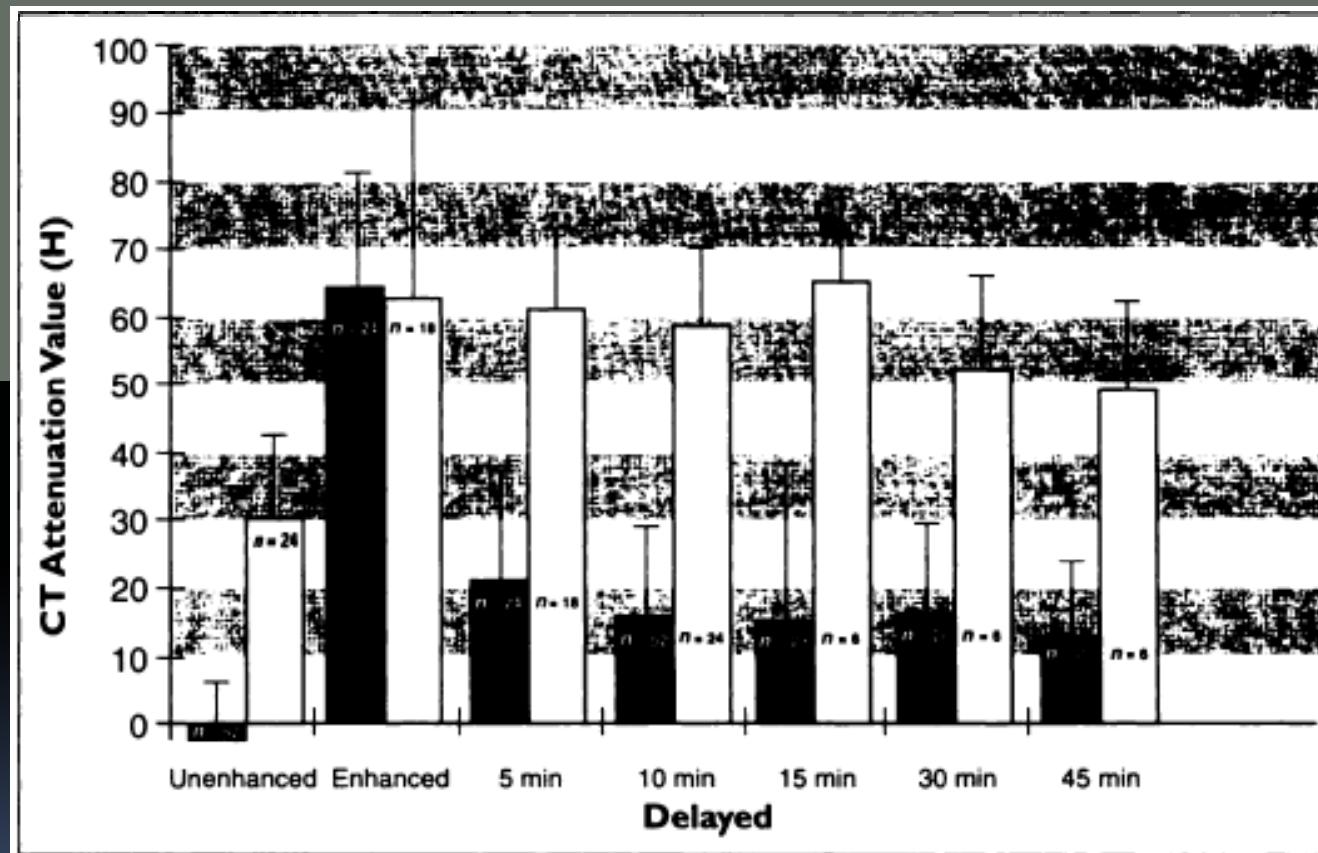
- SR e Adenomas
 - Influxo e efluxo sanguíneo muito rápido



Wash – Out ↑

- As lesões malignas têm um Wash – Out muito mais lento

INCIDENTALOMA- TC com Contraste



Melvyn Korobkin et al; "CT Time-Attenuation Washout Curves of Adrenal Adenomas and Nonadenomas" AJR 1998

INCIDENTALOMA- TC com Contraste

- Cálculo do Wash-Out Absoluto
 - Fase sem contraste
 - Fase portal (70 – 80s)
 - Fase Tardia (15 Minutos*)

* Alguns autores defendem 10 Minutos

INCIDENTALOMA- TC com Contraste

- Cálculo do Wash-Out Absoluto

$$\frac{UH_{\text{Fase Portal}} - UH_{\text{Fase Tardia}}}{UH_{\text{Fase Portal}} - UH_{\text{Fase Pré-Contraste}}}$$

- *Se > 60%* → Adenoma*

**Se aquisição tardia aos 10 minutos, pode considerar-se um "cutoff" de 50%*

INCIDENTALOMA- TC com Contraste

- Se fase sem contraste não disponível
 - Cálculo do Wash-Out Relativo

$$\frac{UH_{\text{Fase Portal}} - UH_{\text{Fase Tardia}}}{UH_{\text{Fase Portal}}}$$

$$UH_{\text{Fase Portal}}$$

- *Se > 40% → Adenoma*

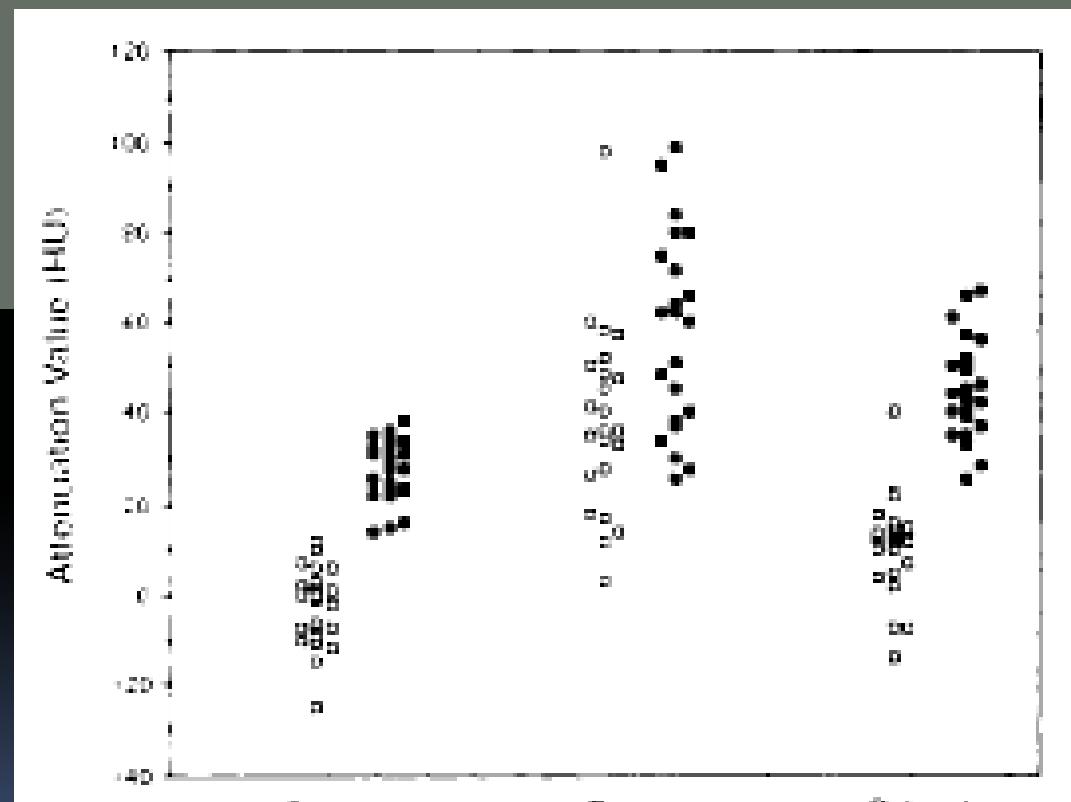
INCIDENTALOMA- TC com Contraste

- Atenuação < 25* UH 10 min pós CIV



Adenoma¹

* Alguns autores
defendem 30 UH



¹Giles W. Boland, MD et al; "Adrenal Masses: Characterization with Delayed Contrast-enhanced CT" Radiology 1997

INCIDENTALOMA- TC com Contraste



Figure 13. Typical attenuation and washout of intravenous contrast material in a left adrenal adenoma in a 54-year-old woman with a history of breast carcinoma. **(a)** Nonenhanced CT scan shows a left adrenal adenoma (arrow), which has an attenuation of 4 HU. **(b)** On the dynamic enhanced phase image, the adrenal gland (arrow) enhances vigorously to 54 HU. **(c)** On the 10-minute delayed image, the attenuation of the left adrenal gland (arrow) is 23 HU (lower than that of the normal right adrenal gland, kidneys, and liver). There is greater than 50% washout between the dynamic phase of contrast enhancement and the 10-minute delay, which is diagnostic of an adenoma and confirms the finding on the nonenhanced CT scan. Quantitative region-of-interest measurements (in Hounsfield units) are important because degree of enhancement is difficult to quantify with the human eye.

¹ William W. Mayo-Smith, MD et al; "From the RSNA Refresher Courses : State-of-the-Art Adrenal Imaging" Radiographics 2001

INCIDENTALOMA- TC com Contraste

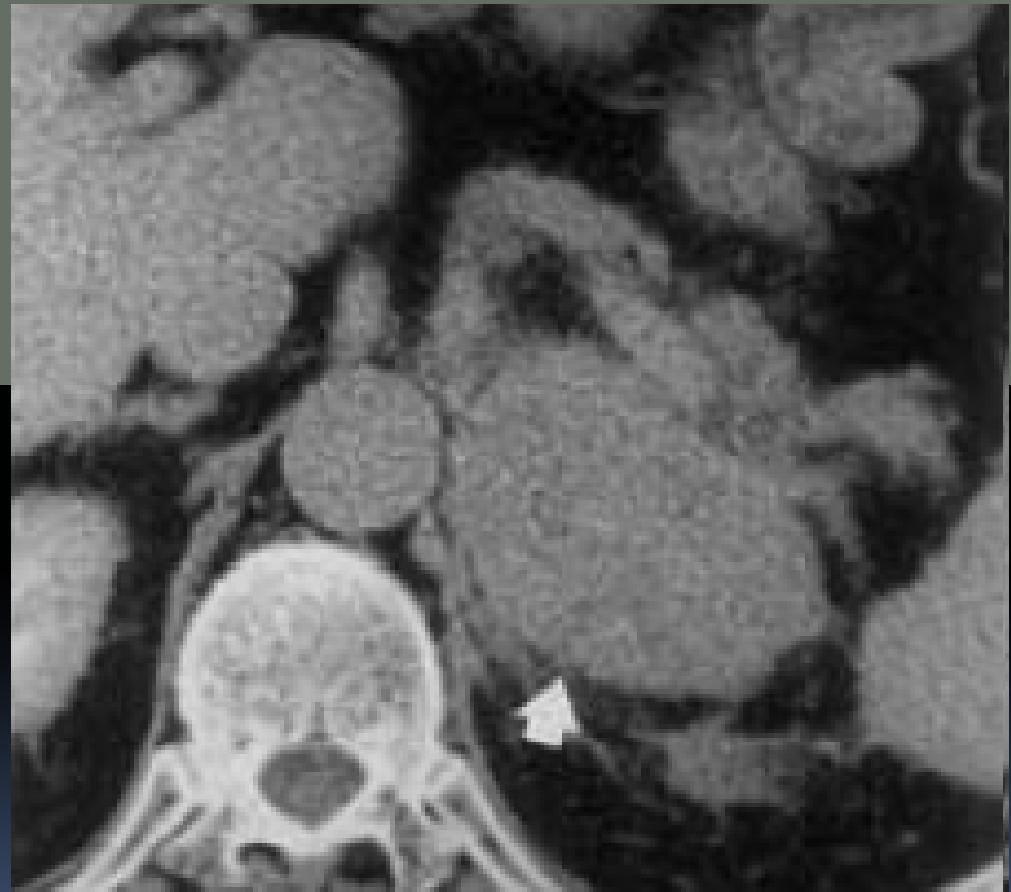


Figure 14. Typical attenuation and washout characteristics of a left adrenal metastasis in a 65-year-old man with lung carcinoma. (a) Nonenhanced CT scan demonstrates an enlarged left adrenal gland (arrow) with irregular margins and attenuation of 40 HU. (b) Dynamic enhanced CT scan of the adrenal gland (arrow) obtained 60 seconds after intravenous administration of contrast material demonstrates an increase in attenuation to 53 HU. (c) Ten-minute delayed image of the left adrenal gland (arrow) demonstrates persistent enhancement of the adrenal gland (56 HU). There is no significant washout of contrast media at 10 minutes, a finding consistent with an adrenal metastasis.

¹ William W. Mayo-Smith, MD et al; "From the RSNA Refresher Courses : State-of-the-Art Adrenal Imaging" Radiographics 2001

INCIDENTALOMA - TC

- < 10 UH no pré-contraste
 - >10 UH no pré – contraste
Wash-Out Absoluto > 60 %
 - Ø pré – contraste
Wash-Out Relativo > 40 %
 - < 25 UH 10 min pós-CIV
- } Adenoma

- Nenhuma das 4 hipóteses acima
 - Adenoma pobre em lípidos ?
 - Lesão maligna ?

→ RM

INCIDENTALOMA – RM Desvio Químico

- 1,5T
 - T₁ fora de fase (2.1 mseg)
 - T₁ em fase (4.2 mseg)
 - Voxels com conteúdo misto, lipídico e aquoso, perdem sinal (*usar baço como standard comparativo*) → Adenoma
 - Sensibilidade entre 81 e 100%
 - Especificidade entre 94 e 100%

INCIDENTALOMA – RM Desvio Químico



Figure 4. (a, b) Axial in-phase (a) and out-of-phase (b) MR images show an adrenal adenoma (arrow), which exhibits the typical decrease in signal intensity on the out-of-phase image. (c) Photograph of the specimen shows a well-circumscribed bright yellow nodule, an appearance that is typical of adrenocortical adenoma.

¹ Khaled M. Elsayes, MD et al; "Adrenal Masses: Features with Pathologic Correlation"
Radiographics 2004

INCIDENTALOMA – RM Desvio Químico



Figure 16. Left adrenal metastases in a 74-year-old man with lung cancer. (a) T1-weighted in-phase MR image demonstrates a left adrenal mass (arrow). (b) T1-weighted out-of-phase MR image shows no significant signal loss in the adrenal gland compared with that of the spleen. The mass is either a metastasis or atypical adenoma, and biopsy was recommended.

¹ William W. Mayo-Smith, MD et al; "From the RSNA Refresher Courses : State-of-the-Art Adrenal Imaging" Radiographics 2001

INCIDENTALOMA- RM

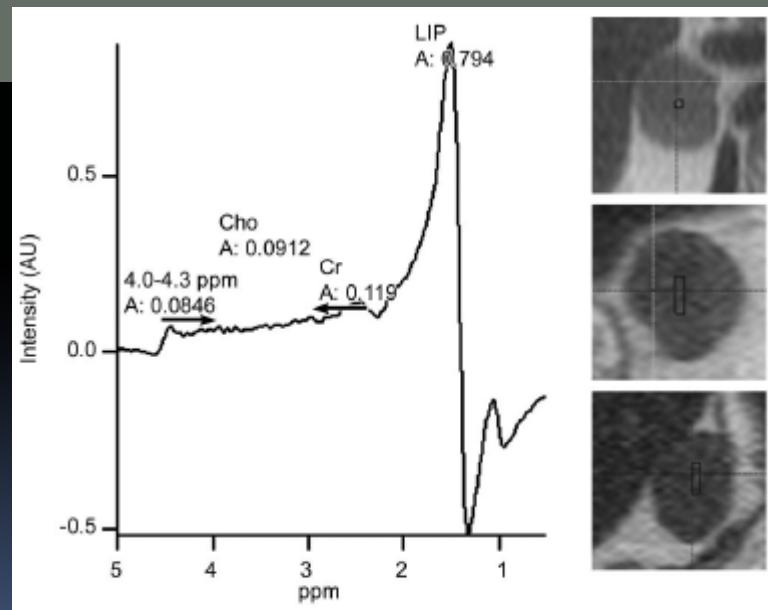
- 14% das lesões das SRs encontradas em 242 doentes apresentavam perda de sinal heterogéneo em oposição de fase. Todas aquelas para as quais existiam exames de follow – up ou análise histológica (18) eram benignas.

A perda de sinal heterogénea é bastante frequente nos adenomas¹

¹Gabriel Helena et al; "Adrenal lesions with heterogeneous suppression on chemical shift imaging: clinical implications." JMRI 2004

INCIDENTALOMA- Espectroscopia

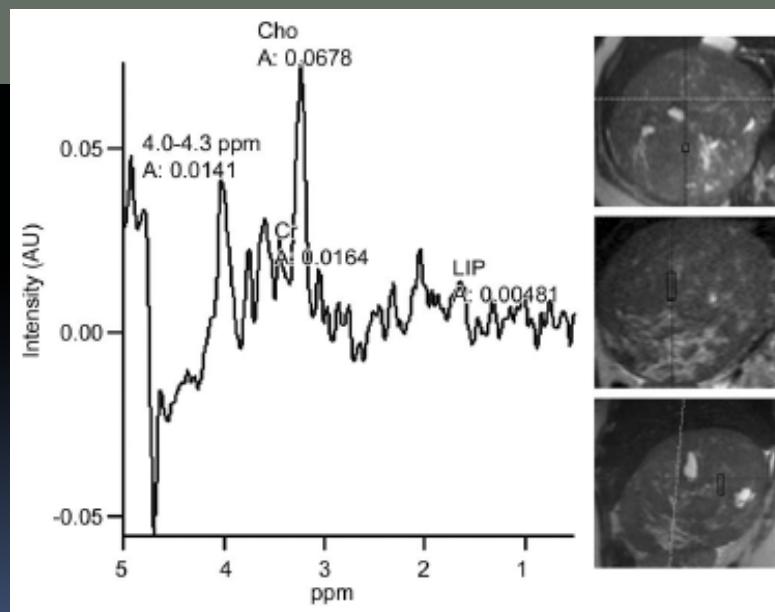
- Os adenomas, ricos ou pobres em lípidos, apresentam espectros homogéneos, com baixa variabilidade, e um pico apenas para os lípidos¹



¹Juliana F. Faria et al; "Adrenal Masses: Characterization with in Vivo Proton MR Spectroscopy – Initial Experience" Radiology 2007

INCIDENTALOMA- Espectroscopia

- Os feocromocitomas, carcinomas e Mx apresentam espectros com grande variabilidade, sobretudo as Mx, que têm um pico de colina e nenhum pico lipídico¹



¹Juliana F. Faria et al; "Adrenal Masses: Characterization with in Vivo Proton MR Spectroscopy – Initial Experience" Radiology 2007

INCIDENTALOMA – Cintigrafia

- NP – 59 (análogo do colesterol)¹
- Diferenciação de lesões malignas e benignas se > 2 cm¹
- As lesões que não são adenomas não captam ou captam significativa/ menos o composto¹
- 5 a 7 dias de execução¹

¹ Thottathil Gopan, MD et al; "Evaluating and managing adrenal incidentalomas" Cleveland Clinic Journal of Medicine 2006

INCIDENTALOMA – PET / TC

- Utilidade controversa¹
- Pode ser útil nos doentes com neoplasia conhecida (a >ia das Mx são FDG – ávidas) ¹

¹ Semin Chong, MD et al; "Integrated PET-CT for the Characterization of Adrenal Gland Lesions in Cancer Patients: Diagnostic Efficacy and Interpretation Pitfalls" Radiographics 2006

INCIDENTALOMA - PET / TC

- Mas há alguns falsos negativos
 - Mx c/ hemorragia ou necrose
 - Mx < 1 cm
 - C. bronquiolo-alveolar
 - T. carcinóide
- ...e 5% de falsos positivos
 - Adenomas
 - Quistos
 - Lesões inflamatórias

¹ Semin Chong, MD et al; "Integrated PET-CT for the Characterization of Adrenal Gland Lesions in Cancer Patients: Diagnostic Efficacy and Interpretation Pitfalls" Radiographics 2006

INCIDENTALOMA – PET / TC

- PET – TC provavelmente não útil na caracterização de incidentalomas¹

¹ Semin Chong, MD et al; "Integrated PET-CT for the Characterization of Adrenal Gland Lesions in Cancer Patients: Diagnostic Efficacy and Interpretation Pitfalls" Radiographics 2006

ADENOMA ATÍPICO

- Heterogeneidade
- Hemorragia
- Degenerescência quística / necrose
- Calcificações
 - Aspectos radiológicos sugestivo de outras patologias

ADENOMA – Dx Diferencial

- O feocromocitoma de baixa densidade pode apresentar um comportamento imagiológico semelhante ao do adenoma¹
 - Catecolaminas + → Pensar no FCC¹

¹ Blake, M. A, et al; "Low-Density Pheochromocytoma on CT: A Mimicker of Adrenal Adenoma"
AJR 2003

ADENOMA – Dx Diferencial

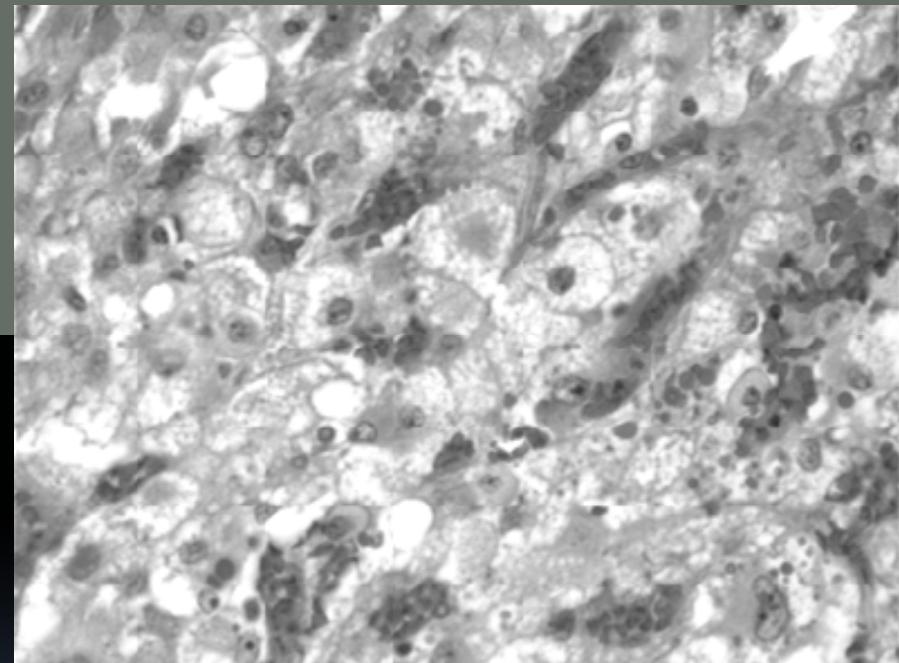
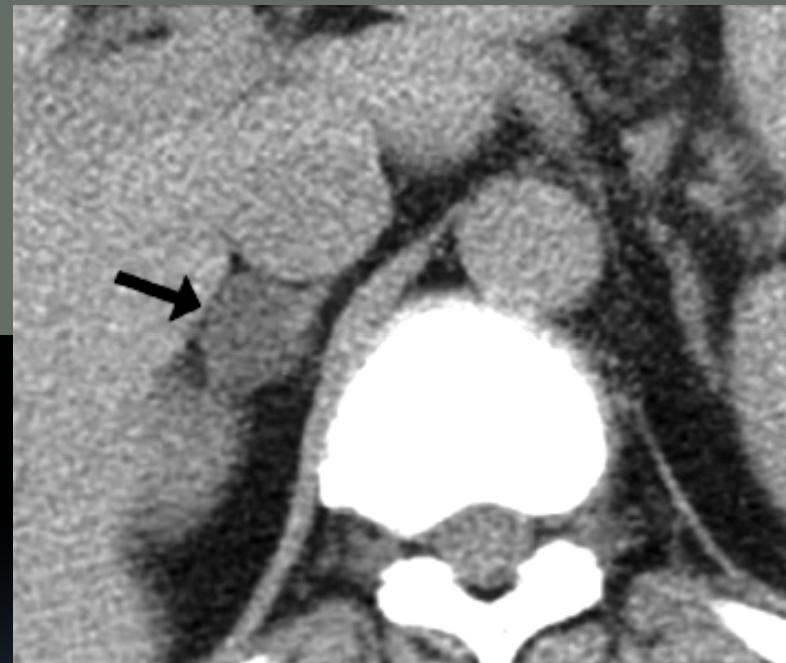


Fig. 2.—49-year-old woman with low-density pheochromocytoma who has neurofibromatosis 1.

A, CT scan shows rounded low-density right adrenal mass (arrow) with attenuation value of 9 H.

B, Photomicrograph of histopathologic specimen shows classic pheochromocytoma. Note areas of medullary cells containing abundant intracytoplasmic fat seen as diffuse bubbly (fatty) cytoplasm. (H and E, $\times 400$)

¹ Blake, M. A, et al; "Low-Density Pheochromocytoma on CT: A Mimicker of Adrenal Adenoma"
AJR 2003

DISFUNÇÃO DAS SUPRARRENAIS

- Papel dos Estudos de Imagem
 - Doença Unilateral vs Bilateral
 - Localização de lesões
 - Caracterização de lesões focais
 - Planeamento (e execução) Terapêutico

HIPERFUNÇÃO MEDULAR

- Feocromocitoma
- Hiperplasia Medular
- Neuroblastoma
- Ganglioneuroma

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FEOCROMOCITOMA

- Raro
- 4^a e 5^a década
- Causa de < 1% dos quadros de HTA
- Origem nos paraganglia, intra ou extra-adrenais
 - Em localização extra-adrenal tomam a designação de paragangliomas
 - - freq/ hormonal/ activos
 - +freq/ malignos
 - Região paraaortica sup e inf, intra-torácicos, vesicais , gonadais, ...
- Esporádico ou associado a vários síndromes
 - MEN 2a e 2b (40%), VHL(10-20%), NF(<1%), ET, Sturge-Weber
 - + freq/ malignos

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FEOCROMOCITOMA

- Regra dos 10s
 - 10% bilateral
 - 10% maligno
 - 10% extra-adrenal
 - 10% em crianças

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FEOCROMOCITOMA

- TC e RM e Medicina Nuclear
 - Localização do tumor
 - Bilateral? Multifocal?
 - Abordagem cirúrgica

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FEOCROMOCITOMA - TC

- Há algum debate sobre a segurança da administração de contraste não iônico
 - Bloqueio alfa-adrenérgico
 - Vários estudos recentes não associaram a administração de contraste a crises hipertensivas
- Se Dx laboratorial
 - TC abd sem contraste poderá ser suficiente
 - TC pélvica e torácica se o tumor n estiver aí localizado

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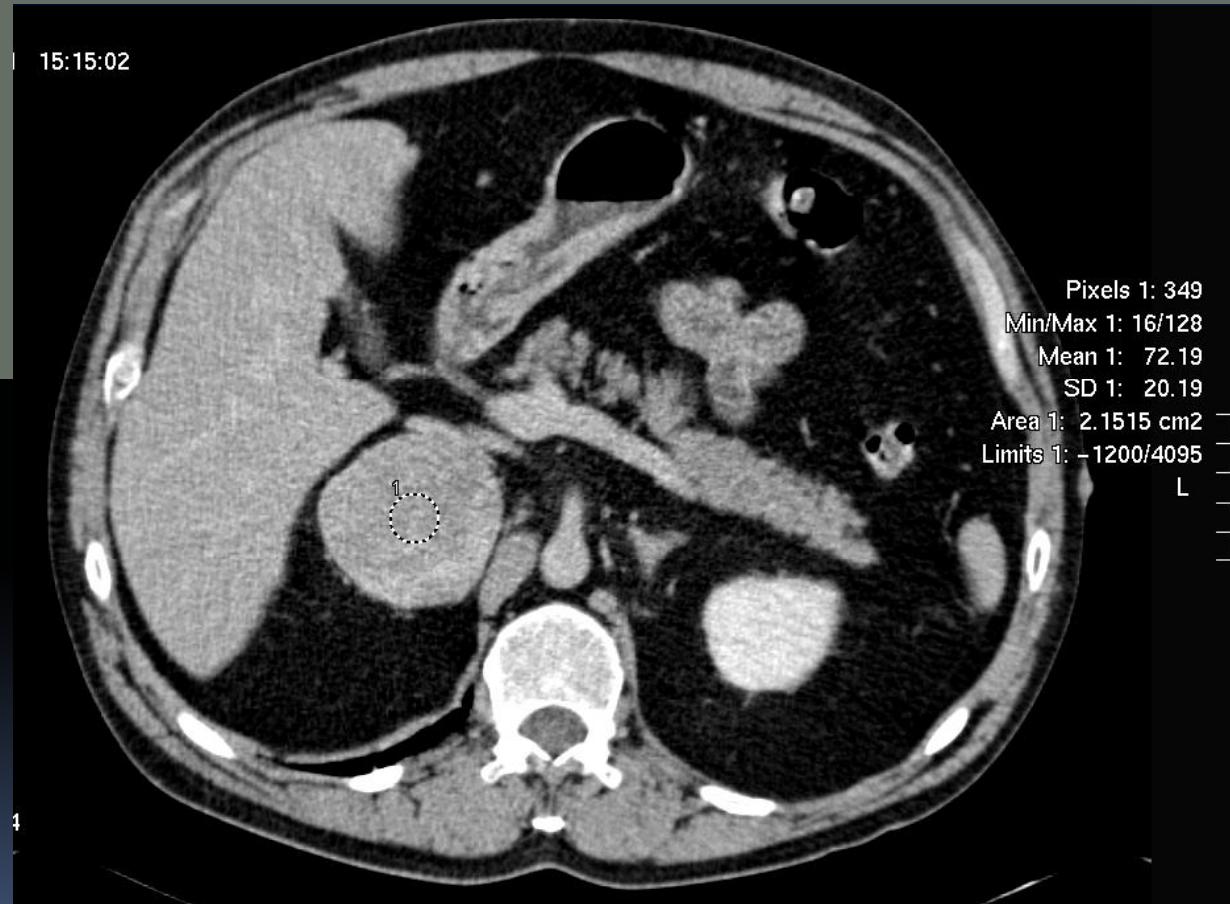
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FEOCROMOCITOMA - TC

- Massa de tecidos moles com 3 cm ou mais
- Calcificações 10 – 20%
- Áreas de necrose ou degenerescência quística
- Realce intenso com lavagem típica de um não-adenoma
- Causa +freq de hemorragia adrenal com origem numa massa
 - Controlo pós-resolução

FEOCROMOCITOMA - TC



FEOCROMOCITOMA - RM

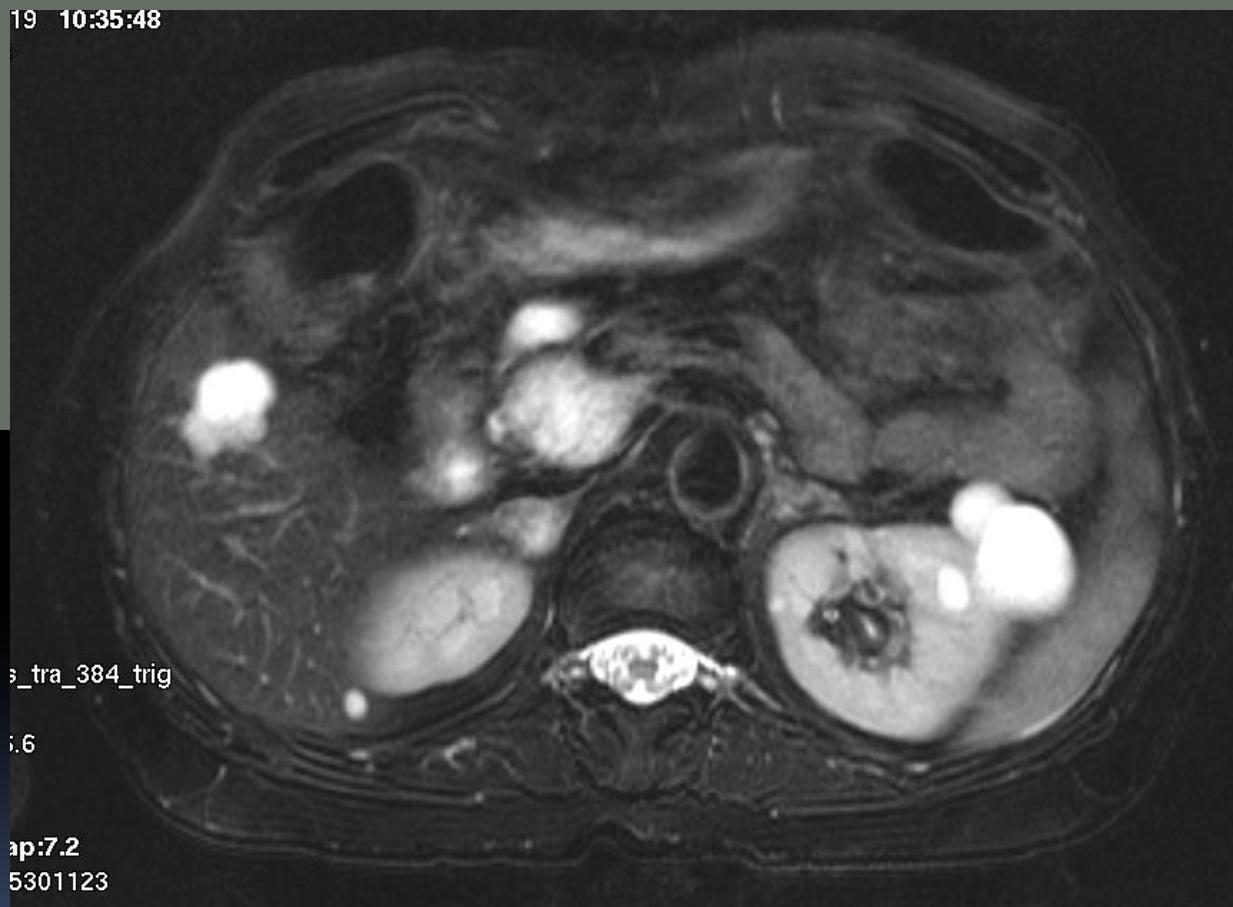
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- Poderá ser o exame de 1^a linha (> sensibilidade do que a TC ou cintigrafia)
- Intensidade de sinal \cong fígado em T1 excepto se hemorragia (hipersinal)
- Hiperintensidade marcada em T2 (60%)
- As áreas de necrose ou degenerescência quística aparecem hiperintensas em T2 e não realçam

FEOCROMOCITOMA - RM



FEOCROMOCITOMA - CINTIGRAFIA

- I^{131} - MIBG (análogo da norepinefrina)
- In^{111} – Octreotido (análogo da somatostatina)
 - P/ FCC malignos ou metastáticos
- Aplicações
 - Confirmação mediante estudos laboratoriais equivocos com TC e RM negativas
 - Procura de Mx
 - Doença multifocal

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FEOCROMOCITOMA

- Não biopsar inadvertidamente!
- Bloqueio adrenérgico se necessário biopsar uma massa suspeita quando os resultados dos testes laboratoriais são inconclusivos

HIPERFUNÇÃO CORTICAL

- Síndrome de Cushing
 - ACTH – Dependente
 - ACTH – Independente
- Síndrome de Conn
- Síndrome Adrenogenital

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SÍNDROME DE CUSHING

- ↑ produção de cortisol
- Não supressão da mesma perante a administração de glucocorticóides exógenos (Dexametasona)
- Níveis de ACTH ↑ - SCACTH - Dependente
 - 90% - Tumor Hipófise (Doença de Cushing)
 - 10% - Produção ectópica
- Níveis de ACTH ↓ - SCACTH - Independente
 - Hipercortisolismo suprarenal primário

S. CUSHING ACTH - DEPENDENTE

- TC ou RM

- Suprarenais com aspecto normal em 30%
- Hiperplasia das suprarrenais
 - com contornos regulares (83%)
 - Micro ou macronodular

Na hiperplasia macronodular, há um aumento do volume das SR, podendo observar-se 1 ou + nódulos. Um nódulo dominante pode atingir até 4 cm e ser mal interpretado como um adenoma funcional.

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S. CUSHING ACTH - DEPENDENTE

- TC ou RM
 - Identificação de uma fonte de produção ectópica de ACTH → TC tóraco-abdomino-pélvica
 - 48% pulmão
 - 30% carcinóides brônquicos
 - 18% Carcinoma de pequenas células
 - Tumor neuroendócrino do timo, pâncreas, TGI, C. medular da tireoide, feocromocitoma, mesotelioma
 - 12 a 20% oculta

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S.CUSHING ACTH - DEPENDENTE

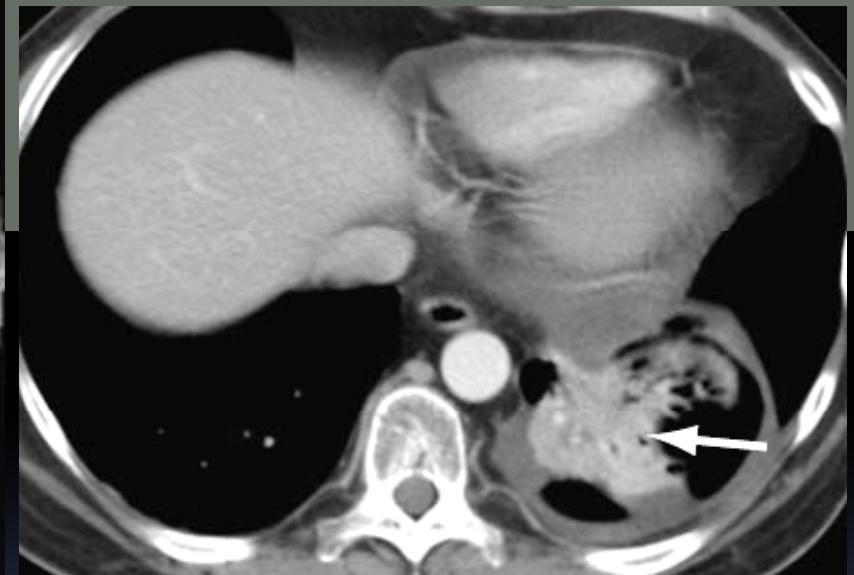


Fig. 6.1 **A** Contrast enhanced CT of the adrenal glands showing ACTH dependent bilateral smooth hyperplasia. **B** Contrast enhanced CT of the chest with left lower lobe collapse (arrow) secondary to an endo-bronchial carcinoid tumour which was the source of the ectopic ACTH

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S. CUSHING ACTH - DEPENDENTE

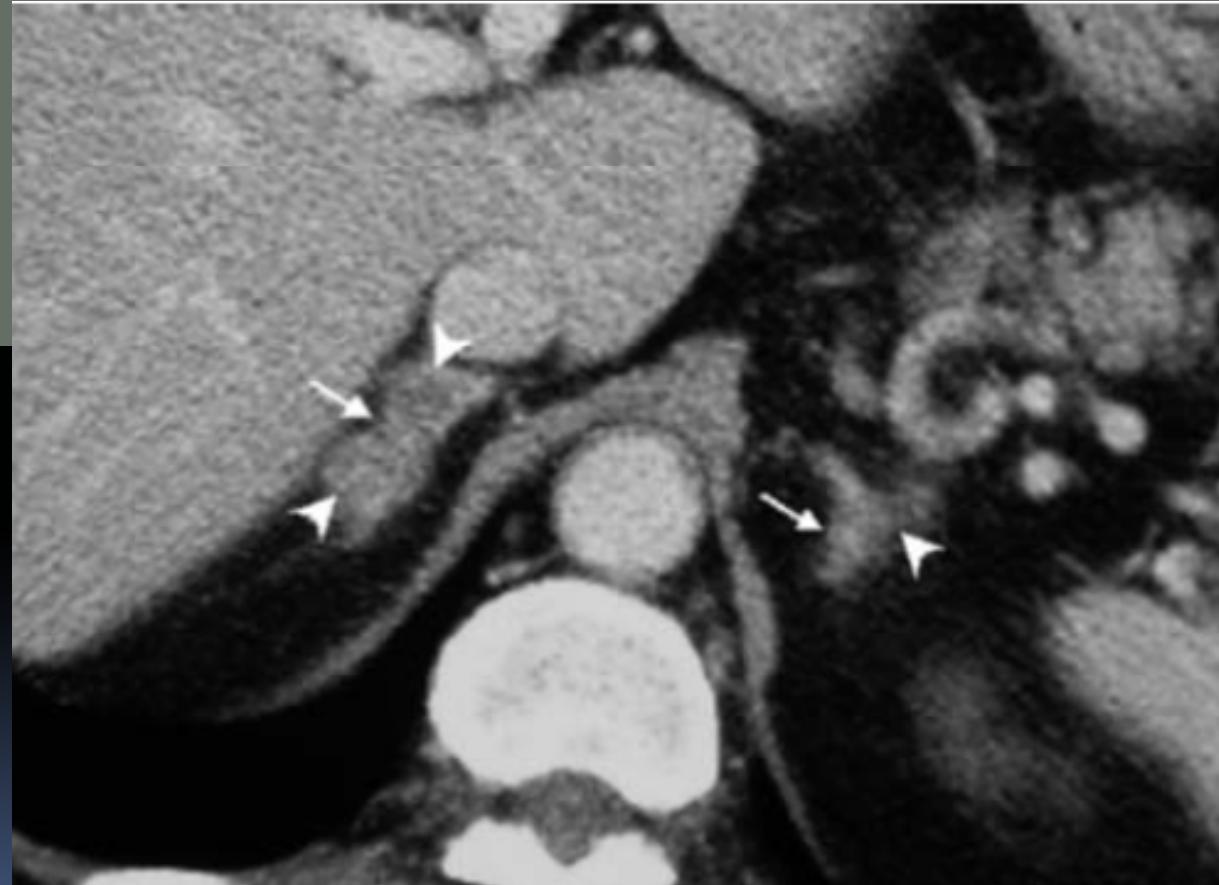


Fig. 6.2 Contrast enhanced CT of the adrenal glands demonstrating ACTH-dependent bilateral macronodular hyperplasia (*arrow heads*). The underlying adrenal gland between the nodules is hyperplastic and enlarged (*arrows*)

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S. CUSHING ACTH - DEPENDENTE

- PET e Cintigrafia com Octreótido
 - Papel limitado, em casos ocultos após TC e/ou RM

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S. CUSHING ACTH - INDEPENDENTE

- TC ou RM
 - Adenomas Hiperfuncionantes da SR (65%)
 - Imagiologica/ semelhantes aos não funcionantes
 - SR restante e contralateral normais ou atróficas
 - Também podem surgir ao longo do percurso embriológico das suprarrenais
 - Carcinoma da SR
 - Displasia nodular pigmentada primária das SR (PPNAD)
 - Hiperplasia macronodular ACTH – Independente (AIMAH)

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SÍNDROME DE CONN

- Hiperaldosteronismo primário
- Causas
 - Adenoma produtor de Aldosterona (1/3)
 - Geral/ < 2 cm
 - Presentes em 1% dos hipertensos
 - Hiperplasia bilateral idiopática (2/3)
 - Alterações laboratoriais geral/ menos pronunciadas
 - Carcinoma (mto raro)

SÍNDROME DE CONN

- TC
 - Achados a confirmar por
 - Cintigrafia com NP -59
 - Adrenal venous sampling

SÍNDROME DE CONN



Figures 8–10. (8) Left adrenal aldosteronoma in a 43-year-old woman. Contrast-enhanced helical CT scan shows a 5-mm well-circumscribed left adrenal mass (arrow), which proved at surgery to be an aldosterone-secreting adenoma. (9) Functioning right aldosteronoma in a patient with hyperaldosteronism. Posterior image obtained 5 days after intravenous administration of NP-59 shows increased activity in the right adrenal gland (arrow), a finding consistent with a functioning adenoma. Normal activity is seen in the bowel, bladder, and liver. (10) Adrenal venous sampling in a 51-year-old man with biochemically proved aldosteronoma. Angiogram shows the catheter, which was placed in the right adrenal vein (arrow) via the inferior vena cava. The adrenal veins were opacified by using gentle hand injection of contrast material, thus confirming correct placement for adrenal venous sampling. Cortrosyn-stimulated aldosterone levels were four times higher on the left than the right. The patient's symptoms resolved after left adrenalectomy.

¹ William W. Mayo-Smith, MD et al; "From the RSNA Refresher Courses : State-of-the-Art Adrenal Imaging" Radiographics 2001

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CARCINOMA

- Raros (1 - 2/1.000.000)
- 2 picos de incidência
 - < 10 Anos
 - 5^a a 7^a
- + frequente em mulheres
- 50% não hormonalmente activos
- 50% com actividade hormonal, sendo geralmente de menores dimensões quando detectados (+ freq em crianças e mulheres)
 - Responsaveis por 27% dos s. Cushing ACTH – independente

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CARCINOMA

- TC e RM
 - Massa unilateral de grandes dimensões (geral/ > 6 cm)
 - Focos de calcificação (1/3), necrose, fibrose ou hemorragia
 - Atender à invasão das estruturas adjacentes
 - A biópsia é geralmente inconclusiva
 - Mx figado e pulmão

CARCINOMA

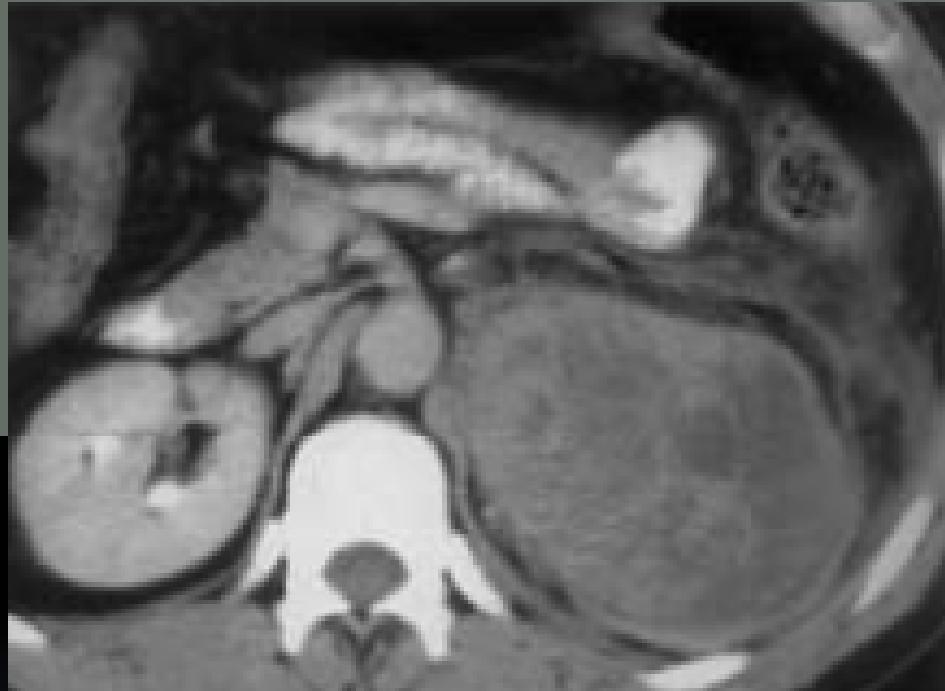


Figure 25. Adrenal carcinoma in a patient who presented with left flank pain. Contrast-enhanced CT scan demonstrates an 11-cm necrotic mass in the left adrenal gland, which causes inferior displacement of the left kidney. There is stranding of the adjacent retroperitoneal fat.

¹ William W. Mayo-Smith, MD et al; "From the RSNA Refresher Courses : State-of-the-Art Adrenal Imaging" Radiographics 2001

CARCINOMA

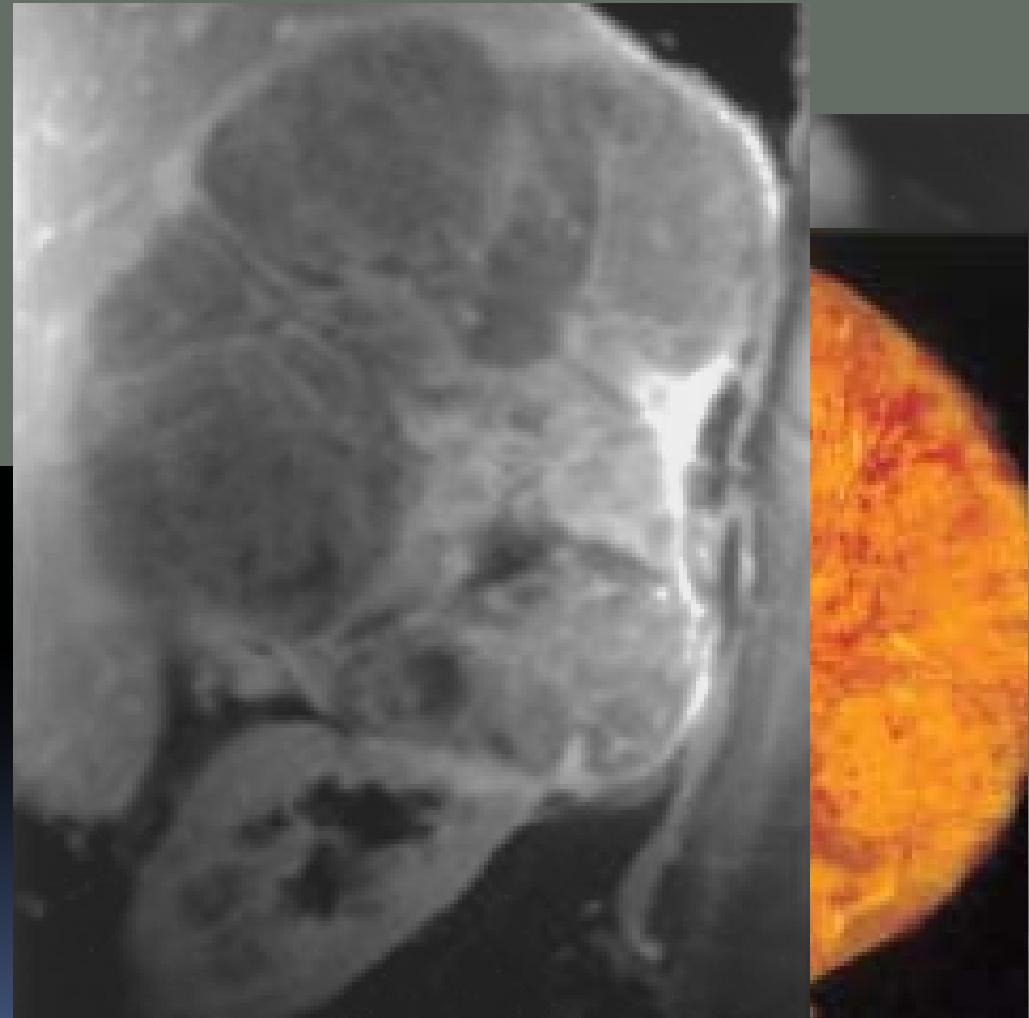


Figure 14. (a, b) Sagittal T1-weighted three-dimensional contrast-enhanced GRE MR image obtained with VIBE (a) and coronal T2-weighted MR image obtained with half-Fourier RARE (b) show a large mass involving the right adrenal gland. The mass exhibits heterogeneous low signal intensity on the T1-weighted image and high signal intensity with a heterogeneous pattern of contrast enhancement and areas of necrosis (arrow in b) on the T2-weighted image. (c) Photograph of the specimen shows a yellow and red tumor with large areas of necrosis, findings typical of adrenocortical carcinoma.

¹ William W. Mayo-Smith, MD et al; "From the RSNA Refresher Courses : State-of-the-Art Adrenal Imaging" Radiographics 2001

HIPOFUNÇÃO

- D. de Addison
- Hipocortisolismo Secundário

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DOENÇA DE ADDISON

- Insuficiência suprarenal primária
- Redução dos níveis de todas as hormonas produzidas na região cortical
- Etiologia
 - autoimune (+ freq nos países desenvolvidos)
 - Infecciosa (Tb, fungos, CMV e MAI nos doentes c/ SIDA)
 - Hemorrágica (crianças e adultos sob anticoagulação)

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DOENÇA DE ADDISON

- TC e RM
 - Autoimune
 - Atrofia não calcificada (as glds podem quase n se ver)
 - TB aguda
 - ↑ volume bilateral (1%), podendo mimetizar massa
 - Calcificações (59%)
 - 88% volta ao normal após tratamento

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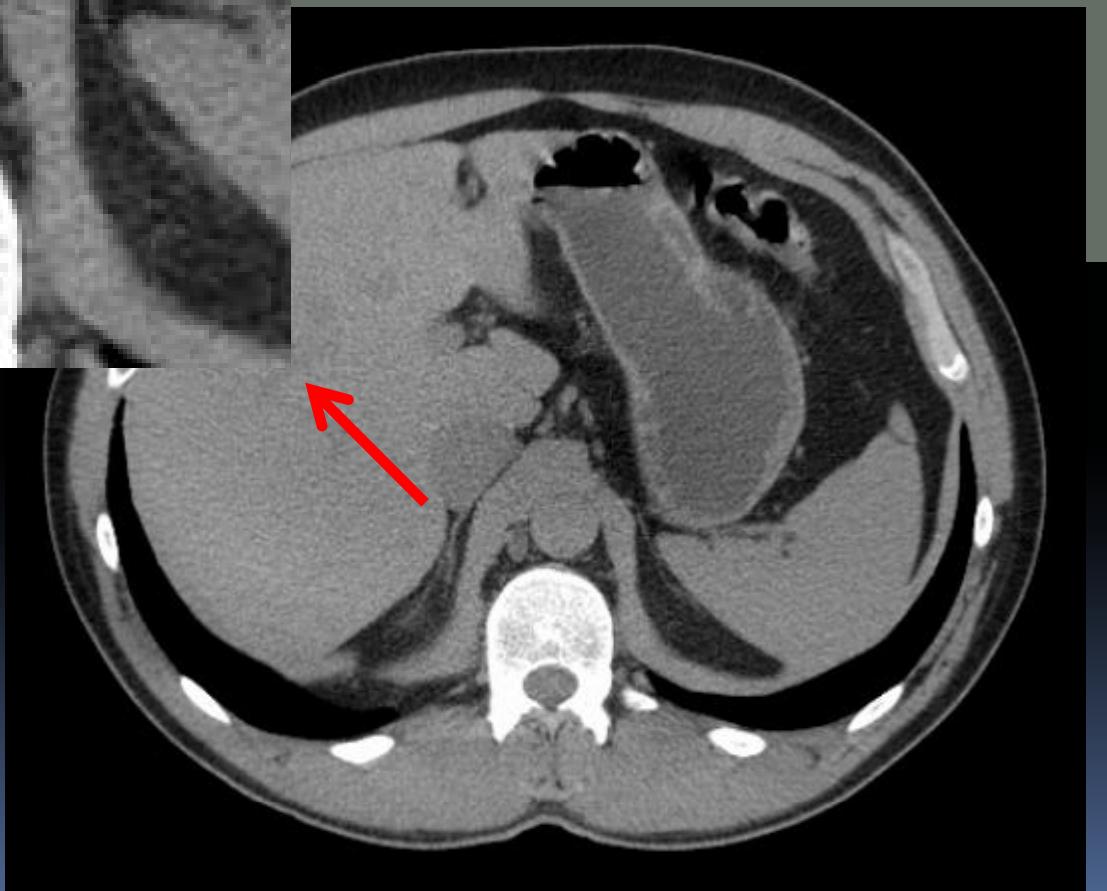
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DOENÇA DE ADDISON

- TC e RM
 - Hemorrágica
 - Fase aguda
 - Áreas de hiperatenuação (50 a 90 UH) em TC
 - Áreas de iso/ hipointensidade em T₁ e hipointensidade em T₂
 - Fase subaguda
 - Áreas centrais de hipoatenuação/hiperintensidade em T₁ e T₂
 - Fase crónica
 - Anel de hipointensidade em T₁ e T₂
 - ↓ tamanho
 - podem organizar sob a forma de pseudoquistos ou calcificar

Excluir massa – áreas de realce na Tc ou RM

DOENÇA DE ADDISON AUTOIMUNE



DOENÇA DE ADDISON HEMORRÁGICA

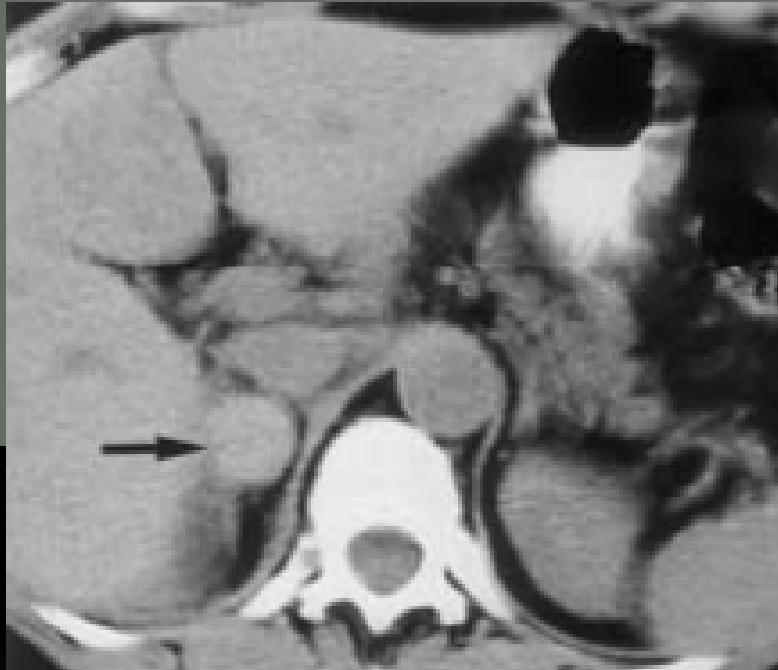


Figure 27. Right adrenal hemorrhage in a 57-year-old woman who sustained pelvic trauma in a motor vehicle accident. Nonenhanced helical CT scan of the abdomen obtained 2 days after the accident demonstrates an enlarged right adrenal mass (arrow). The mass was not present on CT scans acquired at admission (not shown). The attenuation of the right adrenal hemorrhage was 53 HU.

¹ William W. Mayo-Smith, MD et al; "From the RSNA Refresher Courses : State-of-the-Art Adrenal Imaging" Radiographics 2001

OUTRAS LESÕES DAS SUPRARRENAIS

- Mielolipoma
- Quisto
- Linfoma
- Tumores mesenquimatosos

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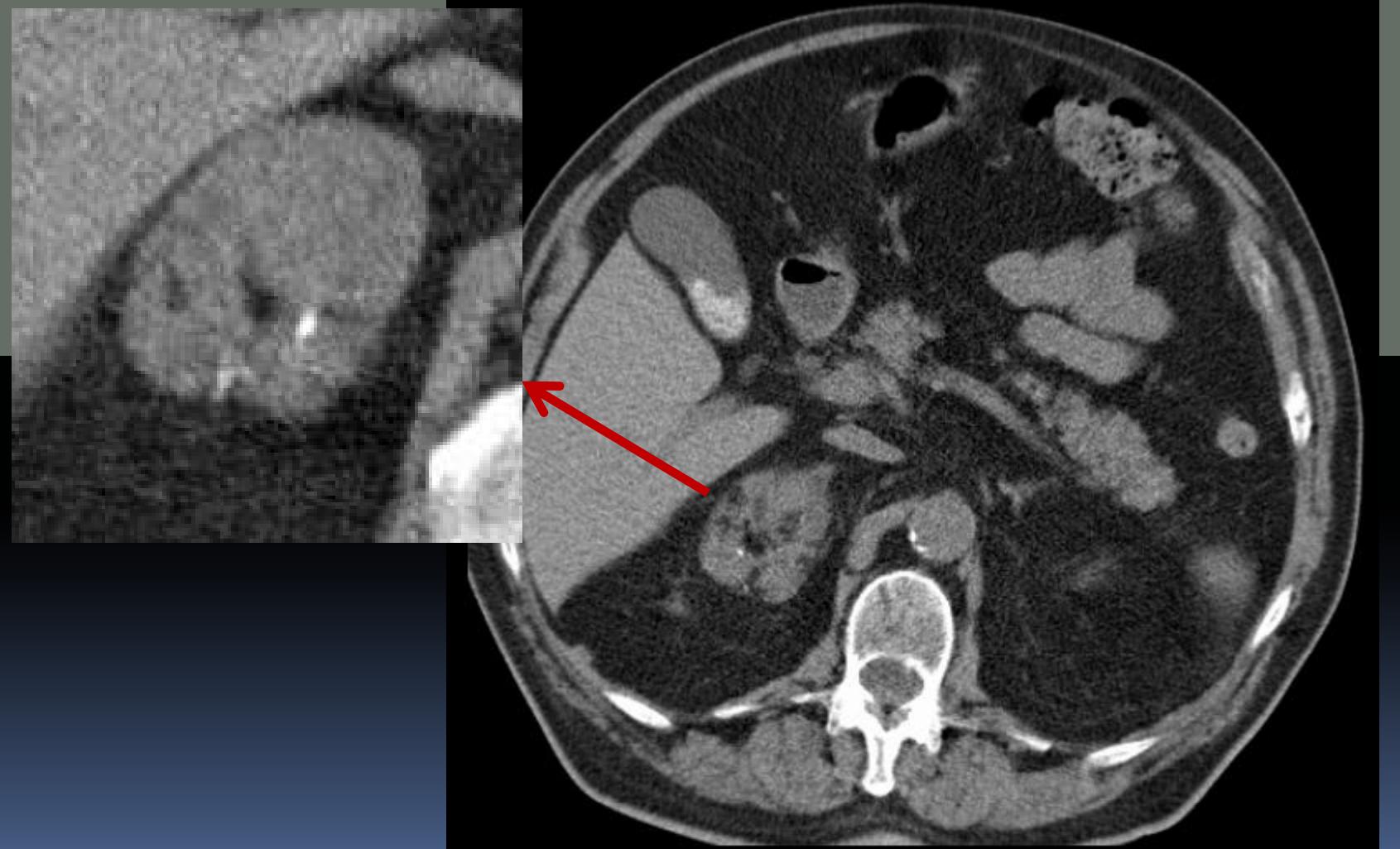
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MIELOLIPOMA

- Massas unilaterais benignas incomuns (0.2 a 0.4%)
- Podem ter localização extra-adrenal
 - DxD com liposarcoma
- Histologia semelhante à medula óssea
- Lesões bem definidas, heterogéneas
- Gordura pura em TC e RM é Dx
- 1/3 calcificadas
- Muito rara/ associados a actividade hormonal
- Quando de grandes dimensões, podem sangrar

MIELOLIPOMA



MIELOLIPOMA

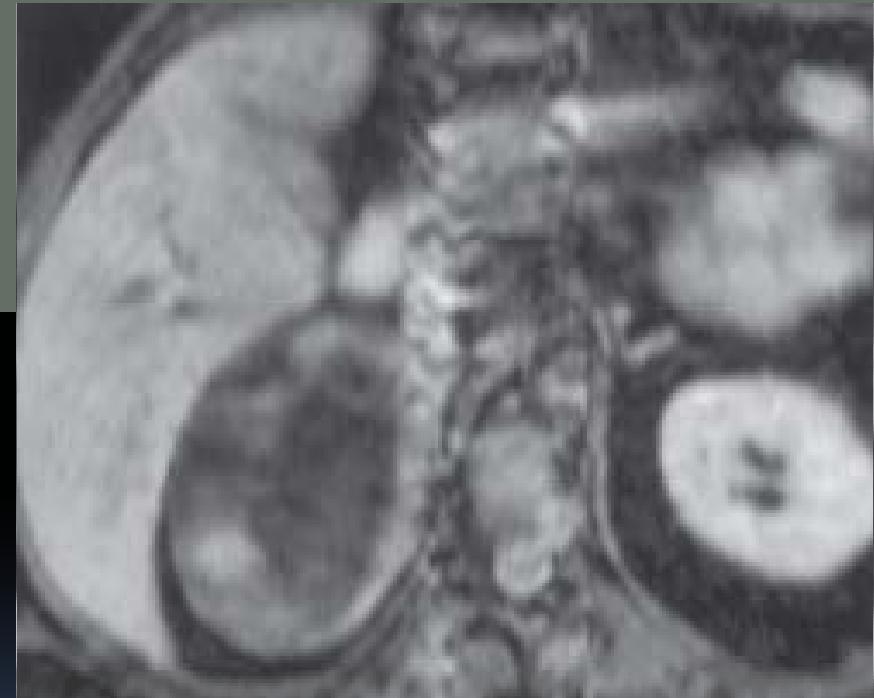
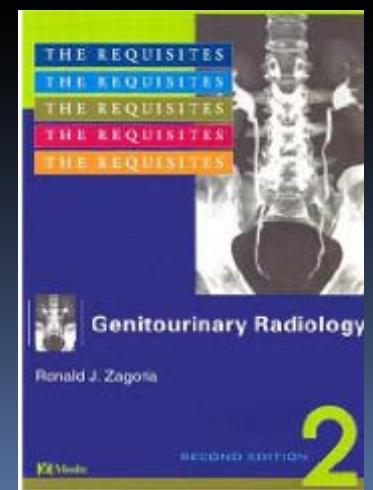


Figure 6. (a, b) Axial T1-weighted MR images obtained without fat suppression (a) and with fat suppression (b) show typical MR imaging features of right adrenal myelolipoma. The fatty component of the myelolipoma (arrow in a) shows a decrease in signal intensity on the fat-suppressed image. (c) Photomicrograph (original magnification, $\times 100$; H-E stain) shows the typical microscopic appearance of myelolipoma. There is fat and a maturing marrow element on the right side and an otherwise normal adrenal cortex on the left.

¹ Khaled M. Elsayes, MD et al; "Adrenal Masses: MR Imaging Features with Pathologic Correlation" Radiographics 2004

QUISTOS

- Raros, benignos, não funcionais
- Podem ter origem
 - Epitelial
 - Parasitária
 - Endotelial (40%)
 - Pseudoquistos
- Hipodensos, com parede hiperaptante
- Parede por xs calcificada
- Podem mimetizar um adenoma em TC
- Hipointensos em T₁ e hiperintensos em T₂
- Dx D neoplasia necrosada, quisto renal



QUISTOS



Figure 7. (a, b) Coronal T1-weighted in-phase (a) and T2-weighted half-Fourier RARE (b) MR images show an oval, well-circumscribed, right adrenal cyst (arrow in b) with a thin wall (arrowhead in b). The cyst has a typical appearance, showing low signal intensity at T1-weighted imaging and high signal intensity at T2-weighted imaging. (c) Photomicrograph (original magnification, $\times 100$; H-E stain) shows a cystic lesion with a simple cuboidal mesothelial lining.

¹ Khaled M. Elsayes, MD et al; "Adrenal Masses: Features with Pathologic Correlation"
Radiographics 2004

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LINFOMA

- Raro
- + frequente/ não – Hodgkin (4%)
- Bilateral em 50%
 - Associado a adenopatias retroperitoneais ou Mx
- Comportamento imanológico semelhante ao das Mx
 - Hiposinal em T₁ e Hipersinal heterogéneo em T₂
 - Realce mínimo

LINFOMA

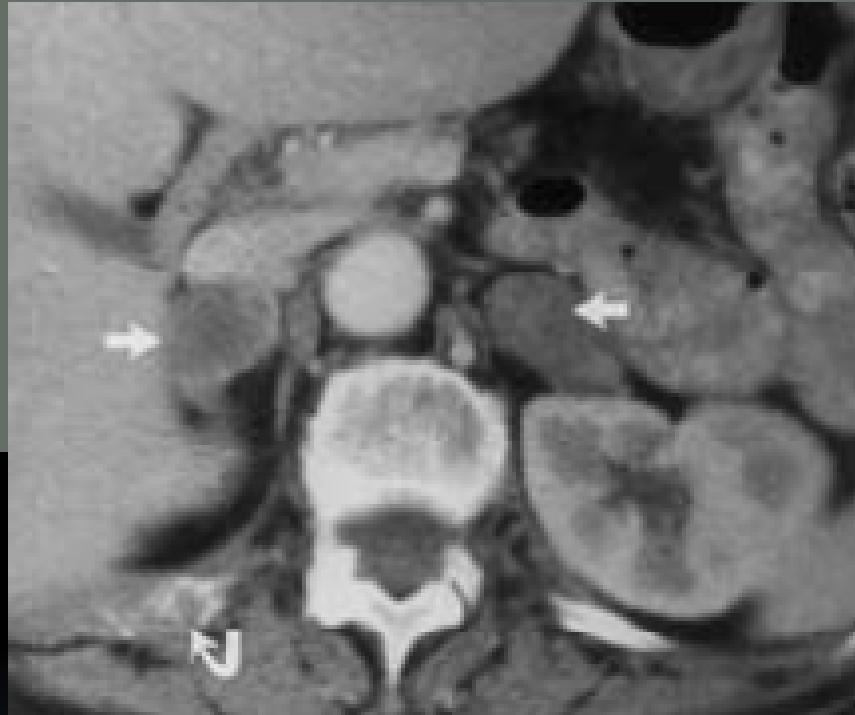


Figure 28. Adrenal lymphoma in a 74-year-old woman with biopsy-proved non-Hodgkin lymphoma. Contrast-enhanced CT scan demonstrates bilateral adrenal masses (straight arrows). The patient also has a destructive lesion from the lymphoma in the right rib (curved arrow).

¹ William W. Mayo-Smith, MD et al; "From the RSNA Refresher Courses : State-of-the-Art Adrenal Imaging" Radiographics 2001

LINFOMA

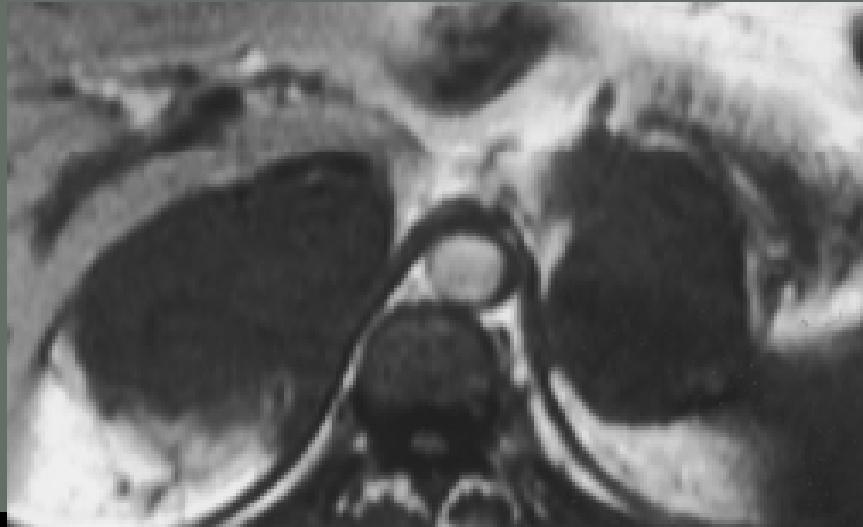


Figure 15. (a, b) Axial T1-weighted in-phase (a) and out-of-phase (b) MR images show bilateral lymphomatous deposits. The deposits have low signal intensity, and the signal intensity does not decrease on the out-of-phase compared with the in-phase image. (c) Photomicrograph (H-E stain) shows moderately pleomorphic large tumor cells in sheets, with abundant apoptosis and mitotic activity. These findings helped characterize this diffuse large cell lymphoma that manifested as an adrenal mass.

¹ Khaled M. Elsayes, MD et al; "Adrenal Masses: Features with Pathologic Correlation" Radiographics 2004

TUMORES MESENQUIMATOSOS

- Hemangiomas
- Lipomas
- Leiomiomas e leiomiosarcomas
- Osteomas
- Neurofibromas
- Neurilenomas

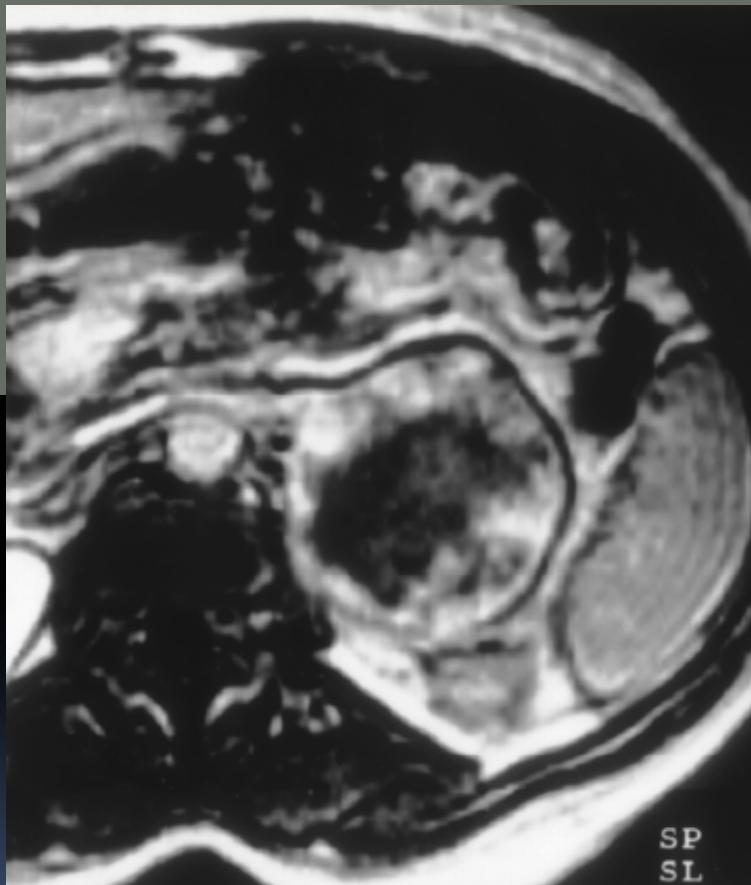
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HEMANGIOMA



Philippe Otal, MD, et al; "Imaging Features of Uncommon Adrenal Masses with Histopathologic Correlation¹" Radiographics 1999

CONCLUSÕES

- Os limites da normalidade no que diz respeito à morfologia e dimensões das SRs nos estudos imiológicos estão ainda mal definidos
- Os exames de imagem têm um papel preponderante na diferenciação entre lesões benignas e malignas das SRs
- O diagnóstico das disfunções das SRs é clínico e laboratorial. Contudo, os exames de imagem permitem localizar e caracterizar as lesões responsáveis, bem como planear ou mesmo executar a sua terapêutica