

Applicability of magnetic resonance imaging for bone age estimation in the context of medical issues.

Dr. med. Daniel Vogele, Department of Diagnostic and Interventional Radiology,
University hospital Ulm

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Introduction

- Bone age as indicator for skeletal and biological maturity
- Usage in the context of medical issues
- Often follow-up examinations under hormonal therapy
- Various imaging techniques available

Introduction

- Ultrasonography of hand bones
- Radiograph of the iliac crest
- Imaging of the medial clavicular epiphysis
- Left hand radiographs

Methoden zur Knochenalterbestimmung

- Greulich and Pyle atlas method
- Determination of size, shape and degree of mineralization of the individual bones
- Comparison of left hand radiographs with gender-specific reference images

Introduction



4 years, female



14 years, male



17 years, female

Material and methods

- 41 children and adolescents (16 female, 25 male)
- Mean age 12,02 Jahre (6,0 – 17,5 Jahre)
- Bone age estimation with left hand radiograph for medical issues
- Complementary MRI on the same day (T₁ VIBE: n=41; T₁ TSE: n=25)
- Bone age estimation by two experienced observers with the Greulich und Pyle standard

Material and methods

MRI: 3 T MagnetomSkyra, Siemens Healthcare, Erlangen, Germany

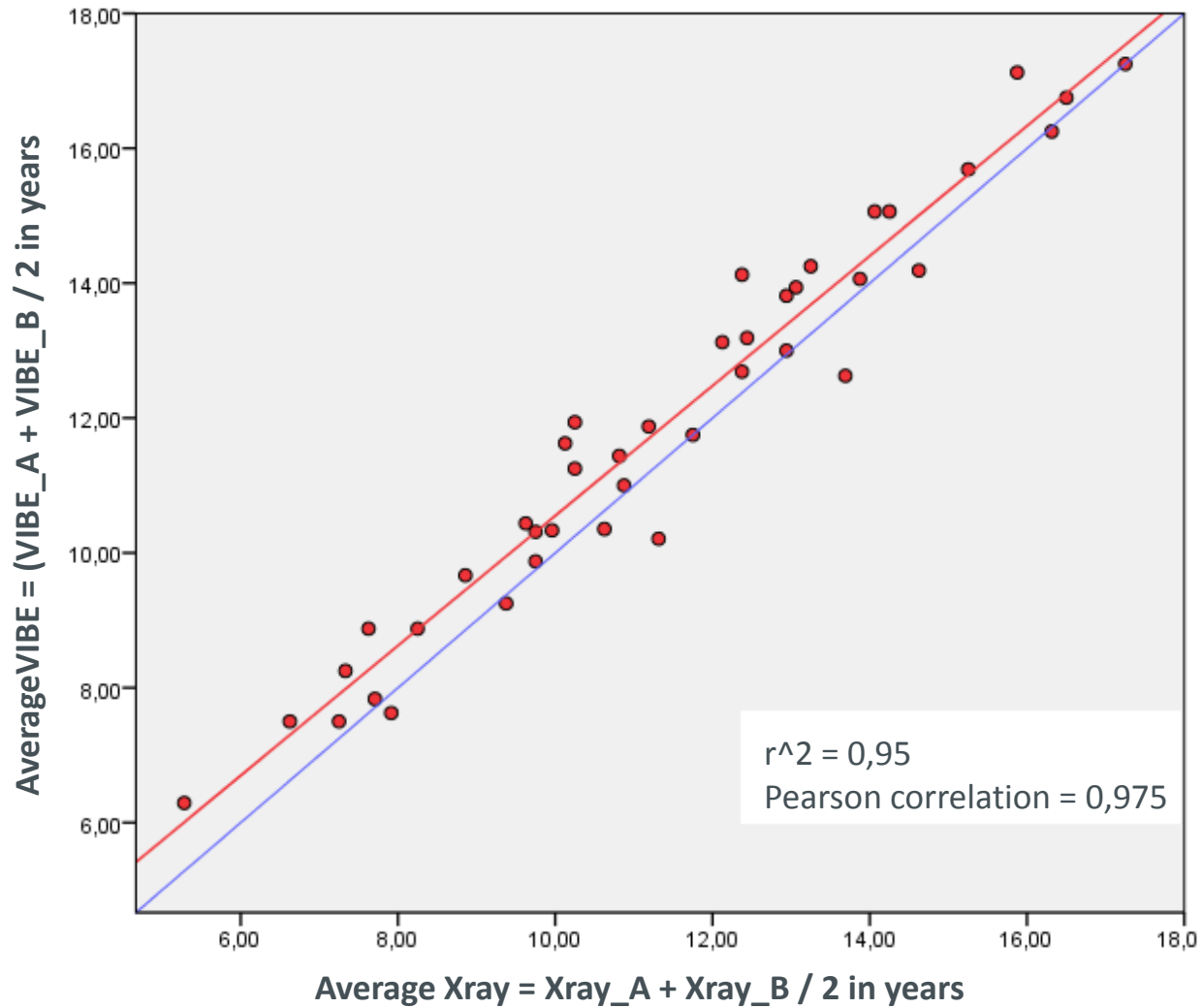
	T1 VIBE	T1 TSE
Matrix	512x384	512x384
Voxel size	0,4x0,4x0,9 mm	0,4x0,4x2,0 mm
Field of View	200 mm	200 mm
Slice thickness	0,9 mm	2,0 mm
Echo time	14 ms	450 ms
Repetition time	5,94 ms	13 ms
Flip angle	15°	180°
Aquisition time	2:45 min	3:48 min

Material und Methodik

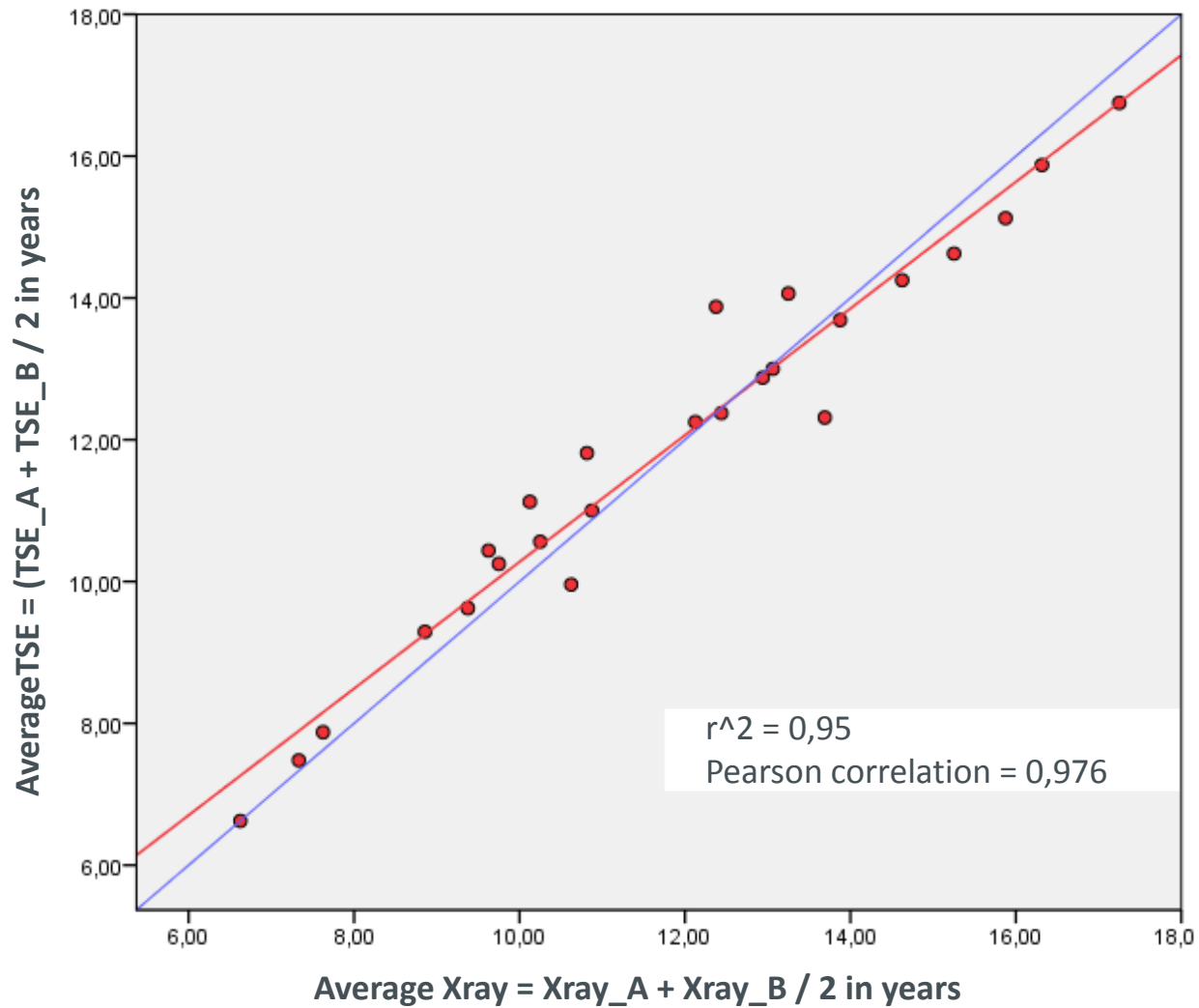


Example: Chronological age 7 years, 11 months, A: X-ray, B: T1 VIBE, C: T1 TSE

Results



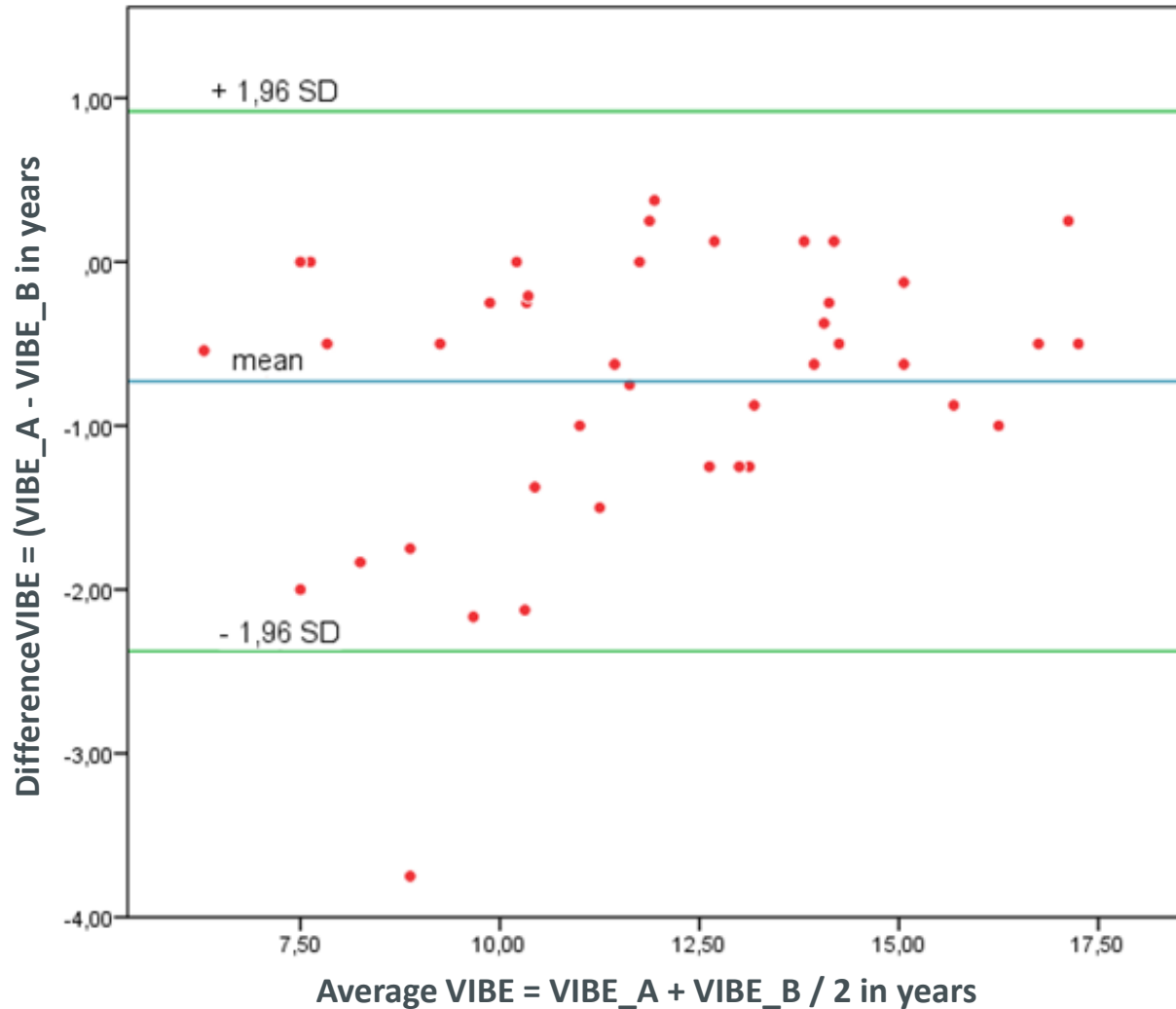
Results



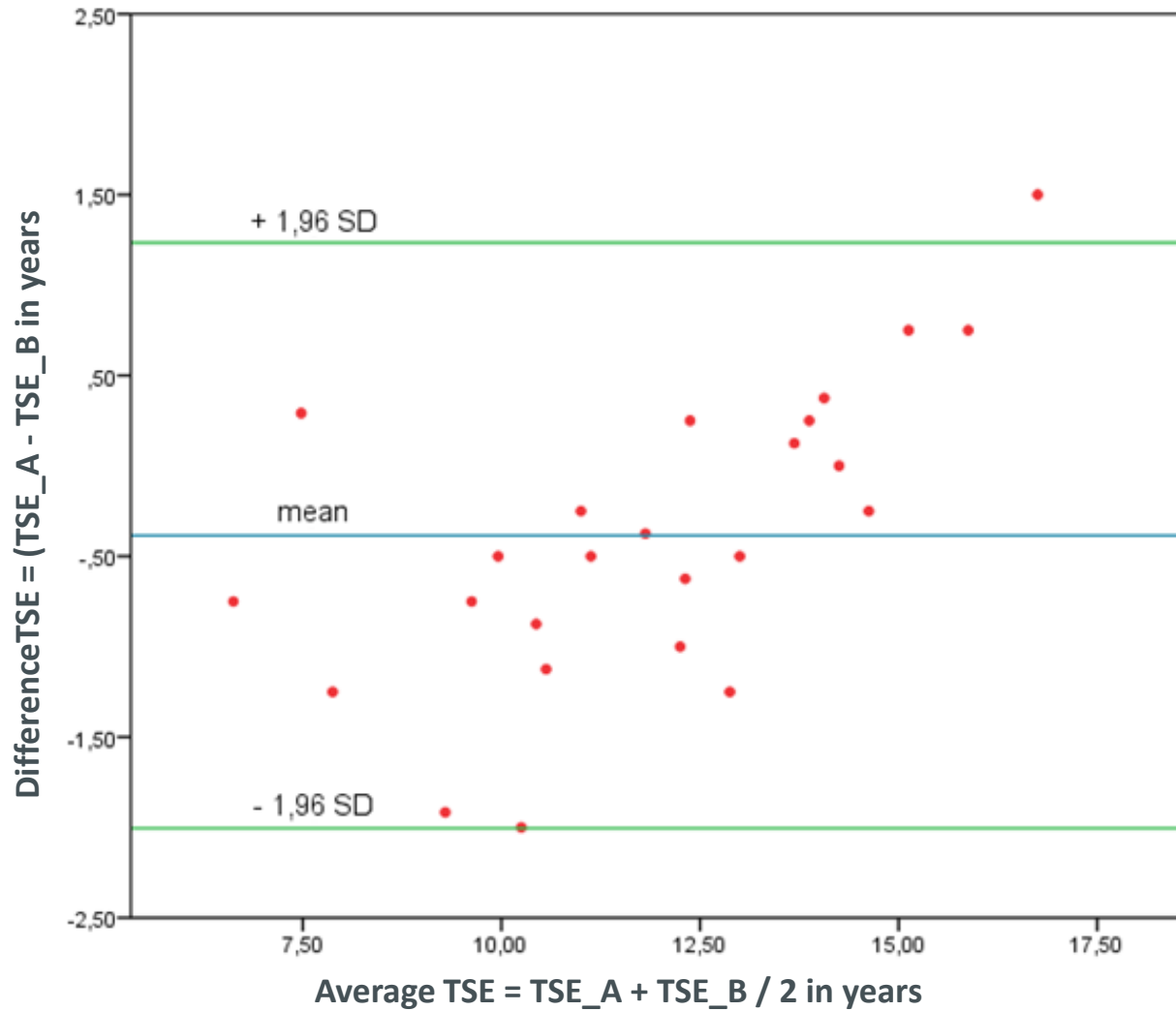
Results



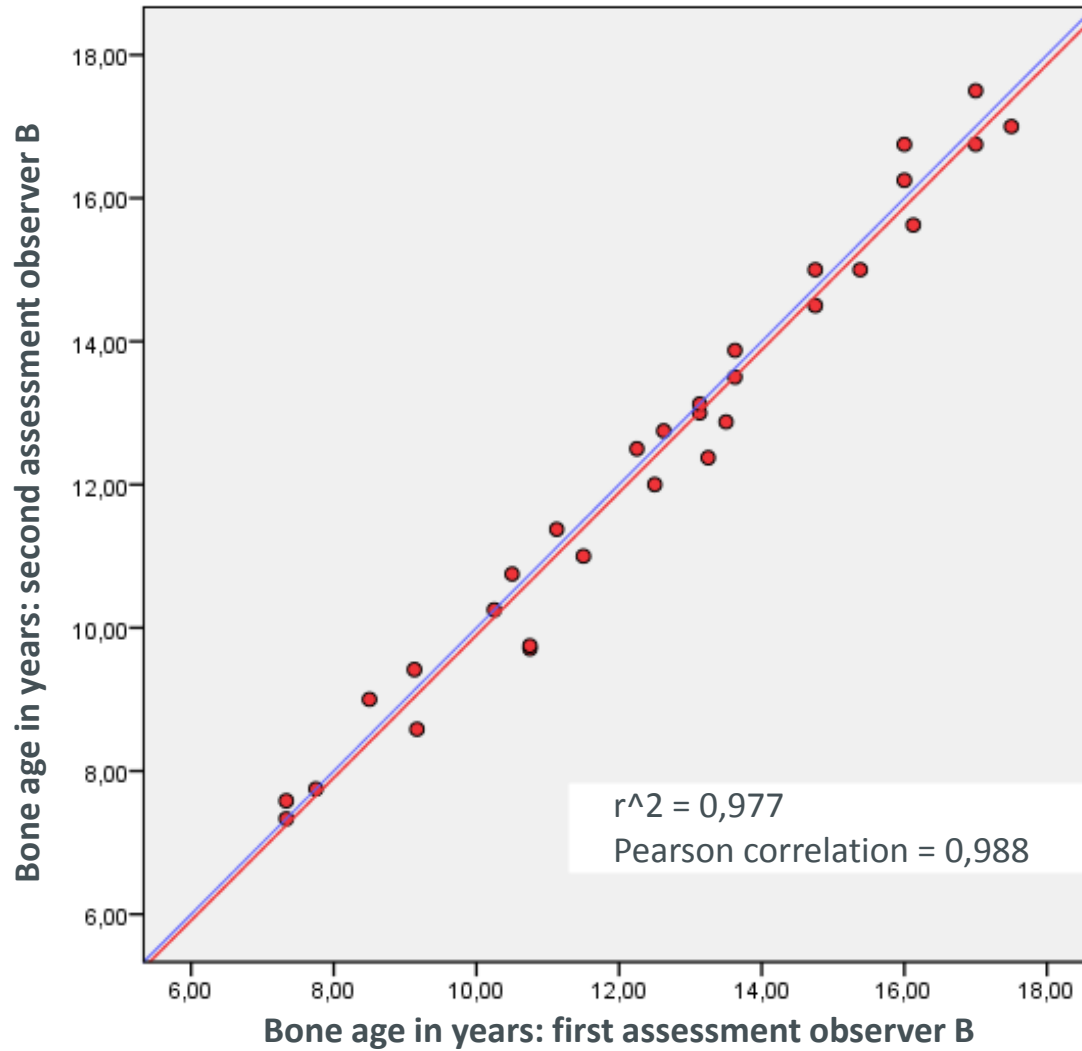
Results



Results



Results



Results

Reporting time	Observer A	Observer B
X ray	147 sec	127 sec
MRI	205 sec	163 sec

Summary and conclusion

- Applicability of the Greulich and Pyle atlas method on MRI is possible
- Good correlation for the estimated bone age for both modalities
- Both MR-sequences with good results
- Time for diagnostic reporting longer for MRI
- MRI is a possible radiation-free alternative for bone age estimation in the context of medical issues

Thank you!

