Can we recognize contrast enhancement in brain MR scans in MS patients without the administration of the contrast material? DR. CHEN HOFFMANN

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Background

- In recent years, studies have shown that gadolinium MRI contrast material precipitates in the brain
- MS patients need to undergo MRI with contrast at least once a year (sometimes multiple times) to monitor disease activity

Goals

- ► Is it possible to predict MS activity without administration of gadolinium IV?
- Checking consistency between results of two radiologists

Study design

- MRI scans with and without contrast of MS patients were obtained
- Scans were categorized as active and non active disease for control group
- A neutral neuroradiologist picked active and non active lesions
- After randomly distributing active and non active disease patients, two neuroradiologists try to determine disease activity without the use of contrast sequence (T1 + gadolinium)

Setting

- MRI scans were obtained through RIS using the Sheba Medical Center database
- MS patients underwent through additional non contrast sequences in advance to the study since March 2018.
- Data was collected retroactively from March November

Participants

- The only eligibility criteria was having MS
- The scans were obtained in from a period of 8 months, March November 2018

Variables

I	Н	G	F	Е	D	С	В	А
	ALL_C	SWI_C	DWI_C	T2_C	FLAIR_C	T1_C	DATE	ID
	1	0	0	1	1	0	3/1/2018	38427654
	1	0	0	1	1	0	3/1/2018	300002243
	0	0	0	0	0	0	3/8/2018	38213054
	1	0	1	1	0	0	3/4/2018	300271558
	0	0	0	0	0	0	3/6/2018	345056535
	0	0	1	0	0	0	3/25/2018	309093805
	1	0	0	0	1	0	3/5/2018	323457143
	0	0	0	0	0	0	3/26/2018	302236658
	0	0	0	0	0	0	3/7/2018	308168699
	1	0	0	0	1	0	3/13/2018	28061851
	0	0	0	0	0	0	3/8/2018	209988906
	1	0	1	1	1	0	4/16/2018	305167843
	1	1	1	1	1	0	4/23/2018	301196929
	1	<u>^</u>	<u>^</u>	1	1	<u>^</u>	2/0/2010	20200402

Measurement

Assessment was done by radiologists using their everyday diagnostic tools for evaluating active MS lesions in the brain, without looking at the post contrast sequences

Bias

- To address observer bias, observers received a randomized list with only a patient ID and the date of the scan without knowing which patient had active disease.
- To address selection bias, scans of patients with MS of all ages and genders were chosen from a period of time of 8 months

Study size

- Scans of 350 MS patients were obtained
- ► 35 patients had active lesions
- ▶ 35 patients with MS in remission were chosen as the control group

Statistical methods

- Categorial variables reported as frequency and percentage are reported as mean and SD after evaluating normal distribution by histogram and 99 plot
- Agreement between observers was evaluated using kappa statistics interpretation of kappa statistics defined by Landis and Koch.
- Each radiologist had Sensitivity, NPV, PPV, Specificity calculated SPSS was used for all statistical analysis.

Results

Average age 42 SD 11.2

▶ 16 Males, 54 Females

	Yes	Νο	Disagreement	Κ
Flair	19 (27.5%)	31(44.9%)	19(27.5%)	0.432
T2	36(52.2%)	13(18.81%)	20(28.9%)	0.363
DWI	20(29%)	36(52.2%)	13(14.4%)	0.612
Overall	21(30.9%)	27(39.7%)	20(29.4%)	0.408

Results cont.

	Sensitivity	Specificity	PPV	NPV
Observer A	57.1%	65.7%	62.5%	60.5%
Observer B	50.0%	61.8%	56.6%	55.3%

From looking at single lesions with non contrast sequences the radiologists couldn't predict which lesions were active

Future

The next step will be to use non contrast sequences compared to previous MRI scans to see if reliability improves

Thank you

► Thank you.