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The distribution of femoral and tibial coronal alignment in Japan: a multicentric retrospective study of patients with knee osteoarthritis

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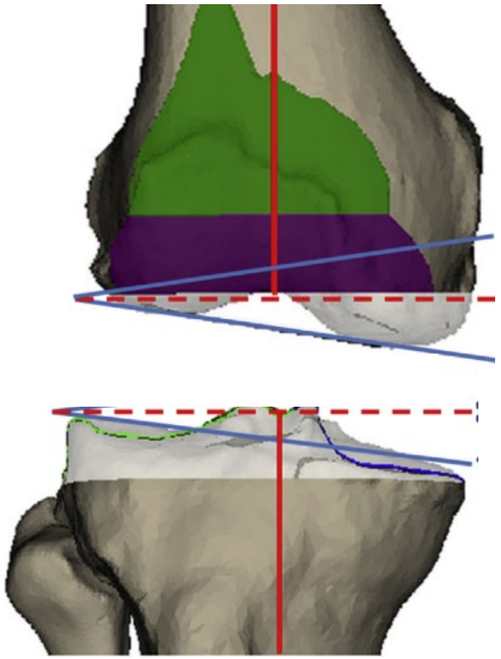
Faculty Disclosure Information

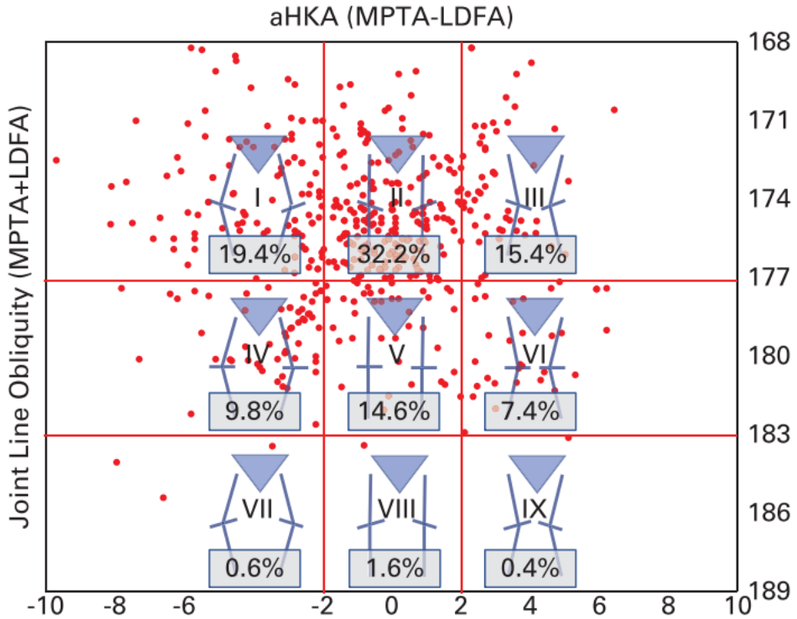
No potential COI to disclose

Lower limb alignment of knee osteoarthritis patients



Both the femur and the tibia have a medially inclined joint line[1]

CPAK Classification

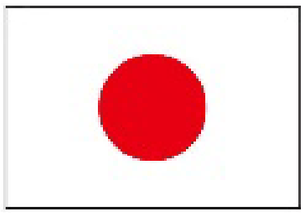


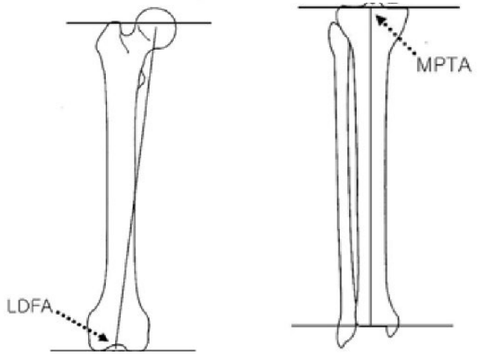
The joint line most frequently shows medial inclination[2]

Constitutional varus is constituted by long lower limb alignment and the joint line

Purpose

The distribution of individual femoral and tibial coronal alignments in patients with knee osteoarthritis in Japan remains poorly understood





This multicentric retrospective study investigated knee alignment in a Japanese population.

Patients

1623 knees

that underwent total knee arthroplasty or unicompartmental knee arthroplasty for knee osteoarthritis in six institutions

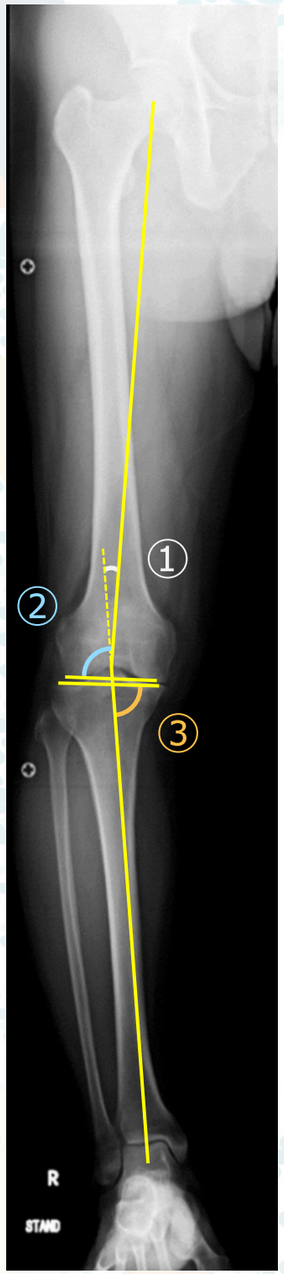
Age (years)	Sex (%)	Height (cm)	Weight (kg)	BMI (kg/m^2)
74.3 (7.9)	Male 24.2 Female 75.8	154.1 (8.7)	62.1 (12.0)	26.1 (4.0)

Values are presented as mean (standard deviation; range)

Exclusion criteria

Patients with
- inflammatory arthritis,
- incomplete data
- non-Japanese patients
- a history of knee injury or surgery

Methods



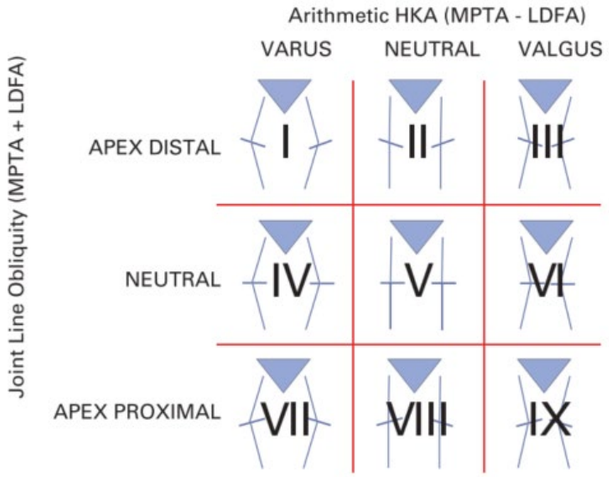
Measured alignment parameters of the subjects

① Hip-knee-ankle angle (HKA)

② mechanical lateral distal femoral angle (mLDFA)

③ medial proximal tibial angle (MPTA)

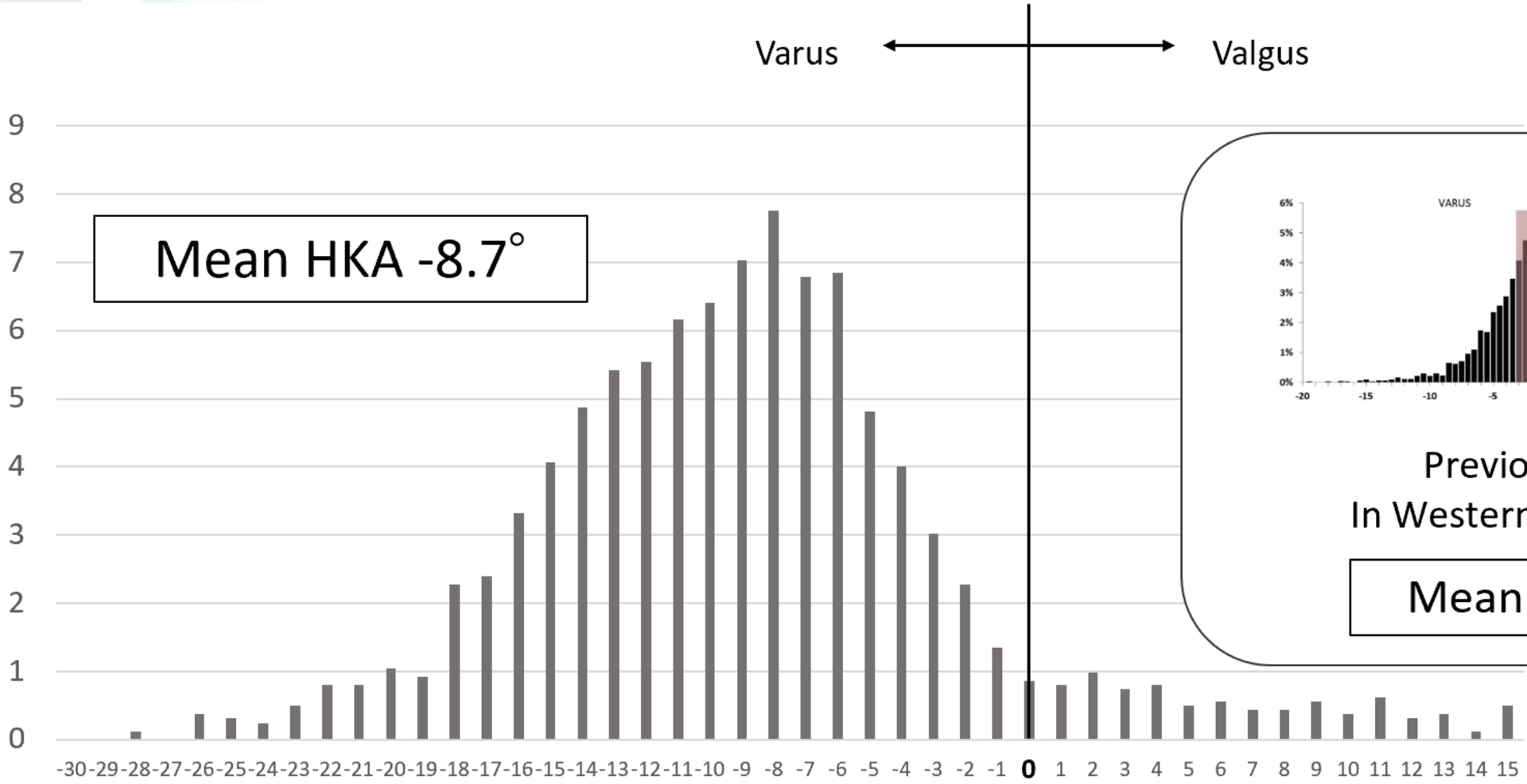
Subjects were classified according to **CPAK classification**

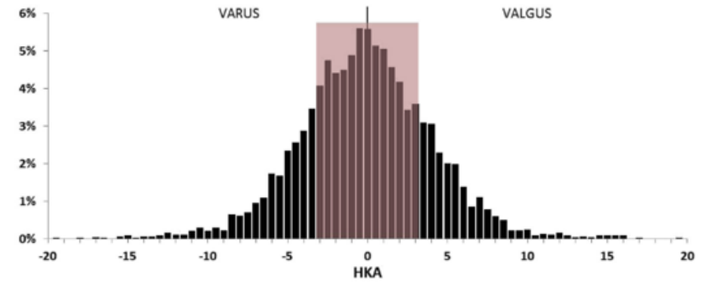


Alignments were compared among the three groups divided by **age**

(< 70 yo, 70-79 yo, and ≥ 80 yo)

Results ①



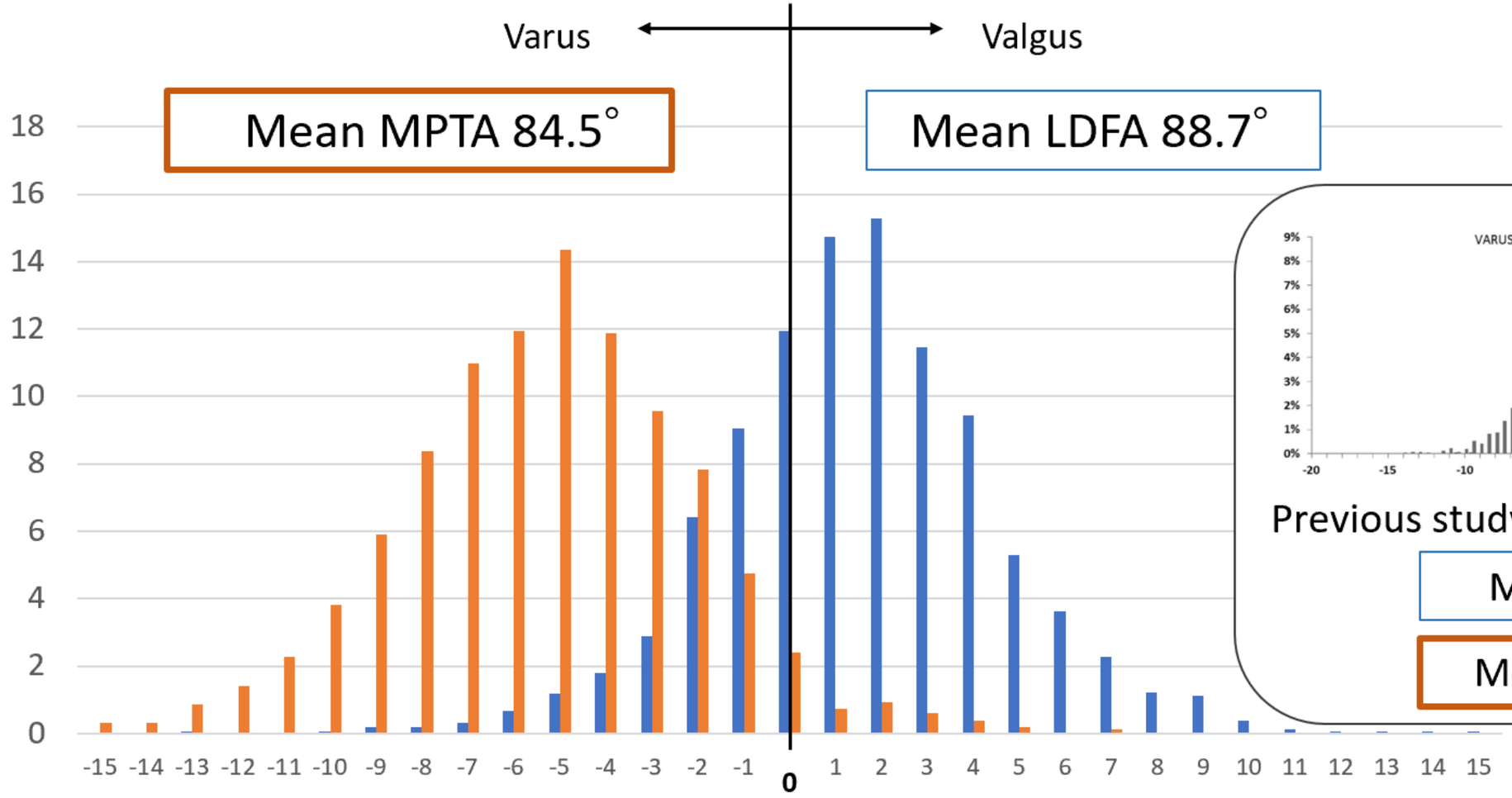


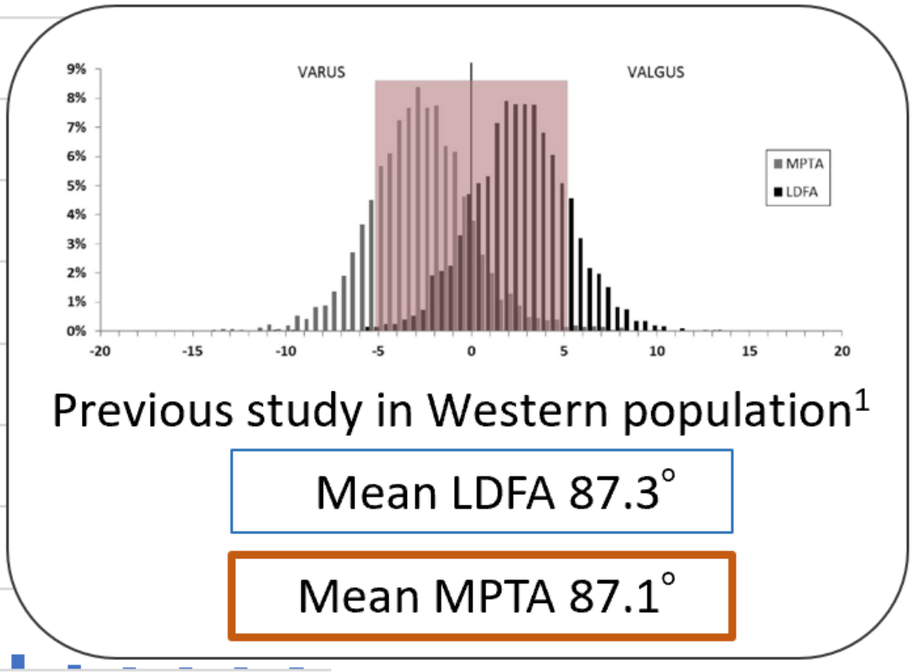
Previous study
In Western population[1]

Mean HKA -0.1°

The extent of varus deformity is more pronounced compared to that in western countries

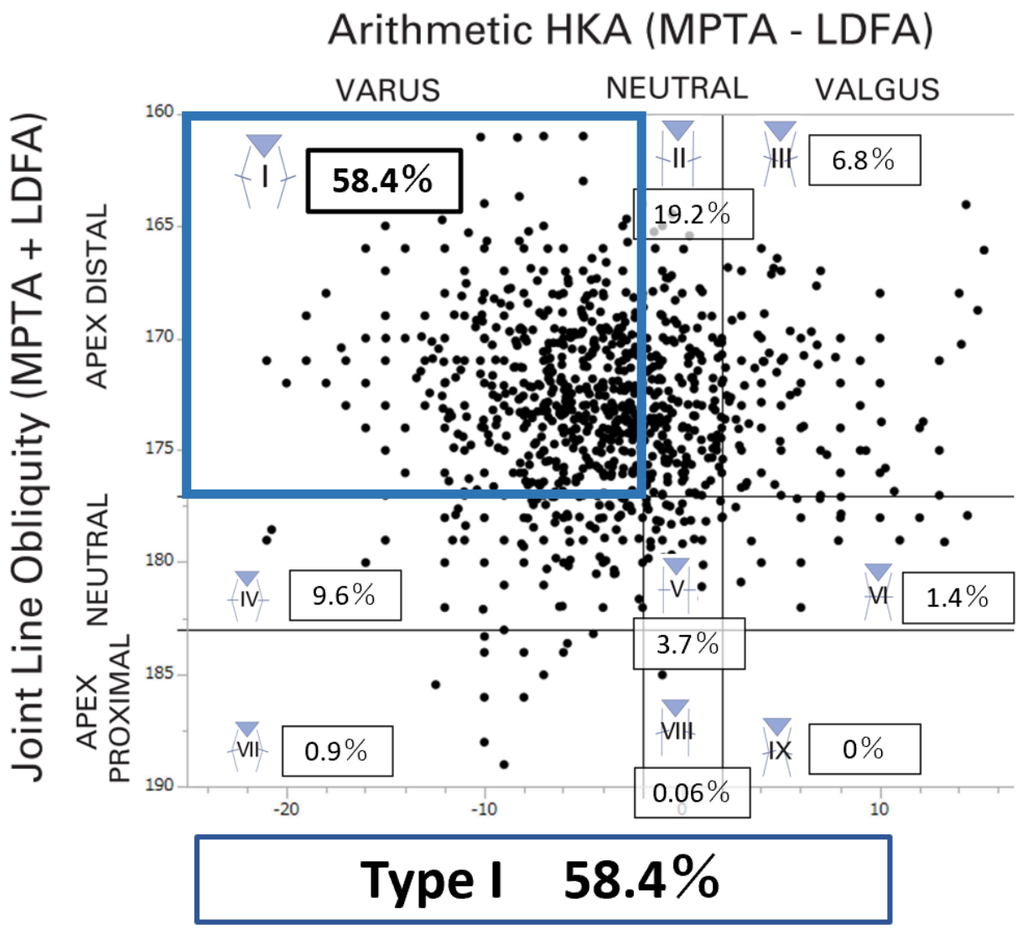
Results ②

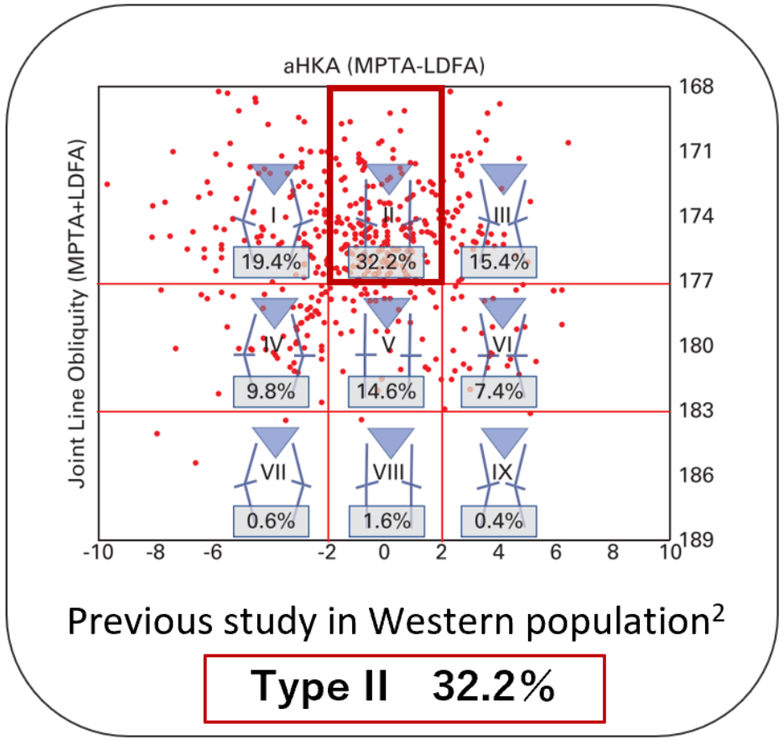




Further varus alignment of the MPTA was observed compared with valgus alignment of the LDFA

Results ③





The most common distribution was type I (58.4%)
followed by type II (19.2%)

Results ④

Age	<70 (n=376)	70-79 (n=823)	80≥ (n=424)	p-value
HKA (°)(SD)	-7.6 (7.2)	-8.7 (7.9)	-9.9 (7.4)	<0.0001⁂
LDFA (°)(SD)	88.2 (3.1)	88.6 (2.9)	89.1 (2.9)	<0.0001**
MPTA (°)(SD)	84.5 (3.1)	84.6 (3.2)	84.2 (3.1)	0.2

Kruskal-Wallis test was performed and Steel-Dwass test for post hoc comparisons

**significant differences between 80≥ vs. 70-79 and 80≥ vs. <70

⁂ significant differences between all comparisons

Patients aged ≥ 80 years had a significantly larger mLDFA than those aged < 70 and 70-80 years

Discussion

Further varus alignment of HKA and MPTA

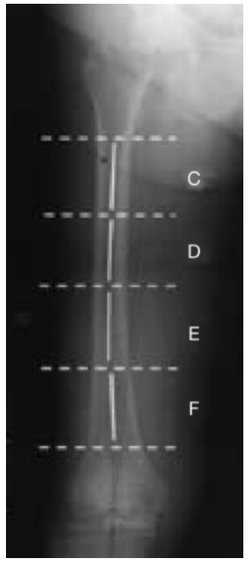
A greater medial tibial inclination accelerates the progression of OA[3]

Medial tibial inclination is associated with the development of OA[4]

Larger mLDFA in elderly patients

The valgus angle of the femoral anatomical axis relative to the mechanical axis predisposes to lateral bowing[5]

Lateral bowing was prevalent and severe in TKA patients[6]



The medial tibial joint line inclination was pronounced and associated with greater varus alignment in Japanese OA patients

Progression of femoral lateral bowing was observed with age, which accelerates progression of OA

Conclusion

Japanese OA patients showed pronounced varus alignment, particularly with respect to the tibial joint line inclination.

Age-related increases in femoral varus alignment were observed.

Recognizing race-specific alignment characteristics is essential for developing reliable treatment strategies for modern knee arthroplasty.

References

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