特殊評価（3）

関節軟骨の超音波評価

（科学研究費　基盤B 2005年度）

国際誌には、加齢に伴って軟骨細胞の活性は低くなると数多く報告されている

↓

関節軟骨には若返りは見込めない

関節軟骨は自然**治癒しない**

（ただし未成熟な、つまり小児の軟骨は治癒する）

変形性膝関節症患者は**高齢者**である

変形性関節症は**関節軟骨の病変**である

したがって、変形性膝関節症は放置すると治らないと考えて良い

我々PTは、この治らない変形性膝関節症に対して理学療法を行っている

変形性膝関節症の理学療法で重要なことは

維持すること

悪化を防ぎ、進行を遅らせること

私の考えです

Evidence に基づく積極的理学療法により貢献可能

研究は大学人の役目ですから、今、ヒトと動物の軟骨研究を推進してます。関心のある方は一緒に研究しましょう

ここで、変形性膝関節症の理学療法学を整理してみると

手術療法

保存療法

予防的理学療法

手術療法

重度で広範囲な変形性膝関節症：

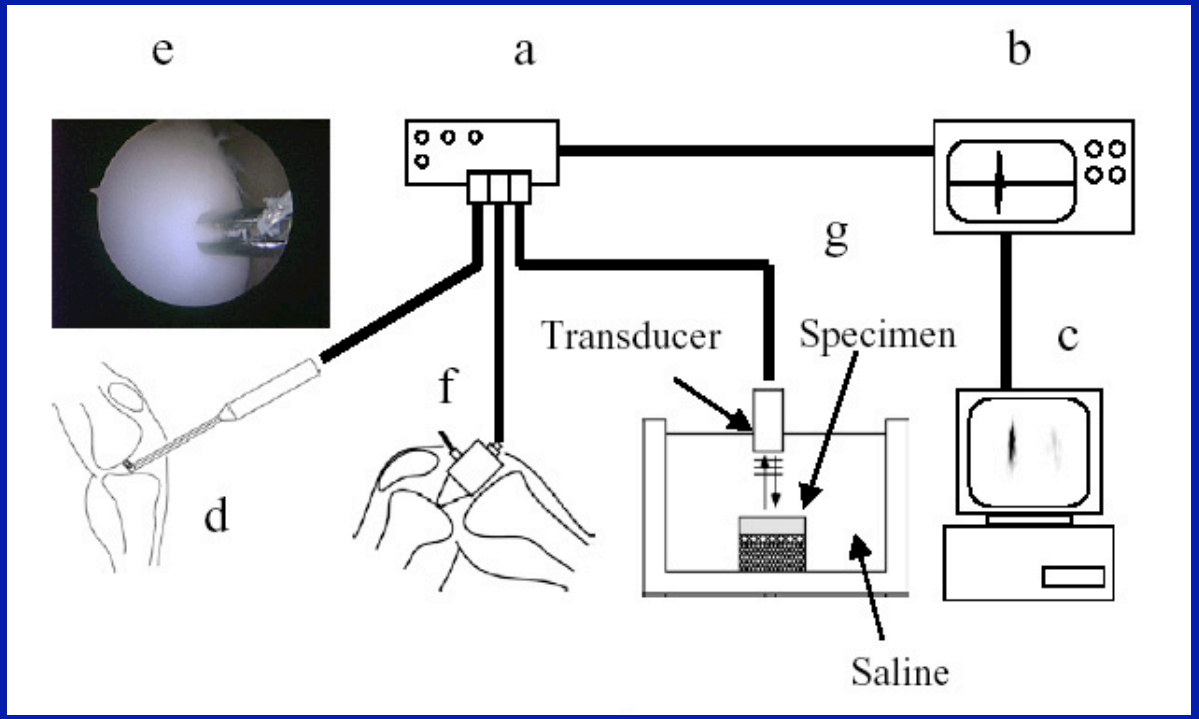
人工膝関節置換術後の理学療法、など

限局性膝関節軟骨損傷・初期変形性膝関節症：

骨軟骨移植術後の理学療法、など

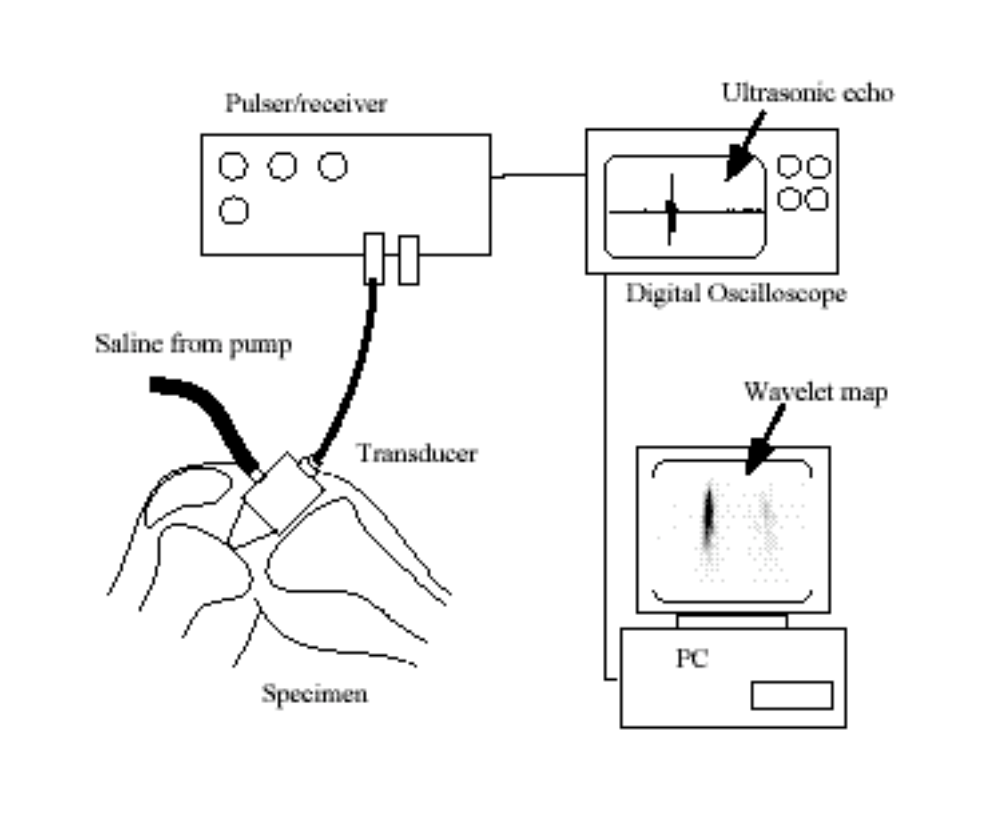
関節軟骨の超音波測定

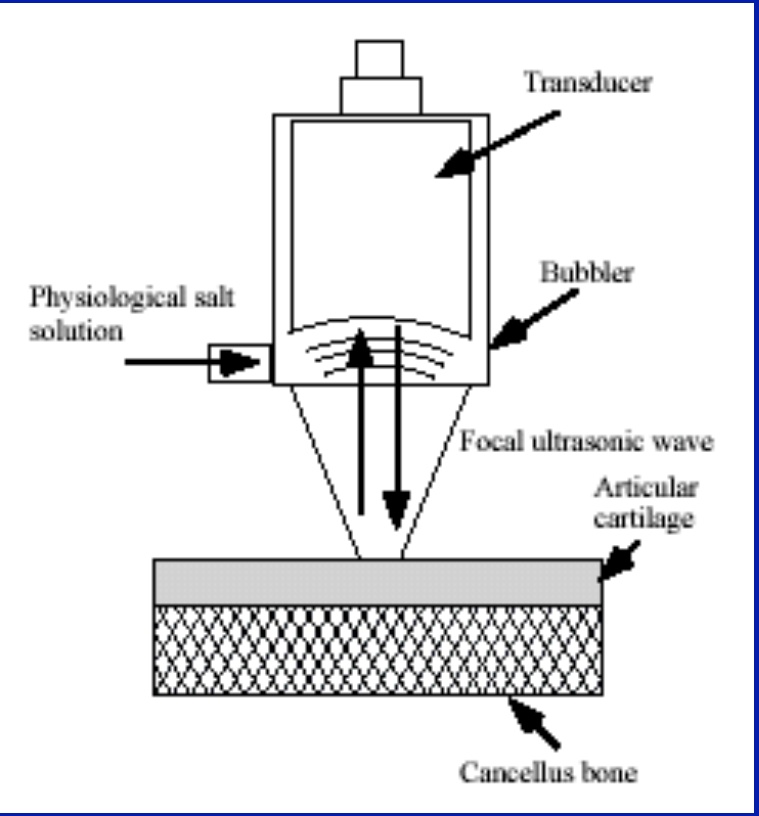
The US system



Arthritis Res (2004)

The system



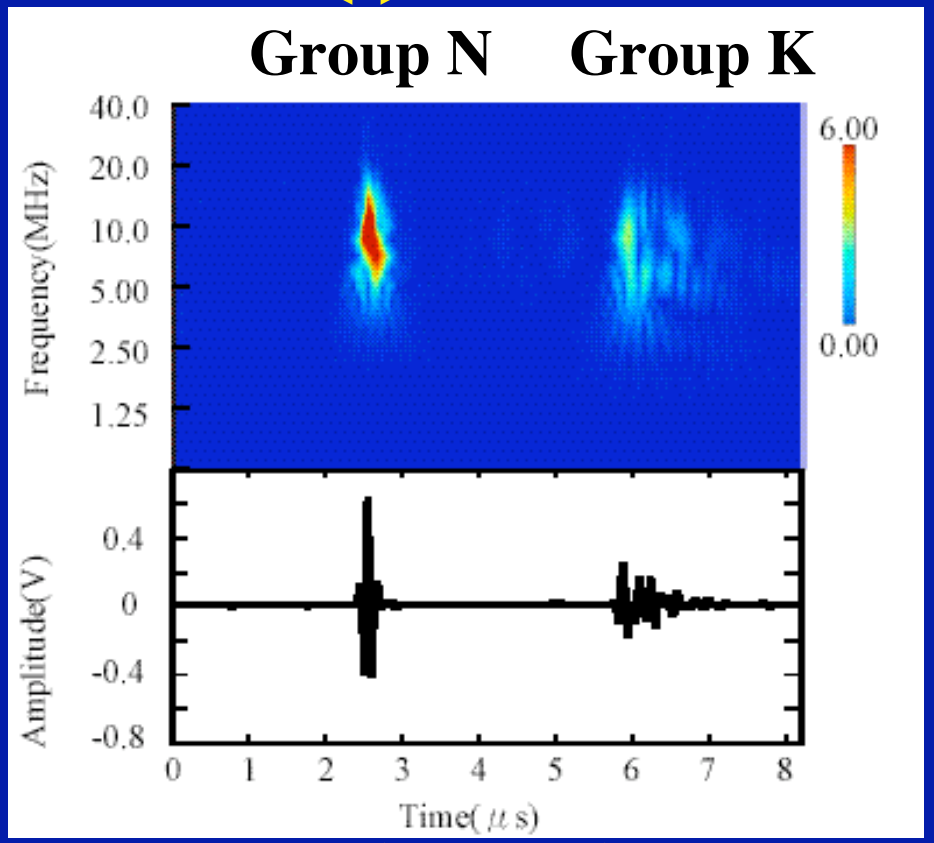


Mori K (2001)

Development of ultrasound measurement system

Mori K (2001)

Index of surface irregularity; duration time (signal duration)



Index of stiffness; maximum magnitude (signal intensity)

Index of thickness; interval time (interval between signals)

Three indexes of ultrasound measurement

家兎における測定

Osteoarthritis & Cartilage 2006

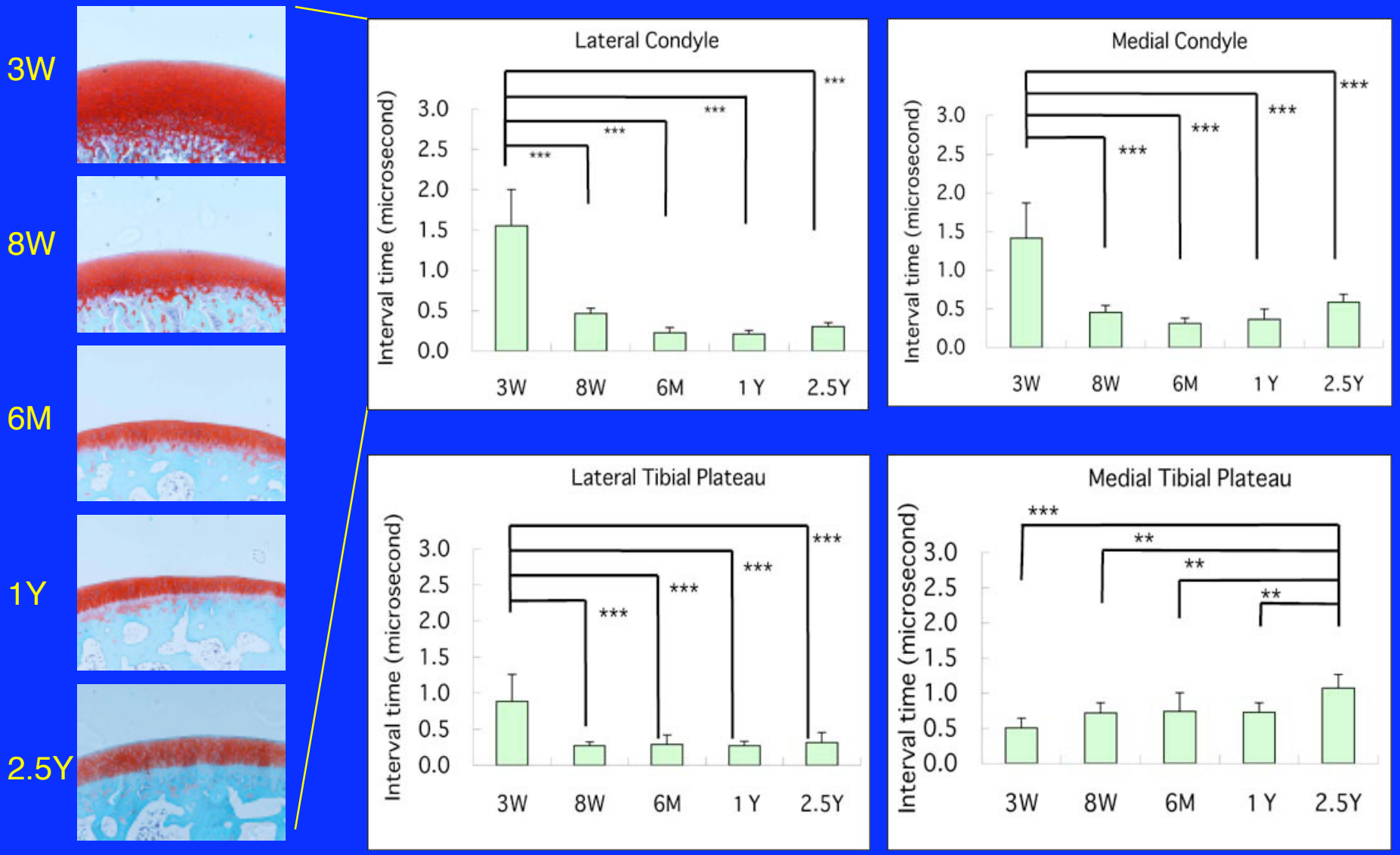
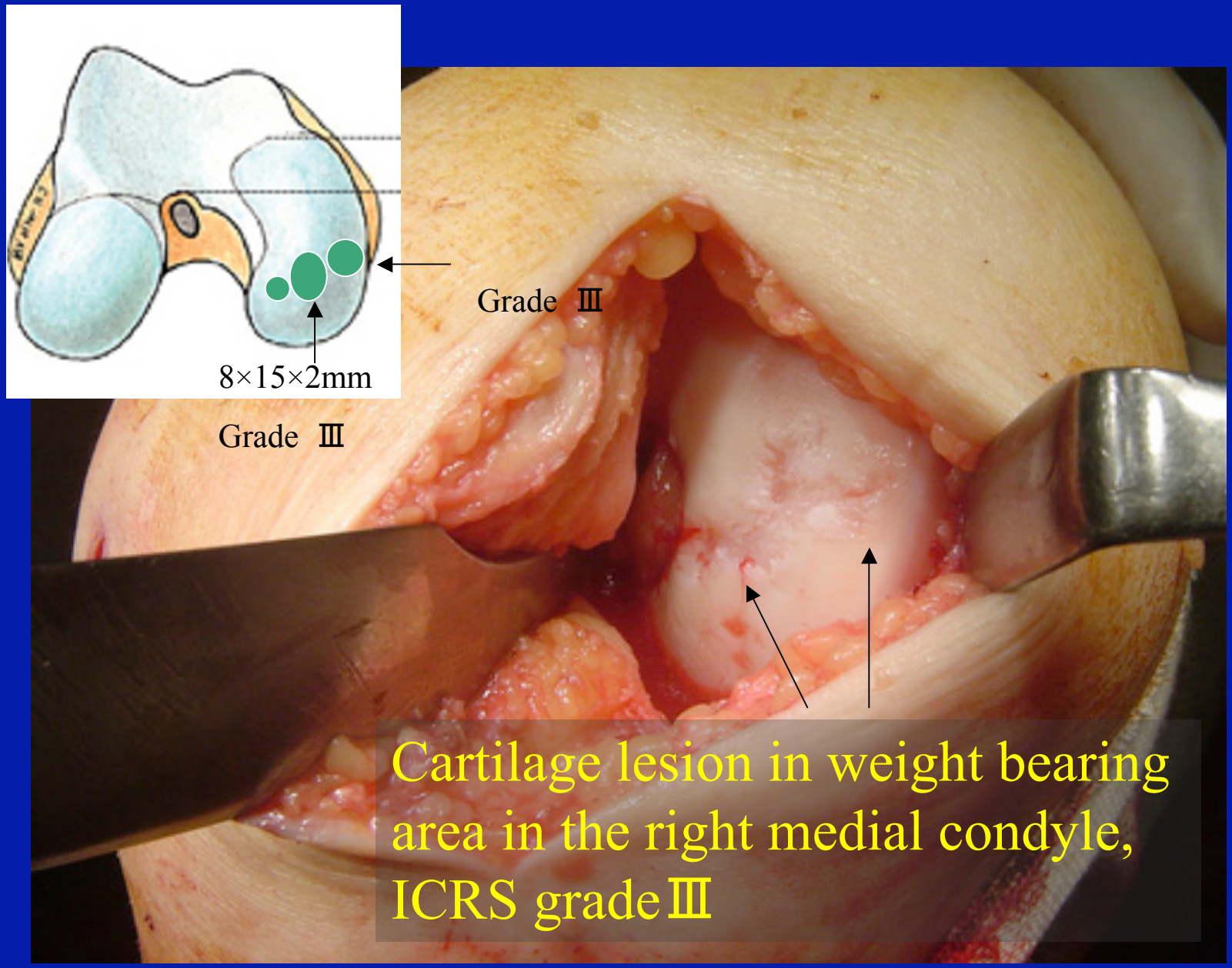
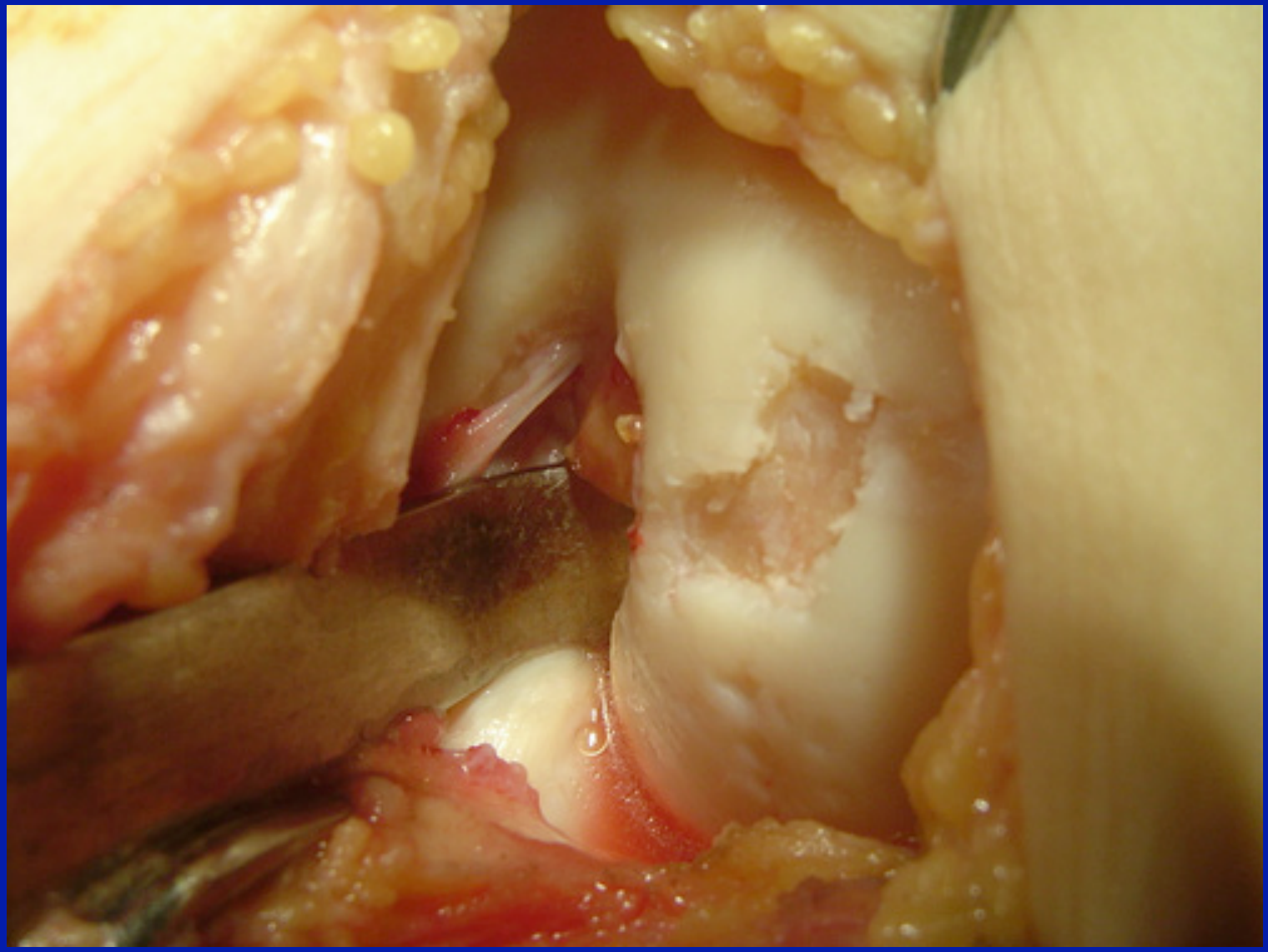


Fig 7. Interval time (an index of thickness) in each site and histology in lateral condyle (safranin-O staining). The values in lateral condyle, medial condyle and lateral tibial plateau were the highest in 3W, decreased in 8W and maintained until 2.5Y. In medial tibial plateau, the value was the lowest in 3W and it increased in 2.5Y. **: $P<0.01$, ***: $P<0.001$

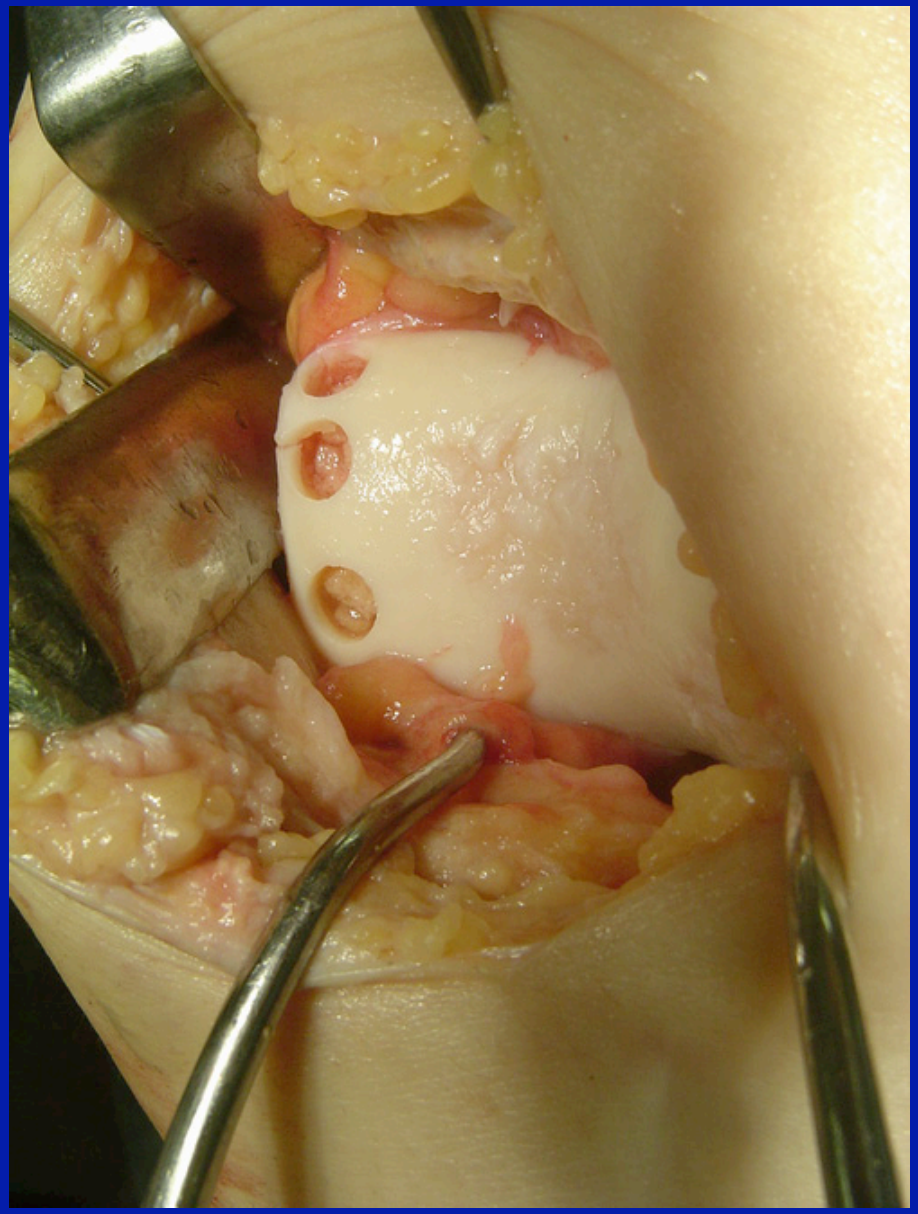
ヒトにおける測定

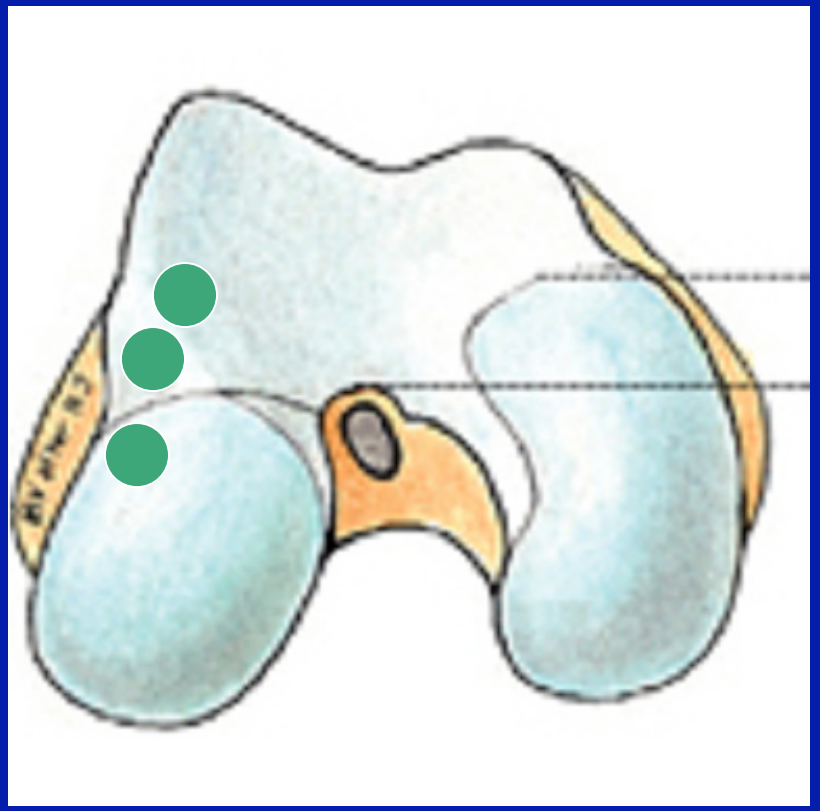
骨軟骨移植術
（日本膝関節学会2005）


Grade Ⅲ
8×15×2mm
Grade Ⅲ
Cartilage lesion in weight bearing area in the right medial condyle, ICRS grade Ⅲ

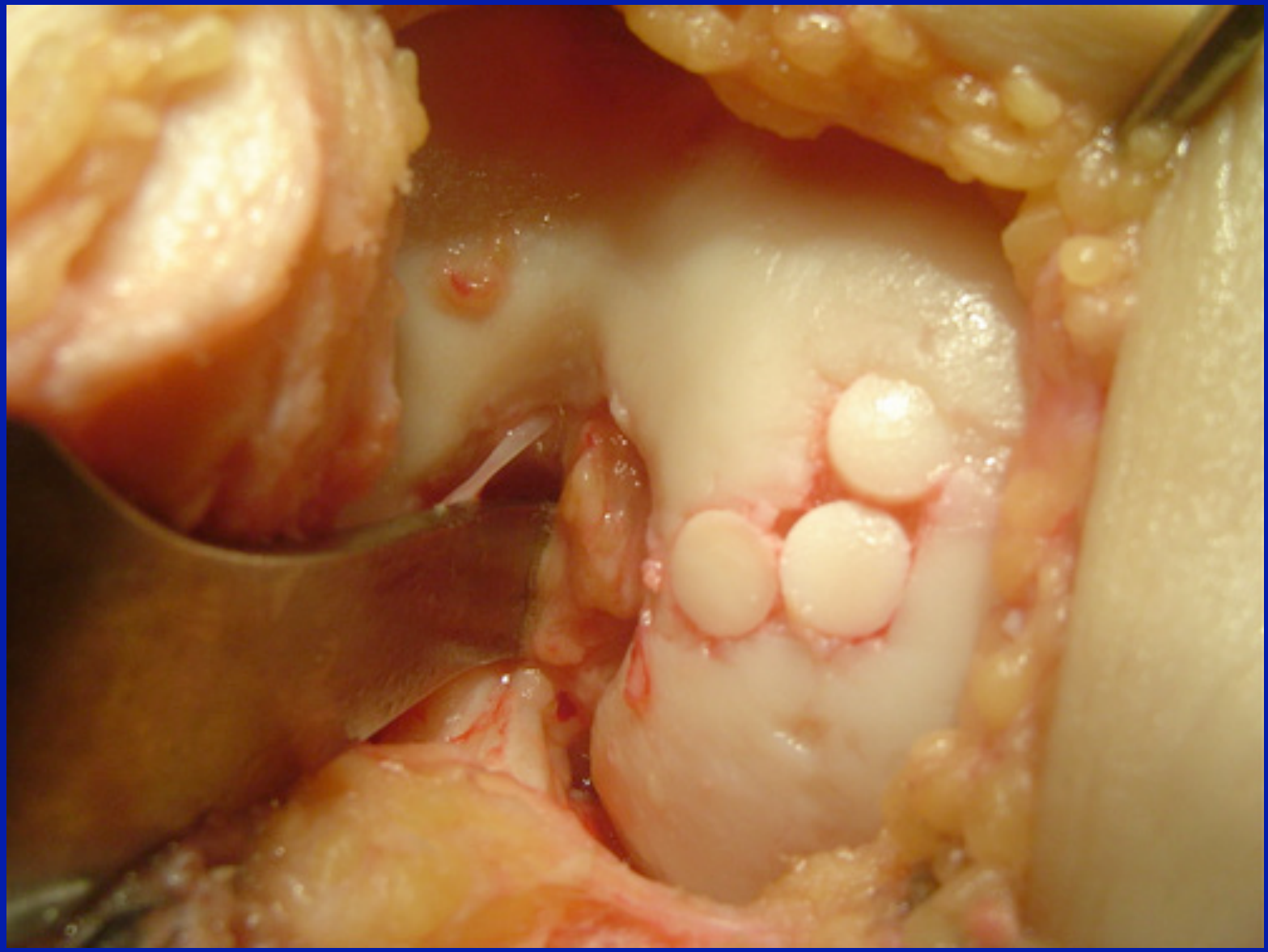


After abrasion

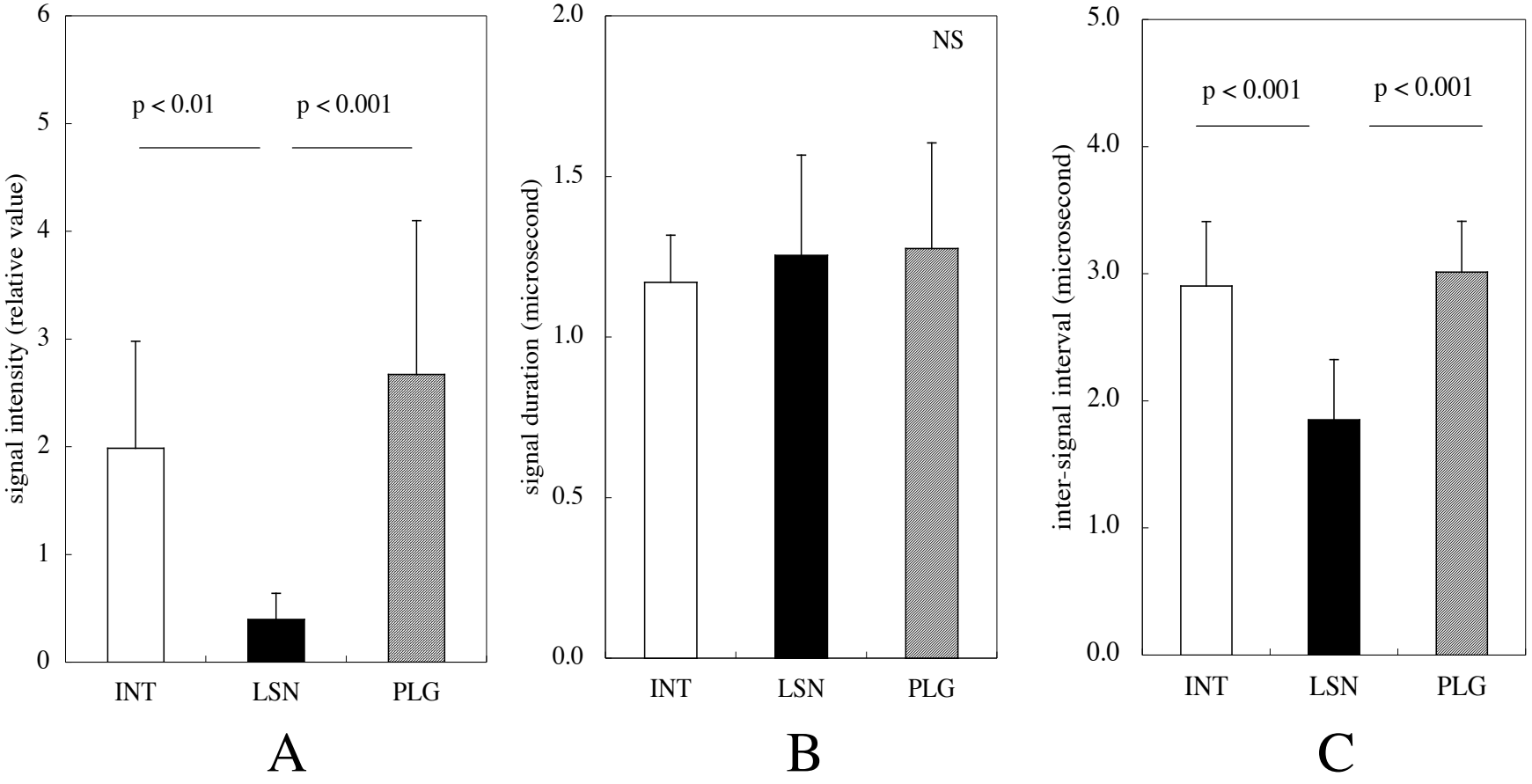




Three plugs, 7 mm in diameter, were harvested from the donor site.



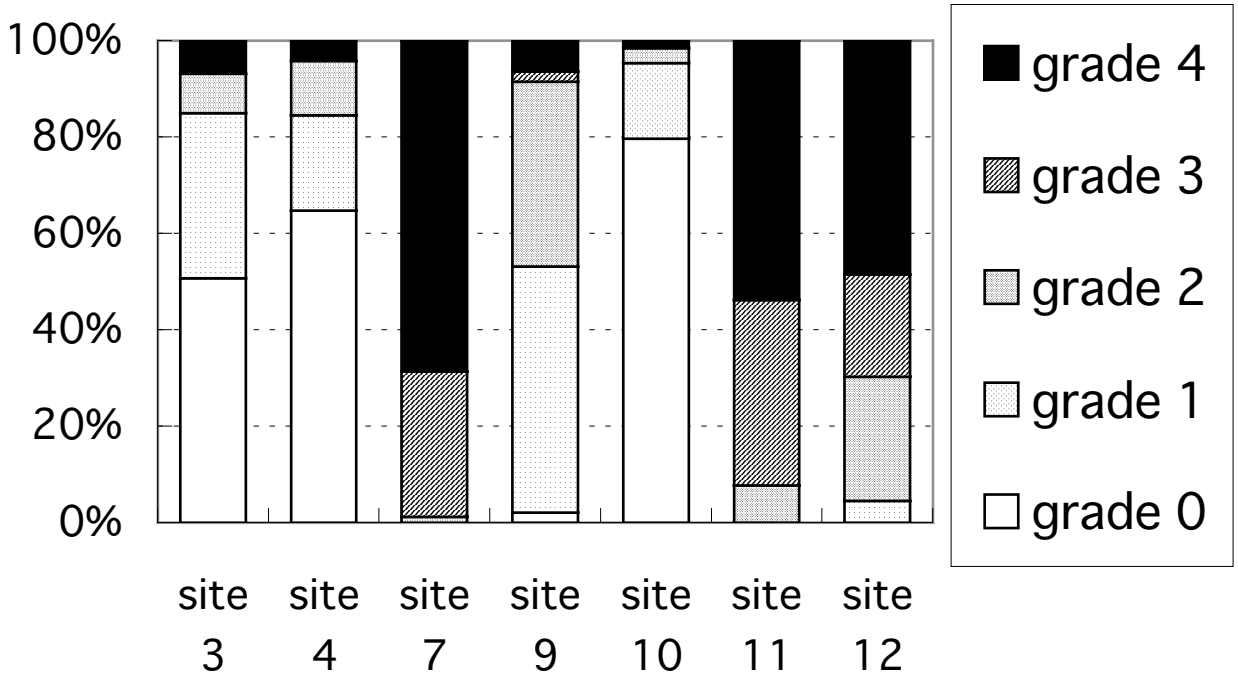
After OCG



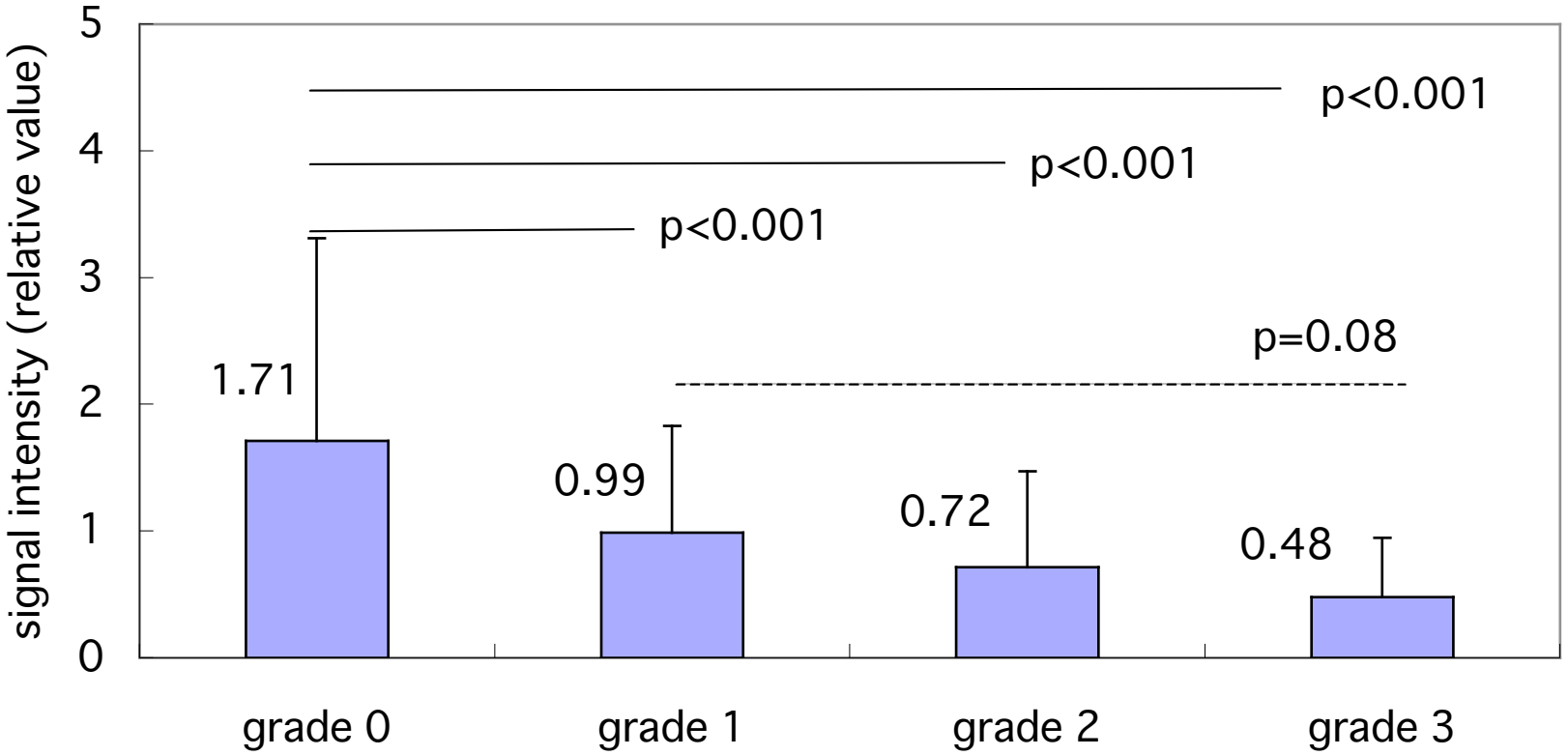
Mean value and SD of adjacent intact cartilage (INT), lesion cartilage (LSN) and plug cartilage (PLG) at nine sites of eight knees. A, signal intensity; B, signal duration; C, inter-signal interval.

Mechanical property of articular cartilage in severe varus knee osteoarthritis

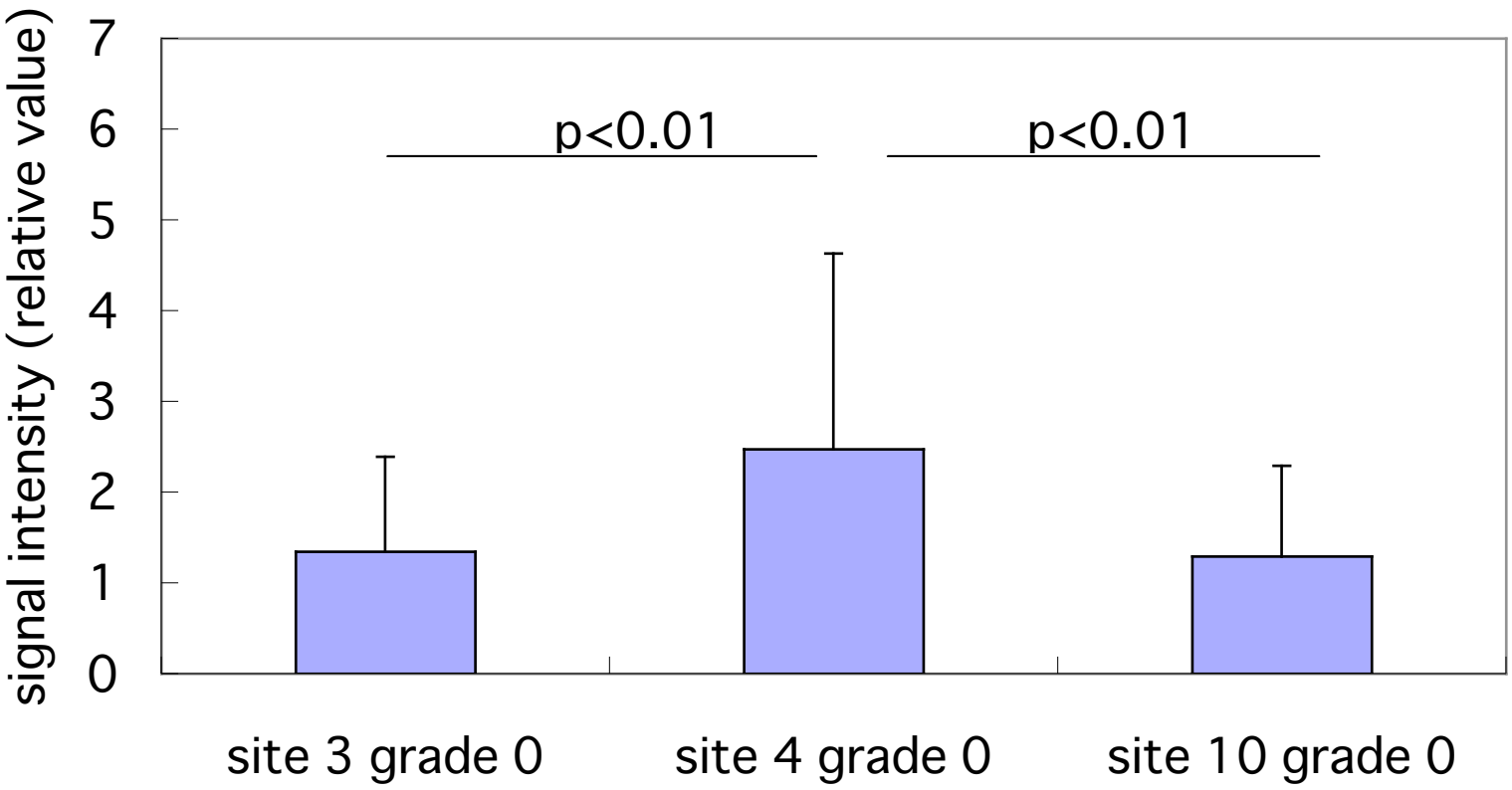
	grade 0	grade 1	grade 2	grade 3	grade 4	total
site 3	37	25	6	0	5	73
site 4	46	14	8	0	3	71
site 7	0	0	1	26	59	86
site 9	1	24	18	1	3	47
site 10	51	10	2	0	1	64
site 11	0	0	5	25	35	65
site 12	0	3	17	14	32	66
total	135	76	57	66	138	472



Number (upper) and percentage (lower) of ICRS grade in each site



Signal intensity (an index of stiffness) in grade 0 cartilage was higher (stiffer) than those in others (mean and SD).



In the cartilage evaluated as grade 0, signal intensity in the site 4 was significantly higher than that in the site 3 or 10.

最近の論文等（１）

- Kuroki H, Nakagawa Y, Mori K. Authors' Reply. Arthroscopy 2007; 23(10):1139-1141.
- Kuroki H, Nakagawa Y, Mori K, Masahiko Kobayashi, Yukihiro Okamoto, Ko Yasura, Kohei Nishitani, Takashi Nakamura. Sequential changes in implanted cartilage after autologous osteochondral transplantation: postoperative acoustic properties up to 1 year in an in vivo rabbit model. Arthroscopy 2007; 23 (6): 647-654.
- Hiroshi Kuroki, Yasuaki Nakagawa, Koji Mori, Masahiko Kobayashi, Ko Yasura,Yukihiro Okamoto, Yasuyuki Mizuno, Keiji Ando, Ken Ikeuchi, Takashi Nakamura. Maturation-dependent change and regional variations in acoustic stiffness of rabbit articular cartilage: an examination of the superficial collagen-rich zone of cartilage. Osteoarthritis & Cartilage 2006; 14(8): 784-792.

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- Hiroshi Kuroki, Yasuaki Nakagawa, Koji Mori, Ken Ikeuchi, Takashi Nakamura: Mechanical effects of autogenous osteochondral surgical grafting procedures and instrumentation on grafts of articular cartilage. Am J Sports Med 2004; 32(3): 612-620.
- Hiroshi Kuroki, Yasuaki Nakagawa, Koji Mori, Mao Ohba, Takashi Suzuki, Yasuyuki Mizuno, Keiji Ando, Makoto Takenaka, Ken Ikeuchi, Takashi Nakamura. Acoustic stiffness and change in plug cartilage over time after autogenous osteochondral grafting: correlation between ultrasonic signal intensity and histological score in a rabbit model. Arthritis Res 2004; 6: R492-R504.