Bilaga till rapport

Åldersbedömning- magnetkameraundersökning av tillväxtzonen i lårbenets nedre del / Age estimation by magnetic resonance imaging of the knee, rapport 333 (2021)

Bilaga 4 Tabellverk över inkluderade studier/Appendix 4 Characteristics of included studies

Author **Year** **Country** **Ref nr**	Alatas 2021 Turkey [1]
Study design	Retrospective cross-sectional cohort study
Setting **Time period**	Radiology Clinic, Dokuz Eylül University, Turkey January 2008- April 2018
Population **ethnicity** **Age, sex** **Sample**	Clinical population. Patients with knee pathology, chemotherapy, radiotherapy, steroid treatment or systemic/neoplastic disorders excluded. Ethnicity not stated Age: 12.01-27.55 years N=709 Male: n=425 Female: n=284
Ossification classifications:	Vieth (2-6). Femur, tibia.
Indextest **Tesla** **Weight plan** **Scan parameters**	**Field strength:** 1,5T **Weight:** PD fs (spair) tse, T1 tse **Plane**: Coronal **Scan parameters**: PD: 3.5mm section thickness, coronal. TR 3400ms, TE 30 ms, duration 2:07min, FOV 512, matrix 256× 128 and NEX 1 T1: 4T1WI 3.5mm section thickness, coronal TR 480ms, TE 10ms, duration 1:22min, FOV 512, matrix256× 128 and NEX 1 **Resolution:** 2x4x3,5 mm
No of observers **Intra/inter reliability**	Two observers, both experienced in forensic age estimation. 150 randomly selected scans examined together, the remaining examined separately. 100 scans were re-examined after 2 months. Examiners blinded to age of subjects. Intra-observer reliability, K 0.828 Inter-observer reliability, K 0.841
Outcome	**Stages of distal femoral epiphysis** *Males*: mean age (± SD); min-max age per age Stage 2: 13.68 (1.29); 12.02-16.28 Stage 3: 15.07 (1.19); 12.34-18.92 Stage 4: 18.35 (1.99); 14.84-21.96 Stage 5: 21.02 (2.54); 15.81-26.71 Stage 6: 24.09 (1.73); 20.76-27.37 *Females*: mean age (± SD); min-max age per age Stage 2: 12.89 (0.72); 12.01-14.53 Stage 3: 14.25 (1.11); 12.01-17.22

	Stage 4: 16.26 (1.24); 13.77-19.08 Stage 5: 19.83 (2.83); 14.77-25.61 Stage 6: 23.89 (2.19); 20.45-27.55
Comments	Also includes measurements of proximal tibia. Moderate risk of bias

Author **Year** **Country** **Ref nr**	Altinsoy 2020 Turkey [2]
Study design	Retrospective cross-sectional cohort study
Setting **Time period**	Radiology Clinic, Elazig Training and Research Hospital, Turkey January 2014 to December 2016
Population **ethnicity** **Age, sex** **Sample**	Clinical population. Patients with knee pathology, chemotherapy, radiotherapy, steroid treatment or systemic/neoplastic disorders excluded. Ethnicity not stated. Age:10-30 years N=472 Male: n=277 Female: n=195
Ossification classifications:	Dedouit (1-5) Femur, Tibia
Indextest **Tesla** **Weight plan** **Scan parameters**	Field strength: 1,5 T Weight: PD fast SE Plane: Coronal Scan parameters: 4.5 mm section thickness, coronal TR: 3400 ms, TE: 30 ms, FOV: 250 × 200, matrix: 256 × 128, NEX: 1. Resolution: 0,9x1,6x4,5mm
No of observers **Intra/inter reliability**	Two observers, both radiologists evaluated all scans. 100 randomly selected scans were re-examined after 2 weeks. Examiners blinded to age of subjects. Intra-observer reliability, K 0.881/0.870 (observer 1/2) Inter-observer reliability, K 0.759
Outcome	Stages of distal femoral epiphysis Males: mean age (± SD); min-max age per stage Stage 1: 13.42 (2.32); 10.23-16.70 Stage 2: 15.30 (1.65); 12.73-18.51 Stage 3: 19.80 (2.52); 14.94-26.70 Stage 4: 22.70 (3.19); 17.17-30.10 Stage 5: 25.72 (2.38); 21.83-30.98 Females: mean age (± SD); min-max age per stage Stage 1: 12.30 (1.62); 10.26-14.03 Stage 2: 14.21 (1.37); 11.48-16.09 Stage 3: 17.36 (2.14); 13.43-22.39 Stage 4: 21.86 (3.54); 16.31-30.48 Stage 5: 25.14 (2.16); 21.23-29.68
Comments	Also includes measurements of proximal tibia. Low risk of bias

Author **Year** **Country** **Ref nr**	Auf der Mauer 2019 Germany [3]
Study design	Prospective longitudinal cohort study
Setting	University Medical Center Hamburg-Eppendorf (UKE), Germany

Time period	Recruited April 2015- June 2017, followed with 3 scans over 2 years.
Population **ethnicity** **Age, sex** **Sample**	Healthy volunteers. Subjects with knee pathology or systemic disorders excluded. Ethnicity not stated. Age:14-19 years N=40 Male: n=40 Female: n=0
Ossification classifications:	Jopp (1-3) Femur, Tibia, Fibula
Indextest **Tesla** **Weight plan** **Scan parameters**	Field strength: 3T Weight: T1 sense Plane: coronal Scan parameters: TR 850ms, TE 10ms, flip angle 90◦, resolution 800×800×41; in-plane resolution 0.1875×0.1875mmx 2; slice thickness 2mm; spacing between slices 2.2mm Resolution: 0.1875×0.187x 2 mm
No of observers **Intra/inter reliability**	Three observers, scientists in the field of forensic medicine. Blinded to age. Re-evaluation of all scans at follow-up. Intra-observer reliability not stated Inter-observer reliability, K 0.799 (femur)
Outcome	Majority of subjects scanned three times: baseline (BL), follow-up 1 (FU1) and follow-up 2 (FU2). The time gap between each MRI examination was 11 months on average (8-14 months). Stages of distal femoral epiphysis, BL Males: min-max age per stage Stage 1: 14.4-17.8 Stage 2: 15.3-19.2 Stage 3: 16.3-21.7
Comments	Also includes measurements of proximal tibia and proximal fibula as well as calculations of SKJ, an overall score of the knee joint. Moderate risk for bias

Author **Year** **Country** **Ref nr**	Daghighi 2021 Iran [4]
Study design	Retrospective cross-sectional cohort study
Setting **Time period**	Tertiary hospital outpatient clinics April 2016-April 2019
Population **ethnicity** **Age, sex** **Sample**	Patients referred to hospital for imaging of the knee for legal purposes. Patients with knee pathology, chemotherapy or corticosteroids excluded. Ethnicity: Caucasoid race and Iranid type Age:14-40 years (inclusion criteria 15-40 year) N=193 Male: n=139 Female: n=54
Ossification classifications:	Schmelling (1-5), Femur, Tibia
Indextest **Tesla** **Weight plan** **Scan parameters**	Field strength: 1,5 T Weight: PD fs and T2 tse Plane: Sagittal and coronal Scan parameters: proton density fat sat: TR 2500 ms, TE 39 ms, slice thickness 4 mm, time for each acquisition: 2 min and 20 s,

	T2 sagittal: TR 4000 ms, TE 71 ms, slice thickness 4 mm, time for each acquisition: 2 min10s Resolution: Not stated, not possible to calculate from given parameters
No of observers **Intra/inter reliability**	Two observers, radiologists with at least 10 years of experience. All scans examined by both separately and re-examined after 30 days. Observers blinded to age, sex and name of subjects. Intra-observer reliability, K 0.89/0.861 (each observer separately) Inter-observer reliability, K 0.83
Outcome	Stages of distal femoral epiphysis Males: mean age (± SD) Stage 1: 15.18 (0.603) Stage 2: 16.56 (1.094) Stage 3: 21.47 (5.137) Stage 4: 29.08 (5.592) Stage 5: 37.00 (4.243) Females: mean age (± SD) Stage 1: 15.00 (0.000) Stage 2: 15.25 (0.500) Stage 3: 16.43 (0.976) Stage 4: 29.93 (5.443) Stage 5: 37.17 (2.250)
Comments	Also includes measurements of proximal tibia. Results did not include minimal and maximum age within each stage. Results did include statistical testing (ANOVA and Tukey test) of mean age between stages. Moderate risk for bias

Author **Year** **Country** **Ref nr**	Dedouit 2012 France [5]
Study design	Retrospective cross-sectional cohort study
Setting **Time period**	Radiology Department, Centre Hospitalier Universitaire Rangueil, Toulouse, France Time period not specified
Population **ethnicity** **Age, sex** **Sample**	Clinical population. Patients with knee pathology, chemotherapy, radiotherapy, steroid treatment, or systemic/neoplastic disorders excluded. Ethnicity not stated. Age: 10.1-30.9 years N=290 Male: n=138 Female: n=152
Ossification classifications:	New classification model (later called Dedouit (1-5)). Femur, tibia.
Indextest **Tesla** **Weight plan** **Scan parameters**	Field strength: 1,5T Weight: PD fast spin echo, images show fs Plane: Sagittal and coronal Scan parameters: TR 2500–4000ms, TE25–50 ms, slice thickness 3.5–4mm, time for each acquisition:4min, 23 images Resolution: Not stated, not possible to calculate from given parameters
No of observers **Intra/inter reliability**	Two examiners, one radiologist and one forensic pathologist. The radiologist re-examined the scans after 3 weeks. Examiners blinded to age and name of subjects.

	Intra-observer reliability, K 0.96 Inter-observer reliability K 0.86
Outcome	Stages of distal femoral epiphysis Males: mean age (± SD); min-max age per age Stage 1: 12.9 (1.71); 10.3-16.1 Stage 2: 15.5 (1.76); 12.1-18.9 Stage 3: 19.9 (3.20); 14.8-25.7 Stage 4: 23.6 (3.08); 17.8-30.0 Stage 5: 27.6 (2.15); 22.6-30.8 Females: mean age (± SD); min-max age per age Stage 1: 11.7 (1.28); 10.1-13.6 Stage 2: 13.6 (1.29); 11.0-15.7 Stage 3: 18.0 (3.36); 13.6-25.1 Stage 4: 22.7 (3.68); 16.6-29.6 Stage 5: 27.9 (2.70); 22.1-30.9
Comments	Also includes measurements of proximal tibia. Moderate risk for bias

Author **Year** **Country** **Ref nr**	Ekizoglu 2021 Turkey [6]
Study design	Retrospective cross-sectional cohort study
Setting **Time period**	Izmir Tepecik Training and Research Hospital, Turkey 2016-2019
Population **ethnicity** **Age, sex** **Sample**	Clinical population, suspicion of trauma or pathology to the knee. All patients with knee pathology, neoplastic disorders or radiation/chemotherapy excluded. Ethnicity not stated Age: 10-30 years N=649 Male: n=355 Female: n=314
Ossification classifications:	Schmeling (five stages) and Kellinghaus (subclasses added). Staging defined in plain radiography (Schmeling) and computed tomography (Kellinghaus) originally. Femur, tibia.
Indextest **Tesla** **Weight plan** **Scan parameters**	Field strength: 1.5 T Weight: T1 tse Plane: Sagital Scan parameters: TR 345 ms, TE 11 ms, slice thickness 1.5mm, FOV180, acquisition time 2.3min. Resolution: 0.35x0.35x1.5mm
No of observers **Intra/inter reliability**	Two examiners, one expert in legal medicine and one radiologist. Re-evaluation by both after 4 weeks. Not stated if examiners were blinded to age and sex of subjects. Intra-observer reliability, K 0.924 Inter-observer reliability K 0.898
Outcome	Stages of distal femoral epiphysis Males: mean age (± SD) per stage; min-max age per age Stage 2c: 12.35 (1.53); 10.0-15.3 Stage 3a: 15.65 (1.41); 12.7-18.7 Stage 3b: 16.52 (0.78); 15.1-17.5 Stage 3c: 17.26 (1.42); 15.8-21.9 Stage 4: 23.91 (3.19); 17.0-29.8 Females: mean age (± SD) per stage; min-max age per age

	Stage 2c: 11.21 (0.82); 10.1-12.9 Stage 3a: 13.91 (0.91); 12.8-15.9 Stage 3b: 15.32 (0.30); 15.1-15.8 Stage 3c: 16.27 (1.22); 14.6-18.8 Stage 4: 23.63 (3.96); 15.4-29.8
Comments	Also includes measurements of proximal tibia Moderate risk for bias

Author **Year** **Country** **Ref nr**	Gurses 2020 Turkey [7]
Study design	Retrospective cross-sectional cohort study
Setting **Time period**	Radiology Clinic, Duzce University, Turkey Jan 2012- June 2019
Population **ethnicity** **Age, sex** **Sample**	Clinical population. Patients with knee pathology, chemotherapy, radiotherapy, steroid treatment or systemic/neoplastic disorders excluded. Ethnicity not stated. Age: 12-30 years N=598 Male: n=367 Female: n=231
Ossification classifications:	Vieth (2-6). Femur, tibia.
Indextest **Tesla** **Weight plan** **Scan parameters**	**Field strength:** 1,5T **Weight:** PDfs (T2w), T1 tse **Plane**: coronal **Scan parameters**: Proton density (PD _tse cor _fs) sequence: 3.5 mm section thickness; coronal TR:2000 ms; TE16 ms; FOV 200 mm; matrix: 256 × 128; NEX 1.T1 W imaging: 3.0 mm section thickness; sagittal/coronal TR: 450 ms; TE: 12 ms; FOV:200 mm; matrix: 256 × 128; NEX 1. **Resolution:** 0,78x1,56x3,5mm NB! This is a PD sequence, not a T2
No of observers **Intra/inter reliability**	Two observers with experience in forensic age estimation. The images of 100 patients re-evaluated after 2 mo. Examiners blinded to age of subjects. Intra-observer reliability, K 0.834 Inter-observer reliability K 0.823
Outcome	**Stages of distal femoral epiphysis** *Males*: mean age (± SD); min-max age per age Stage 2: 13.65 (1.11); 12.08-15.33 Stage 3: 16.22 (1.83); 12.92-19.50 Stage 4: 18.33 (1.40); 15.08-20.67 Stage 5: 21.46 (2.74); 15.83-30.50 Stage 6: 25.41 (3.07); 20.58-30.92 *Females*: mean age (± SD); min-max age per age Stage 2: 13.14 (0.86); 12.08-14.75 Stage 3: 14.58 (0.89); 12.92-16.08 Stage 4: 16.81 (1.36); 14.33-19.67 Stage 5: 20.46 (2.86); 14.75-29.42 Stage 6: 25.06 (2.98); 20.58-30.92
Comments	Also includes measurements of proximal tibia. Moderate risk for bias

Author **Year** **Country** **Ref n**r	Krämer 2014 Germany [8]
Study design	Retrospective cross-sectional cohort study
Setting **Time period**	Center of Modern Diagnostics (ZEMODI), Bremen, Germany 2010-2012
Population **ethnicity** **Age, sex** **Sample**	Clinical population. All patients with systemic/neoplastic disorders or steroid/chemotherapy excluded. Ethnicity not stated Age: 10-30 years N= 290 Male: n= 166 Female: n= 124
Ossification classifications:	Schmeling et al (five stages) and Kellinghaus et al (subclasses added). Staging defined in plain radiography (Schmeling) and computed tomography (Kellinghaus) originally. Femur.
Indextest **Tesla** **Weight plan** **Scan parameters**	**Field strength:** 3T **Weight:** T1 tse **Plane**: Sagittal **Scan parameters**: TR 783 ms, TE 13 ms, matrix, 512 [90 %], FOV 180 mm, slice thickness,3.0 mm, FA160°; voxel size, 0.4×0.4×3.0 mm; scan time,1 min 57 s **Resolution:** 0.4×0.4×3.0 mm
No of observers **Intra/inter reliability**	One examiner, experience in musculoskeletal MRI diagnostics. In 30 cases re-evaluation by the same examiner after 3 months + additional examiner. Examiners blinded to age and sex of subjects. Intra-observer reliability, K 0.94 Inter-observer reliability, K 0.85
Outcome	**Stages of distal femoral epiphysis** *Males*: mean age (± SD) per stage; min-max age per age Stage 2c: 12.3 (1.7); 10.1-15.5 Stage 3a: 15.0 (1.7); 12.2-19.4 Stage 3b: 15.1 (0.1); 15.0-15.1 Stage 3c: 17.0 (1.2); 15.0-19.5 Stage 4: 24.9 (3.5); 18.3-30.8 *Females*: mean age (± SD) per stage; min-max age per age Stage 2c: 11.8 (1.40); 10.1-13.4 Stage 3a: 13.8 (1.70); 11.4-18.4 Stage 3b: - Stage 3c: 17.0 (0.7); 15.6-18.2 Stage 4: 24.3 (4.0); 16.2-30.8
Comments	Moderate risk for bias

Author **Year** **Country** **Ref nr**	Kvist 2020 Sweden [9]
Study design	Prospective cross-sectional cohort study
Setting **Time period**	Karolinska University Hospital and Blekinge Tekniska Högskola Health Technology Research Lab October 2017-April 2018
Population **ethnicity**	Healthy volunteers.

Age, sex **Sample**	Born in Sweden but ethnicity not stated. Subjects with bilateral knee pathology, chronic diseases or long-term medication excluded. Age: 14.0-21.5 years N=395 Male: n=217 Female: n=178
Ossification classifications:	Modified version of Dedouit and Schmeling (five stages). Subclasses by Kellinghaus
Indextest **Tesla** **Weight plan** **Scan parameters**	**Field strength: 1.**5 T **Weight:** T1 fse & cartilage **Plane**: Coronal and sagittal **Scan parameters**: TE 460 to 600 ms; TE 20 to x46 ms; slice thickness, 3 mm. FOV 160x160 mm Matrix 256x256 **Resolution:** 0,62x0,62x3mm
No of observers **Intra/inter reliability**	Two pediatric radiologists and two general radiologists evaluated all scans. In case of disagreement between the observers, a third experienced pediatric radiologist assessed the images. Cartilage sequences not evaluated by general radiologists. All observers blinded to age and gender. After 4 weeks, a pediatric radiologist re-evaluated all scans. Intra-observer reliability: femur, T1W-TSE: K 0.65, femur, cartilage sequences: K 0.79 Inter-observer reliability for pediatric radiologists: femur, T1W-TSE: K 0.73, femur, cartilage sequences: K 0.86 Inter-observer reliability for general radiologists: femur, T1W-TSE: K 0.56.
Outcome	Stages of distal femoral epiphysis Males: Min-max age per stage (only stated in full years), TW1-TSE; cartilage sequences Stage 2: 14-15; - Stage 3: 14-17; - Stage 4a: 14-18; 14-16 Stage 4b: 15-19; 14-18 Stage 4c: 15-21; 14-19 Stage 5: 16-21; 16-21 Females: Min-max age per stage (only stated in full years), TW1-TSE; cartilage sequences Stage 2: -; - Stage 3: 14-15; - Stage 4a: 14-17; 14-15 Stage 4b: 14-16; 14-17 Stage 4c: 14-21; 14-17 Stage 5: 15-21; 14-21
Comments	Study not designed to assess chronological estimations of age, but rather to evaluate the growth plates of the knee in a descriptive manner. Also includes measurements of proximal tibia. A re-classification with only stages 1-5 (no subclassification of stage 4) improved the inter-observer agreement for pediatric radiologists but not for general radiologists. Moderate risk for bias

Author **Year**	Margalit 2019

Country **Ref nr**	USA [10]
Study design	Retrospective cross-sectional cohort study
Setting **Time period**	Department of Orthopaedic Surgery, The Johns Hopkins Hospital, Baltimore, USA January 2004- January 2014
Population **ethnicity** **Age, sex** **Sample**	Clinical population. Patients with knee pathology or systemic disorders excluded. Ethnicity not stated. Age: 6-19 years N=165 Male: n=98 Female: n=67
Ossification classifications:	Dedouit (1-5), eightlocations both Femur, Tibia, Fibula
Indextest **Tesla** **Weight plan** **Scan parameters**	**Field strength:** 1,5 T or 3T **Weight:** Intermediate FSE, spair **Plane**: Coronal or sagittal **Scan parameters**: TE 2500 to 5000 ms; TE 25 to 40 ms; slice thickness, 3.5 to 4 mm NB Variable weighting, all PD but more or less towards T2 **Resolution:** Not stated, not possible to calculate from given parameters
No of observers **Intra/inter reliability**	Two observers (orthopedic surgeons) made all measurements, blinded to age of patient. The same rater measured the same image 1 week after the first measurement. Intra-observer reliability, K 0.85 (overall, all locations) Inter-observer reliability, K 0.88 (overall, all locations)
Outcome	**Stages of distal femoral epiphysis** *Males*: mean age (± SD) for medial, central, lateral. Stage 1: M: 6.8 (0.4), C: 9.3 (2.0), L: 6.8 (0.4) Stage 2: M: 12.4 (2.2), C: 12.2 (1.6), L: 12.4 (2.2) Stage 3: M: 14.8 (1.3), C: 15.5 (1.5), L: 14.8 (1.4) Stage 4: M: 16.4 (1.8), C: 16.3 (1.8), L: 16.1 (1.6) Stage 5: M: 17.9 (1.2), C: 18.5 (0.6), L: 18.5 (1.3) *Females*: mean age (± SD) for medial, central, lateral Stage 1: M: 8.3 (2.2), C: 8.3 (2.2), L: 8.3 (2.2) Stage 2: M: 8.5 (2.2), C: 8.5 (2.2), L: 8.5 (2.2) Stage 3: M: 13.4 (1.9), C: 12.4 (1.1), L: 13.3 (1.7) Stage 4: M: 14.0 (2.2), C: 14.3 (2.2), L: 14.6 (2.2) Stage 5: M: 17.2 (1.2), C: 17.2 (1.2), L: 17.2 (1.2)
Comments	Minimal and maximum age per stage was not stated. The 8 different locations measured on each patient were: medial, lateral and central femur, medial, lateral and central tibia, fibula and inferior tibeal tubercle (ITT). No significant differences in mean chronological age were detected within each stage between the different locations. Moderate risk for bias
Author **Year** **Country** **Ref nr**	Ottow 2017 Germany [11]
Study design	Prospective cross-sectional cohort study
Setting **Time period**	Germany May 2013- June 2015
Population **ethnicity**	Healthy volunteers German nationality (ethnicity not further specified)

Age, sex **Sample**	Age: 12-24 years N=658 Male: n=325 Female: n=333
Ossification classifications:	Schmeling (five stages) and Kellinghaus (subclasses added). Staging defined in plain radiography (Schmeling) and computed tomography (Kellinghaus) originally. Femur, tibia.
Indextest **Tesla** **Weight plan** **Scan parameters**	Field strength: 3T Weight: T1 TSE Plane: Coronal Scan parameters: TR 633 ms, TE 20ms, flip angle 90, duration 3:51 min; measured voxel size 0.6 × 0.77 ×3 mm, reconstructed voxel size 0.31 × 0.31 × 3 mm Resolution: 0.6 × 0.77 ×3 mm
No of observers **Intra/inter reliability**	One examiner with experience in musculoskeletal MRI diagnostics. 115 randomly chosen cases were re-examined by same examiner after 2 mo +additional examiner. The examiners were blinded to age and sex of subjects. Intra-observer reliability, K 0.961 Inter-observer reliability, K 0.941
Outcome	Stages of distal femoral epiphysis Males: mean age (± SD) per stage; min-max age per age Stage 2c: 14.12 (1.45); 12.05-19.15 Stage 3a: 15.95 (1.22); 13.68-17.88 Stage 3b: 17.77 (-); - Stage 3c: 17.95 (2.12); 16.13-24.84 Stage 4: 21.5 (2.03); 17.46-24.98 Females: mean age (± SD) per stage; min-max age per age Stage 2c: 13.42 (1.14); 12.11-15.74 Stage 3a: 14.80 (0.91); 13.39-17.82 Stage 3b: 15.89 (1.23); 14.73-19.5 Stage 3c: 16.21 (1.22); 14.53-20.62 Stage 4: 20.72 (2.38); 16.13-25.00
Comments	Also involves measurements of proximal tibia Moderate risk for bias

Author **Year** **Country** **Ref nr**	Uygun 2020 Turkey [12]
Study design	Retrospective cross-sectional cohort study
Setting **Time period**	Cukurova University Faculty of Medicine, Balcali Hospital, Adana, Turkey January 2012- April 2018
Population **ethnicity** **Age, sex** **Sample**	Clinical population. Patients with knee pathology, chemotherapy, radiotherapy, steroid treatment or systemic/neoplastic disorders excluded. Ethnicity not stated. Age: 10-25 years N=489 Male: n=292 Female: n=197
Ossification classifications:	Dedouit (1-5) Femur, Tibia
Indextest **Tesla** **Weight plan**	Field strength: 1,5T Weight: PD fs FSE Plane: Coronal

Scan parameters	Scan parameters: section thickness, 4 mm; TR, 2600ms; TE 42ms; FOV,170x170; slice, 20; Nex, 2. Resolution: Not stated, not possible to calculate from given parameters
No of observers **Intra/inter reliability**	Number of observers for all cases not stated. 100 randomly selected cases were re-evaluated after two weeks for intra-observer and inter-observer reliability. Observers were blinded to age and sex. Intra-observer reliability, K 0.955 Inter-observer reliability, K 0.913
Outcome	Stages of distal femoral epiphysis Males: mean age (± SD); min-max age per stage Stage 1: 12.24 (1.546); 10-16 Stage 2: 13.51 (1.487); 11-16 Stage 3: 17.96 (2.129); 14-25 Stage 4: 21.51 (2.029); 16-25 Stage 5: 23.57 (1.826); 15-25 Females: mean age (± SD); min-max age per stage Stage 1: 11.67 (1.090); 10-13 Stage 2: 13.25 (1.597); 10-17 Stage 3: 16.78 (2.309); 12-23 Stage 4: 20.48 (2.227); 15-25 Stage 5: 23.37 (2.116); 14-25
Comments	Age stated in full years only. Also includes measurements of proximal tibia. Moderate risk for bias

Author **Year** **Country** **Ref nr**	Vieth 2018 Germany [13]
Study design	Prospective cross-sectional cohort study
Setting **Time period**	Germany May 2013- June 2015
Population **ethnicity** **Age, sex** **Sample**	Healthy volunteers German nationality (ethnicity not further specified) Age: 12-24 years N=694 Male: n=344, Female: n=350
Ossification classifications:	New classification model (later called Vieth, 2-6). Femur, tibia.
Indextest **Tesla** **Weight plan** **Scan parameters**	Field strength: 3T Weight: T1 and T2 spir Plane: Coronal Scan parameters: T1 TR633 ms; TE 20 ms; flip angle 90 degree; duration 3:51 min measured voxel size 0.6 × 0.77 × 3 mm; reconstructed voxel size 0.31 × 0.31 × 3 mm. T2-w TSE SPIR TR shortest; TE 65 ms; flip angle 90 degree; duration 3:08 min; measured voxel size 0.6 × 0.76 × 3 mm; reconstructed voxel size 0.31 ×0.31 × 3 mm Resolution: 0.6 × 0.76 × 3 mm
No of observers **Intra/inter reliability**	One examiner with experience in musculoskeletal MRI diagnostics. 100 randomly chosen cases were re-examined by same examiner after 2 mo + additional examiner, experienced in

	musculoskeletal diagnostics. The examiners were blinded to age and sex of subjects. Intra-observer reliability, K 0.914 Inter-observer reliability K 0.913
Outcome	Stages of distal femoral epiphysis Males: mean age (± SD); min-max age per age Stage 2: 13.39 (0.89); 12.05-15.56 Stage 3: 14.75 (1.66); 12.13-19.15 Stage 4: 17.04 (0.81); 15.49-18.81 Stage 5: 21.20 (2.23); 15.71-24.98 Stage 6: 23.23 (1.32); 21.24-24.70 Females: mean age (± SD) per stage; min-max age per age Stage 2: 12.41 (0.31); 12.11-12.88 Stage 3: 13.83 (1.02); 12.16-15.74 Stage 4: 15.90 (1.00); 14.33-18.46 Stage 5: 20.50 (2.54); 14.82-24.98 Stage 6: 22.62 (1.20); 20.65-24.05
Comments	Partly same population as in #6 but with different testing and different purpose of the study (new classification system). Also includes measurements of proximal tibia. Moderate risk for bias.

References

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