Supplemental Table 1: Approach 3D MRI protocol for quantitative cartilage morphometry

	Paris	Utrecht	Leiden	Oslo	A Coruna
Manufacturer	Siemens Healthcare, Germany	Philips Medical Systems, Netherlands	Philips Medical Systems, Netherlands	Siemens Healthcare, Germany	Philips Medical Systems, Netherlands
Model	Skyra	Achieva or Ingenia	Ingenia	Aera	Ingenia CX
Magnetic field strength	3T	3T	3T	1.5T	1.5T
MRI sequence	T1 FS FLASH	3D-FFE-SPIR	3D-FFE-SPIR	T1 VIBE WE	3D WATS
Anatomical orientation	Double oblique sagittal				
Acquisition matrix	512x512[1]	512x512	512x512	512x512	512x512[3]
Field of view (mm)	160	160	150	160	160[3]
Pixel spacing	0.3125[1]	0.3125	0.2930	0.3125	0.3125[3]
Slice thickness / spacing (mm)	1.5 / 1.5	1.5 / 1.5	1.5 / 1.5	1.5 / 1.5	1.5 / 1.5[3]
Repetition time (ms)	17 [1]	17	17	17	17
Echo time (ms)	7	7	7	7	7
Flip angle (°)	12	12	12	15	15
No. excitations	1	1	1	1	1
Coil	TxRx Knee 15 [2]	Sense Knee 16 [2]	Sense Small Extremity	TxRx Knee 15	Sense HR Knee
Approx. scan time	7 minutes	10 minutes	10 minutes	10 minutes	7-12 minutes[4]

T1 FS FLASH: T1-weighted fat suppressed fast low angle short, 3D-FFE-SPIR: 3D fast field echo with spectral presaturation with inversion recovery, T1 VIBE WE: T1-weighted volumetric interpolated breath hold examination with water excitation, 3D WATS: 3D water selective;

The image acquisition guidelines requested that the patients should be relaxed and should not have performed athletic exercise in the 3 hours before the scan.

[1]: In 3 scans, an acquisition matrix of 448x448, a pixel spacing of 0.36mm, and a repetition time of 29ms were used.

[2]: A body coil was used for patients for whom the knee coil was too narrow (1 in Paris, 3 in Utrecht)

[3]: 17 scans were performed using an acquisition matrix of 528x528 and an in-plane resolution of 0.30mm (field of view: 160mm), 17 scans were performed using an acquisition matrix of 560x560 and an in-plane resolution of 0.286mm (field of view: 160mm), 13 scans were performed using an acquisition matrix of 576x576, an in-plane resolution of 0.295mm (field of view: 170mm) and a slice spacing of 0.75mm (to avoid overlapping slices and to be consistent with the protocol, every 2nd slice was analyzed in these knees)

[4]: scans were adapted to the size of the knee (variable number of slices)

Supplemental Table 2: Baseline cartilage thickness (in mm) in cartilage plates and cartilage subregions

	Mean	SD
MT	1.5	0.3
cMF	1.5	0.4
LT	1.7	0.4
cLF	1.7	0.3
cMFTC	3.6	1.0
cLFTC	4.5	1.1
cMT	1.8	0.5
eMT	1.2	0.4
iMT	1.8	0.4
aMT	1.4	0.3
pMT	1.3	0.3
ccMF	1.7	0.6
ecMF	1.2	0.4
icMF	1.5	0.4
cLT	2.6	0.8
eLT	1.5	0.4
iLT	1.7	0.5
aLT	1.5	0.3
pLT	1.5	0.4
ccLF	2.0	0.4
ecLF	1.6	0.4
icLF	1.4	0.3

MT: medial tibia, cMF: central medial femur, LT: lateral tibia, cLF: central lateral femur, cMFTC: central medial femorotibial compartment, cLFTC: central lateral femorotibial compartment, cMT/eMT/iMT/aMT/pMT: central/external/internal/anterior/posterior subregion of the medial tibia, ccMF/ecMF/icMF: central/external/internal subregion of the central medial femur, cLT/eLT/iLT/aLT/pLT: central/external/internal/anterior/posterior subregion of the lateral tibia, ccLF/ecLF/icLF: central/external/internal subregion of the central lateral femur

Supplemental Table 3: Test-retest precision of subregional cartilage thickness measurements across all sites and for individual sites

	All Sites (n=34)		Paris# (n=7)		Utrecht# (n=8)		Leiden# (n=6)		Oslo‡ (n=6)		A Coruna‡ (n=7)	
	RMS CV%	RMS SD	RMS CV%	RMS SD	RMS CV%	RMS SD	RMS CV%	RMS SD	RMS CV%	RMS SD	RMS CV%	RMS SD
cMFTC	1.7	60	1.9	61	1.0	36	2.6	83	2.0	67	1.3	48
cLFTC	2.0	82	2.9	131	1.2	58	1.5	61	2.2	75	1.5	62
cMT	1.8	31	1.9	31	2.0	37	1.9	31	2.2	36	0.9	17
eMT	3.3	41	4.9	56	2.4	31	2.5	32	3.7	40	3.1	41
iMT	3.6	62	5.1	88	2.1	36	3.0	50	4.2	76	2.8	50
aMT	2.6	35	3.2	42	2.6	32	3.4	46	1.7	23	1.7	25
pMT	2.3	29	3.3	42	1.5	20	1.6	18	2.8	34	2.0	26
ccMF	3.0	51	3.7	61	1.9	34	4.4	70	2.8	47	2.1	37
ecMF	2.6	31	2.8	34	2.0	25	2.0	23	3.3	39	2.5	33
icMF	3.0	46	4.0	63	2.3	38	3.2	45	1.8	27	3.3	48
cLT	2.6	62	3.3	80	1.6	49	2.4	52	3.8	62	2.7	60
eLT	3.7	51	4.5	66	1.7	27	4.8	59	2.0	24	4.8	64
iLT	1.7	28	2.3	36	0.9	17	1.1	15	1.8	21	2.4	39
aLT	3.3	48	3.1	43	2.1	33	5.5	81	2.7	34	2.7	40
pLT	2.3	33	3.2	47	1.8	32	2.2	23	2.8	35	1.4	19
ccLF	2.2	41	3.3	69	1.6	30	1.8	32	1.5	26	1.5	26
ecLF	2.2	33	2.0	36	1.7	25	2.7	40	2.8	41	1.8	23
icLF	3.3	44	3.7	51	3.6	56	1.8	22	3.6	44	2.8	37

#: 3T MRI, ‡: 1.5T MRI, RMS CV%: root mean square coefficient of variation (in %), RMS SD: root mean square standard deviation (in µm), cMFTC: central medial femorotibial compartment, cLFTC: central lateral femorotibial compartment, cMT/eMT/iMT/aMT/pMT: central/external/internal/anterior/posterior subregion of the medial tibia, ccMF/ecMF/icMF: central/external/internal subregion of the central medial femur, cLT/eLT/iLT/aLT/pLT: central/external/internal/anterior/posterior subregion of the lateral tibia, ccLF/ecLF/icLF: central/external/internal subregion of the central lateral femur, test-retest MRI pairs were acquired at the baseline visit for 20 of the 34 knees, Paris / Utrecht / Oslo / A Coruna acquired n=1/2/6/5 test-retest MRI pairs at month 6 instead of the baseline visit, all sites except for A Coruna acquired the test-retest MRI pairs on the same day.

Supplemental Table 4: Longitudinal change in subregional cartilage thickness (in µm) between the baseline (BL) and the month 6 (M06) follow-up visit, the BL and the month 12 (M12) follow-up visit, and between the BL and the month 24 (M24) follow-up visit

	BL → M06 (n=264)				BL → M12 (n=248)				BL → M24 (n=226)			
	Mean	SD	95% CI		Mean	SD	95% CI		Mean	SD	95% CI	
cMFTC	-49	162	-69	-30	-84	185	-107	-61	-150	235	-180	-119
cLFTC	-18	149	-36	0	-47	157	-66	-27	-112	244	-144	-80
cMT	-24	93	-36	-13	-44	111	-57	-30	-74	120	-90	-58
eMT	-17	71	-25	-8	-35	97	-47	-23	-53	100	-66	-40
iMT	-18	124	-33	-3	-32	144	-50	-14	-49	142	-67	-30
aMT	-29	74	-38	-20	-32	81	-42	-22	-48	83	-59	-37
pMT	1	65	-7	9	-9	72	-18	0	-18	86	-30	-7
ccMF	-25	95	-36	-13	-40	112	-54	-26	-76	151	-96	-56
ecMF	-7	82	-17	2	-14	100	-27	-2	-35	106	-48	-21
icMF	-31	81	-41	-21	-42	95	-54	-30	-57	111	-72	-43
cLT	-20	103	-33	-8	-34	111	-48	-20	-72	156	-92	-51
eLT	-4	70	-13	4	-8	82	-18	3	-26	100	-39	-13
iLT	-14	87	-25	-4	-26	104	-39	-13	-47	108	-61	-33
aLT	0	90	-11	10	-1	92	-12	11	-22	106	-36	-8
pLT	-19	76	-29	-10	-27	75	-36	-17	-40	87	-51	-28
ccLF	2	81	-7	12	-13	82	-23	-3	-40	123	-57	-24
ecLF	-3	77	-12	6	-8	88	-19	3	-23	119	-38	-7
icLF	3	79	-6	13	-12	88	-22	-1	-29	102	-43	-16

SD: standard deviation, 95% CI: 95% confidence intervals, cMFTC: central medial femorotibial compartment, cLFTC: central lateral femorotibial compartment, cMT/eMT/iMT/aMT/pMT: central/external/internal/anterior/posterior subregion of the medial tibia, ccMF/ecMF/icMF: central/external/internal subregion of the central medial femur, cLT/eLT/iLT/aLT/pLT: central/external/internal/anterior/posterior subregion of the lateral tibia, ccLF/ecLF/icLF: central/external/internal subregion of the central lateral femur

Supplemental Table 5: Smallest detectable change (SDC) thresholds for 24 month change in subregional cartilage thickness and 24 month progression rates

	SDC threshold	N progression	% progression
cMFTC	<-198µm	77	34.1
cLFTC	<-223µm	43	19.0
cMT	<-102µm	78	34.5
eMT	<-119µm	43	19.0
iMT	<-119µm	63	27.9
aMT	<-129µm	31	13.7
pMT	<-79µm	43	19.0
ccMF	<-180µm	34	15.0
ecMF	<-53µm	73	32.3
icMF	<-105µm	62	27.4
cLT	<-157µm	45	19.9
eLT	<-157µm	17	7.5
iLT	<-86µm	63	27.9
aLT	<-122µm	26	11.5
pLT	<-91µm	58	25.7
ccLF	<-120µm	34	15.0
ecLF	<-87µm	45	19.9
icLF	<-110µm	33	14.6

cMFTC: central medial femorotibial compartment, cLFTC: central lateral femorotibial compartment, cMT/eMT/iMT/aMT/pMT: central/external/internal/anterior/posterior subregion of the medial tibia, ccMF/ecMF/icMF: central/external/internal subregion of the central medial femur, cLT/eLT/iLT/aLT/pLT: central/external/internal/anterior/posterior subregion of the lateral tibia, ccLF/ecLF/icLF: central/external/internal subregion of the central lateral femur