Unenhanced Attenuation and Histogram Analysis in CT Diagnosis of Adrenal Tumors

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Poster presentation

- **Incidentalomas** of the adrenal gland are a relatively common finding

- First of all it is necessary to **differentiate benign lesions** (most common adenomas, myelolipomas) **from** so-called **non-adenomas** (including metastases, pheochromocytomas and carcinomas)

- Our aim was to **verify the optimal cut-off value for unenhanced CT attenuation and the number of negative pixels in the CT histogram** of adrenal adenomas and non-adenomas.
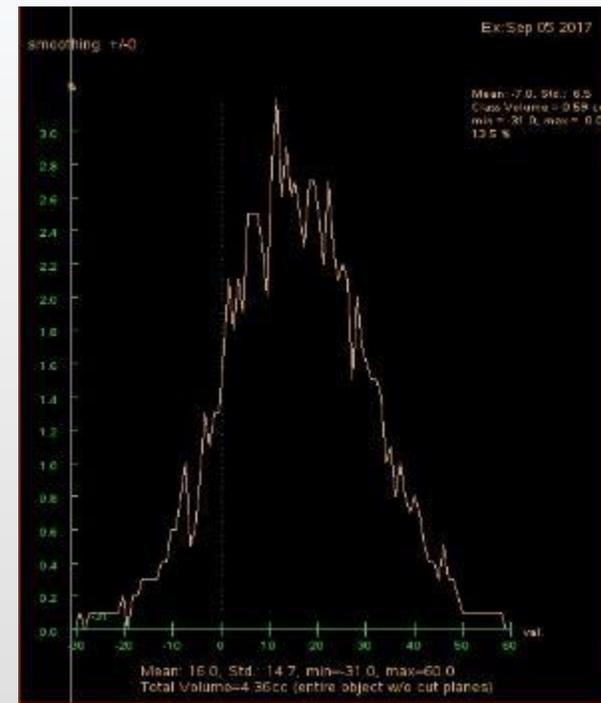
Method

- We retrospectively analyzed CT data of patients who underwent adrenalectomy in period 2002-2017 (in total, 392 adrenalectomies were performed)
- We excluded: - 136 pacients, whose preoperative unenhanced CT was not available (MRI, PET/CT),

  - 8 hematomas,

  - 8 purely cystic lesions,

  - 35 lesions smaller than 10 mm.

- **205 tumors were left for the analysis** – we measured: **- mean unenhanced attenuation**

  - percentage of negative pixels

- **Sensitivity (Se), specificity (Sp) and positive predictive value (PPV)** was calculated **for cut-off values of unenhanced attenuation 10 HU and 15 HU** and **for a histogram value of 10% and 5% of negative pixels.**

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Method

- We analysed 205 lesions and results compared with final histology
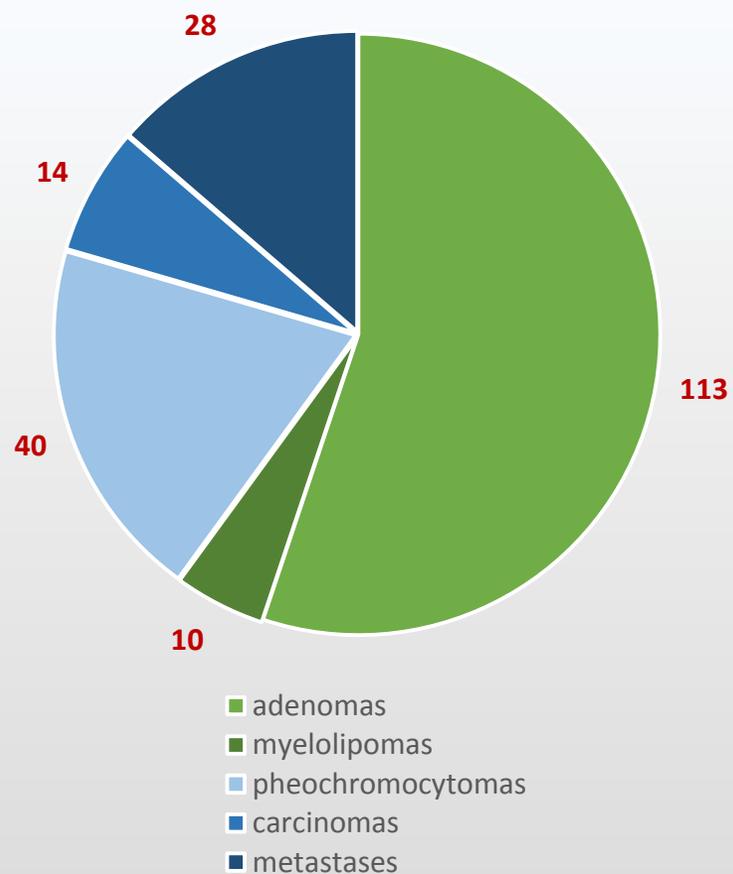

Lesion of adrenal gland:
- mean unenhanced attenuation was 16 HU
- 13,5 % of pixels in selected ROI with attenuation lower than 0 HU – corresponding to a lipid-poor adenoma, which was later histologically confirmed.
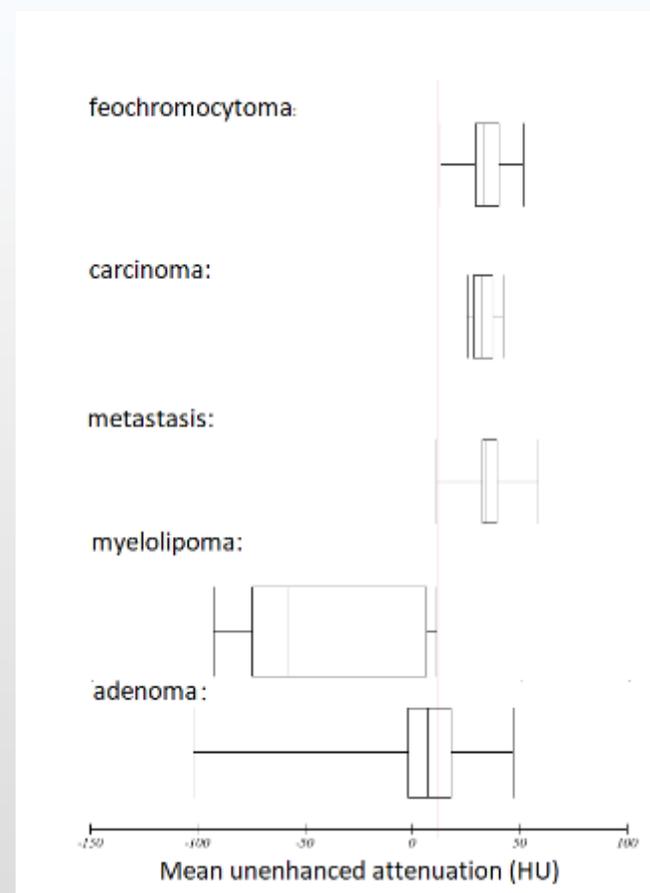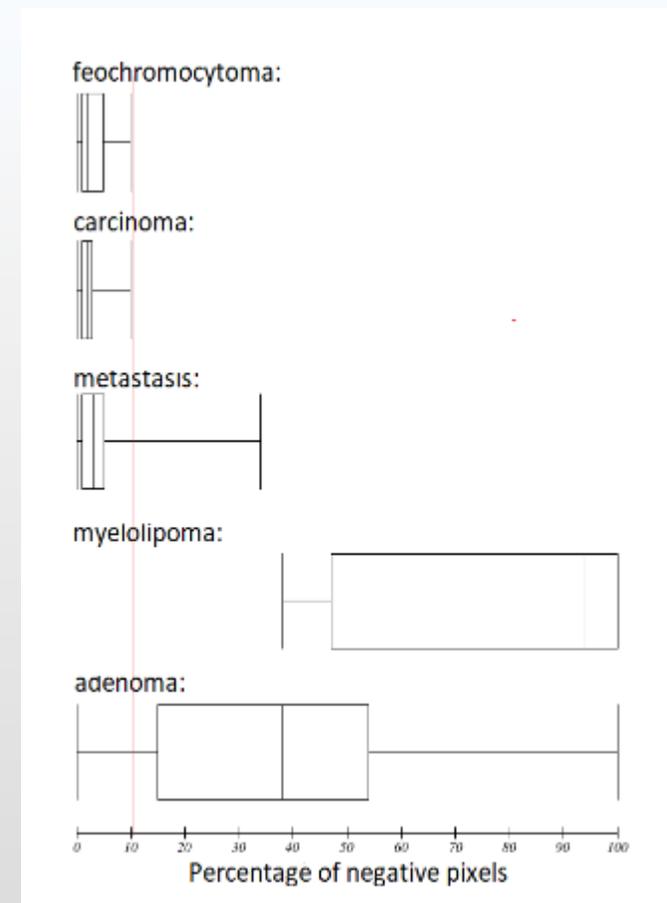
Results

Histology

- adenomas: 113
- myelolipomas: 10
- pheochromocytomas: 40
- carcinomas: 14
- metastases: 28
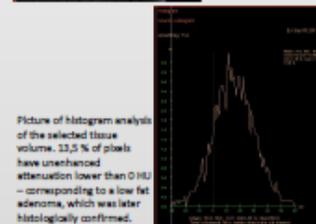
Box-plot 1: mean attenuation of different adrenal leasions:

feochromocytoma:
carcinoma:
metastasis:
myelolipoma:
adenoma:

Mean unenhanced attenuation (HU)
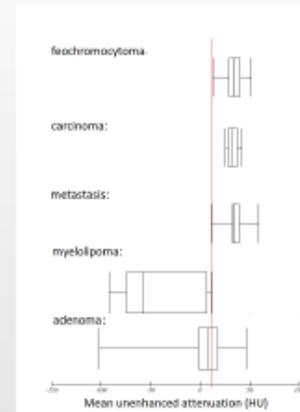
Box-plot 2: percentage of negative pixels of adrenal leasions:

feochromocytoma:
carcinoma:
metastasis:
myelolipoma:
adenoma:

Percentage of negative pixels

Which cut-off value is optimal?

Mean unenhanced attenuation:	Sensitivity:	Specificity:	PPV:
10 HU	62,6 %	98,8 %	98,7 %
15 HU	71,5 %	96,3 %	69,3 %
Cut-off value of negative pixels:	Sensitivity:	Specificity:	PPV:
10 %	84,8 %	97,6 %	98,1 %
5 %	88,6 %	75,6 %	84,5 %
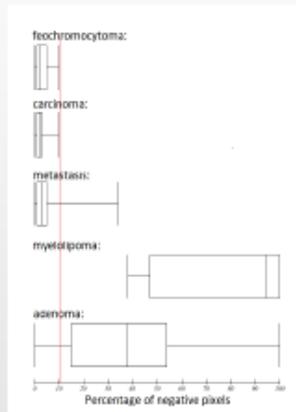
Conclusion:

- Unenhanced attenuation with cut-off value of **10 HU is the simplest and the most specific method** for differentiating benign adenomas and myelolipomas from other types of adrenal tumors.

- **For lesions with unenhanced attenuation >10 HU**, it is appropriate to perform more time-consuming **histogram analysis with the cut-off value of 10% of negative pixels**.

Thank you for your attention