# 膠原病 Journal Club　　2025/1/14 住友

# Relationship Between Ultrasound and Physical Examination in the Assessment of Enthesitis in Patients With Spondyloarthritis: Results From the DEUS Multicenter Study

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# 目的

1. SpA患者の付着部炎について, OMERACT定義によるUS評価所見と理学所見の一致度を調査する.

2. 無症状の付着部炎の有病率と臨床的関連を調査する.

# DEUS (Defining Enthesitis on Ultrasound in SpA)

- 付着部炎のUS所見に関する多施設共同観察研究
  （20施設/11カ国：UK, イタリア, ギリシャ, メキシコ, 中国 etc.）

**同グループの既報**

Power Doppler signal at the enthesis and bone erosions are the most discriminative OMERACT ultrasound lesions for SpA: results from the DEUS (Defining Enthesitis on Ultrasound in Spondyloarthritis) multicentre study

[Ann Rheum Dis. 2024;83(7):847-857.]

- SpA 413人 (Axial SpAとPsA)と, 対照 282人 (OAと線維筋痛症) の下腿付着部 (膝周囲3か所/アキレス腱/足底腱膜) のUS所見 (OMERACT) を比較.
- 付着部のPDは, 頻度は低い(21-27%)がSpAの特異性が最も高かった.
- 多変量解析では, 付着部のPD・骨びらんがSpAの診断と有意に関連していた.
- 部位については, アキレス腱付着部がSpAと対照の識別に最も有用だった.
- アキレス腱を最初に評価し, 疑わしい症例で他の部位に拡張するべきとした.

# OMERACT US task forceの付着部炎の定義 (2018)

| US mode | Elementary component | Consensus-based US definition |
|---|---|---|
| B-mode | Bone irregularity | Bone profile changes not including definite enthesophytes nor bone erosions. |
| B-mode | Calcification | Hyperechoic foci, with or without acoustic shadow, detected at the enthesis (<2 mm from the cortical bone). |
| B-mode | Enthesophyte | Enthesophyte was defined as a step-up of bony prominence, seen in two perpendicular planes at the end of the bone contour of the enthesis. |
| B-mode | Erosion | Cortical break with a step-down contour defect, seen in two perpendicular planes, at the insertion of the enthesis. |
| B-mode | Hypoechogenicity at the enthesis | Lack of the homogeneous fibrillar pattern in the enthesis (<2 mm from the cortical bone) with loss of the tightly packed echogenic lines after correcting for anisotropy. |
| B-mode | Thickened enthesis | Increased thickness of the tendon insertion into the bone (<2 mm from the cortical bone) as compared with the body of tendon, with or without blurring of the tendon margins. |
| Doppler mode | Doppler signal at enthesis | Doppler signal seen at bone insertion (<2 mm from the cortical bone), different from reflecting surface artefact or nutrition vessel signal, with or without cortical irregularities, erosions or enthesophytes. |
| Doppler mode | Doppler signal outside the enthesis | Doppler signal far from the enthesis (ie, >2 mm from the cortical bone, within the body of tendon) and clearly different from nutrition vessel signals. |
| B-mode and Doppler | Bursitis | An enlargement (ie, increase in diameter of the bursa), with well-defined, anechoic or hypoechoic area inside, with or without Doppler signal. |

- Calcification: 付着部(骨皮質から<2mm)の高エコー
- Enthesophyte: 付着部辺縁の2垂直面で認める骨の突出
- Erosion: 付着部入口部の2垂直面で認める, 輪郭のくぼみを伴う皮質の断裂
- Hypoechogenicity: 付着部(骨皮質から<2mm)での均一なfibrillar patternの欠如. anisotropyを調整後密なエコーの線が消失している.
- Thickened enthesis: 腱本体と比較して付着部(骨皮質から<2mm)が厚くなった状態
- Doppler signal at enthesis: 付着部(骨皮質から<2mm)でみられるドップラー信号
- Doppler signal outside the enthesis: 付着部から離れたドップラー信号(骨皮質から≧2mm, 腱本体内)

[Ann Rheum Dis. 2018;77(12):1730-35.]

# OMERACT US task forceの付着部炎の定義 (2018)

炎症性要素

Doppler signal, 低エコー, 肥厚

構造的要素

石灰化/骨棘, 付着部びらん

**Table 3** Accepted inflammatory and structural components for ultrasound enthesitis definition

| Accepted inflammatory components (100% of agreement) | Accepted structural components (100% of agreement) |
|---|---|
| Doppler signal at enthesis (figure 1A). | Calcification/enthesophyte at enthesis (figure 1C). |
| Hypoechogenicity at enthesis (figure 1B). | Erosion at enthesis (figure 1A). |
| Thickened enthesis (figure 1B). | |
| Final definition of enthesitis | |
| Hypoechoic and/or thickened insertion of the tendon close to the bone (within 2 mm from the bony cortex) which exhibits Doppler signal if active and which may show erosions and enthesophytes/calcifications as a sign of structural damage. | |

[Ann Rheum Dis. 2018;77(12):1730-35.]

- Active enthesitisの定義：腱付着部 (骨皮質から2mm以内) に低エコー and/or 肥厚があり, かつDopplerシグナルがある.
- 構造的損傷の兆候として, 付着部びらんや骨棘・石灰化を認めることがある.
- Consensus-basedで決められ, 健常者や他疾患 (線維筋痛症など) でもみられるため, 各要素の意義づけが必要.

# 方法①

- 横断的観察研究. 多施設共同研究 (20施設/11カ国)
- 対象患者：SpA 413名 (axSpA 224名, PsA 189名), 4130付着部
- 観察内容：付着部炎を超音波と理学所見で同日に評価.
- 活動性評価：LEI score (0-6), TJC (0-68), SJC (0-68), DAPSA (PsA), BASDAI/BASFI/BASMI (axSpA), HAQ-DI

# 方法② [理学所見と超音波検査]

- 評価対象：下肢のみ（膝蓋周囲3か所, アキレス腱, 足底腱膜）

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- 付着部炎の理学所見：リウマチ医が診察し, 付着部の腫脹に関わらず, 圧迫・可動・抵抗に対する収縮時に圧痛がある場合に陽性ととる.

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- US所見：OMERACTの付着部炎の各定義に従う.
- 付着部PD：0-3でgrading (0:無, 1:dot, 2:付着部面積<50%, 3:面積>50%).
- “active enthesitis”：DEUSが提案した定義で評価 (OMERACTではなく).
- 無症状付着部炎：臨床的な付着部炎がなく（理学所見で陽性付着部数=0, LEI score = 0), 1つ以上の付着部で ”active enthesitis” を認めると定義.

# 本論文における定義

## DEUSの提唱するUSの“active enthesitis”

- 付着部PD grade ≥ 1 かつ
  付着部肥厚 and/or 低エコー

または

- 付着部PD grade ＞ 1
  (付着部肥厚・低エコーに関係なく)

OMERACT はこれのみ

OMERACTのactive enthesitisの定義：
腱付着部（骨皮質から2mm以内）に低エコー and/or 付着部肥厚があり，かつDopplerシグナルがある

## Prevalence-adjusted bias-adjusted kappa (PABAK)

- 有病率調整・バイアス調整したカッパ値
- 超音波での付着部炎病変と，理学所見の付着部炎との一致を評価するために使用

# SpA付着部炎のUSと理学所見の一致率

**Table 1.** Relationships and agreement between ultrasound and physical evaluation in the assessment of enthesitis in patients with SpA (n = 413 patients)*

| | Negative | Positive | Total |
|---|---|---|---|
| Clinical enthesitis status: thickening | | | |
| Negative | 3,250 | 559 | 3,809 |
| Positive | 173 | 148 | 321 |
| PABAK | | 0.65 (0.63–0.67) | |
| Clinical enthesitis status: enthesophytes | | | |
| Negative | 2,758 | 1,051 | 3,809 |
| Positive | 161 | 160 | 321 |
| PABAK | | 0.41 (0.39–0.44) | |
| Clinical enthesitis status: hypoechoic areas | | | |
| Negative | 3,201 | 608 | 3,809 |
| Positive | 163 | 158 | 321 |
| PABAK | | 0.63 (0.60–0.65) | |
| Clinical enthesitis status: calcifications | | | |
| Negative | 3,466 | 343 | 3,809 |
| Positive | 291 | 30 | 321 |
| PABAK | | 0.69 (0.67–0.72) | |
| Clinical enthesitis status: PD at the enthesis | | | |
| Negative | 3,671 | 138 | 3,809 |
| Positive | 254 | 67 | 321 |
| PABAK | | 0.81 (0.79–0.83) | |
| Clinical enthesitis status: bone erosions | | | |
| Negative | 3,673 | 136 | 3,809 |
| Positive | 279 | 42 | 321 |
| PABAK | | 0.79 (0.77–0.81) | |
| Clinical enthesitis status: "active enthesitis" | | | |
| Negative | 3,703 | 106 | 3,809 |
| Positive | 257 | 64 | 321 |
| PABAK | | 0.83 (0.81–0.85) | |

* "Active enthesitis" was considered as either PD at the enthesis Grade ≥1 + entheseal thickening and/or hypoechoic areas or PD at the enthesis Grade >1 (independent of the presence of entheseal thickening or hypoechoic areas).[21] PABAK, prevalence-adjusted bias-adjusted kappa; PD, power Doppler; SpA, spondyloarthritis. PABAK values are expressed as point estimate with 95% confidence interval.

- 付着部の骨棘と理学所見が軽度の関連
- 付着部肥厚, 低エコー, 石灰化, 骨びらんとは中等度
- 付着部PD, "active enthesitis" と高度の関連

# 部位別のUS所見と理学所見の一致率

**Table 2.** Agreement between ultrasound and physical evaluation divided by single entheses in patients with SpA (n = 413)*

| Ultrasound findings | Agreement (PABAK) | | | | |
|---|---|---|---|---|---|
| | Quadriceps tendon | Patellar proximal | Patellar distal | Achilles tendon | Plantar fascia |
| Thickening | 0.73 (0.68 to 0.77) | 0.71 (0.66 to 0.75) | 0.68 (0.62 to 0.72) | 0.56 (0.50 to 0.61) | 0.54 (0.48 to 0.59) |
| Hypoechoic areas | 0.58 (0.52 to 0.63) | 0.72 (0.67 to 0.77) | 0.68 (0.63 to 0.73) | 0.52 (0.46 to 0.58) | 0.60 (0.54 to 0.65) |
| PD at the enthesis | 0.81 (0.77 to 0.85) | 0.85 (0.82 to 0.89) | 0.85 (0.82 to 0.88) | 0.68 (0.63 to 0.73) | 0.83 (0.79 to 0.87) |
| Enthesophytes | 0.20 (0.13 to 0.27) | 0.60 (0.54 to 0.65) | 0.71 (0.66 to 0.75) | 0.01 (−0.05 to 0.08) | 0.52 (0.46 to 0.58) |
| Calcifications | 0.70 (0.67 to 0.73) | 0.79 (0.75 to 0.83) | 0.73 (0.67 to 0.77) | 0.52 (0.46 to 0.58) | 0.72 (0.67 to 0.76) |
| Bone erosions | 0.82 (0.77 to 0.85) | 0.86 (0.83 to 0.89) | 0.89 (0.86 to 0.92) | 0.62 (0.56 to 0.67) | 0.79 (0.74 to 0.83) |
| "Active enthesitis" | 0.83 (0.80 to 0.87) | 0.86 (0.82 to 0.89) | 0.87 (0.84 to 0.91) | 0.70 (0.65 to 0.75) | 0.84 (0.80 to 0.88) |

* "Active enthesitis" was considered as either PD at the enthesis Grade ≥1 + entheseal thickening and/or hypoechoic areas or PD at the enthesis Grade >1 (independent of the presence of entheseal thickening or hypoechoic areas).[21] PABAK, prevalence-adjusted bias-adjusted kappa; PD, power Doppler; SpA, spondyloarthritis. PABAK values are expressed as point estimate with 95% confidence interval.

- US所見と理学所見の一致率は，膝蓋腱付着部（近位/遠位とも）が最も高い.
- アキレス腱は最も低かった.

# axSpAとPsAを分けたUS所見と理学所見の一致率

**Table 3.** Agreement between ultrasound and physical examination in enthesitis assessment in patients with axSpA and patients with PsA*

| Ultrasound findings | Agreement (PABAK) | |
|---|---|---|
| | axSpA (n = 224) | PsA (n = 119) |
| Thickening | 0.65 (0.62–0.69) | 0.64 (0.60–0.67) |
| Hypoechoic areas | 0.67 (0.64–0.70) | 0.58 (0.54–0.61) |
| PD at the enthesis | 0.82 (0.80–0.84) | 0.80 (0.77–0.83) |
| Enthesophytes | 0.47 (0.43–0.50) | 0.34 (0.31–0.39) |
| Calcifications | 0.70 (0.67–0.73) | 0.68 (0.65–0.71) |
| Bone erosions | 0.79 (0.76–0.81) | 0.81 (0.79–0.84) |
| "Active enthesitis" | 0.83 (0.81–0.86) | 0.82 (0.80–0.85) |

* "Active enthesitis" was considered as either PD at the enthesis Grade ≥1 + entheseal thickening and/or hypoechoic areas or PD at the enthesis Grade >1 (independent of the presence of entheseal thickening or hypoechoic areas).[21] axSpA, axial spondyloarthritis; PABAK, prevalence-adjusted bias-adjusted kappa; PD, power Doppler; PsA, psoriatic arthritis; SpA, spondyloarthritis. PABAK values are expressed as point estimate with 95% confidence interval.

- axSpAとPsAを分けてUS所見と理学所見の一致率を検討.
- 同様の結果がみられた.
- axSpAは PsAと比較してわずかに高い一致を示した.

# 理学所見がない患者のUS所見

**Table 4.** Prevalence and distribution of the ultrasound findings in patients with SpA, axSpA, and PsA without clinical enthesitis*

| | Quadriceps | | | Patellar proximal | | | Patellar distal | | | Achilles tendon | | | Plantar fascia | | | Overall | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ultrasound findings | axSpA n = 140 | PsA n = 115 | P[a] | axSpA n = 140 | PsA n = 115 | P[a] | axSpA n = 140 | PsA n = 115 | P[a] | axSpA n = 140 | PsA n = 115 | P[a] | axSpA n = 140 | PsA n = 115 | P[a] | axSpA n = 140 | PsA n = 115 | P[a] |
| Thickening | 19 (14.0) | 14 (12.2) | >0.9 | 23 (16.4) | 17 (14.7) | >0.9 | 24 (17.1) | 24 (20.9) | >0.9 | 25 (17.8) | 25 (21.7) | >0.9 | 33 (23.6) | 29 (25.3) | >0.9 | 56 (40.0) | 59 (51.3) | 0.14 |
| Hypoechoic area | 26 (18.6) | 31 (26.9) | 0.6 | 15 (10.7) | 21 (18.3) | 0.7 | 18 (12.9) | 27 (23.5) | 0.2 | 31 (22.1) | 30 (26.1) | >0.9 | 18 (12.9) | 29 (25.3) | 0.068 | 47 (33.8) | 63 (54.8) | 0.003 |
| PD at the enthesis | 6 (4.3) | 6 (5.2) | >0.9 | 6 (4.3) | 7 (6.1) | >0.9 | 9 (6.4) | 10 (8.7) | >0.9 | 10 (7.1) | 10 (8.7) | >0.9 | 0 (0) | 1 (0.9) | >0.9 | 25 (17.8) | 25 (21.7) | 0.6 |
| Enthesophytes | 54 (38.6) | 60 (52.4) | 0.2 | 35 (25.0) | 27 (23.5) | >0.9 | 21 (14.3) | 17 (15.8) | >0.9 | 71 (50.7) | 76 (66.1) | 0.11 | 25 (17.8) | 41 (36.6) | 0.007 | 91 (65.0) | 94 (81.4) | 0.012 |
| Calcifications | 19 (14.0) | 26 (22.6) | 0.5 | 13 (9.3) | 7 (6.1) | >0.9 | 27 (19.3) | 16 (13.9) | >0.9 | 23 (16.4) | 16 (13.9) | >0.9 | 8 (5.7) | 19 (16.5) | 0.032 | 55 (39.3) | 49 (42.6) | 0.7 |
| Bone erosions | 6 (4.3) | 3 (2.6) | >0.9 | 4 (2.9) | 4 (3.5) | >0.9 | 4 (2.9) | 1 (0.9) | >0.9 | 19 (13.5) | 14 (12.2) | >0.9 | 10 (7.1) | 1 (0.9) | 0.084 | 34 (24.3) | 18 (15.6) | 0.14 |
| "Active enthesitis" | 6 (4.3) | 6 (5.2) | >0.9 | 5 (3.6) | 6 (5.2) | >0.9 | 7 (5.0) | 7 (6.1) | >0.9 | 10 (7.1) | 6 (5.2) | >0.9 | 0 (0) | 0 (0) | NA | 20 (14.3) | 19 (16.5) | 0.8 |

* "Active enthesitis" was considered as either PD at the enthesis Grade ≥1 + entheseal thickening and/or hypoechoic areas or PD at the enthesis Grade >1 (independent of the presence of entheseal thickening or hypoechoic areas).[21] axSpA, axial spondyloarthritis; NA, not available; PD, power Doppler; PsA, psoriatic arthritis; SpA, spondyloarthritis. Values are the number (%) unless otherwise indicated.
[a] Pearson's chi-square test; Fisher's exact test with Bonferroni correction for multiple testing.

- 付着部炎の理学所見がないSpA患者 255名 (axSpA/SpA)における超音波所見の有病率および分布
- 15.3% (39人 [axSpA 20, PsA 19] ) に active enthesitisあり

# 理学所見がない患者でUS所見有無の群間比較

| | Overall N = 255 | Subclinical enthesitis n = 39 | No subclinical enthesitis n = 216 | P[a] |
|---|---|---|---|---|
| Age (y), mean (SD) | 47.0 (14.3) | 48.0 (14.7) | 46.8 (14.2) | 0.9 |
| Female gender, n (%) | 69 (27.1) | 7 (17.9) | 62 (28.7) | 0.7 |
| BMI (kg/m$^2$), median (IQR) | 26.4 (23.6–29.2) | 27.0 (24.6–29.3) | 26.4 (23.5–29.1) | 0.9 |
| Physical activity (times/wk), median (IQR) | 2 (0–3) | 1 (0–3) | 2 (0–3) | 0.7 |
| Disease duration (mo), median (IQR) | 89 (36–180) | 120 (54–245) | 84 (28–166) | 0.7 |
| CRP (mg/L), mean (SD) | 1.3 (2.7) | 1.9 (4.0) | 1.2 (2.4) | 0.9 |
| ESR (mm/h), mean (SD) | 17.8 (17.9) | 26.9 (32.0) | 16.2 (13.6) | 0.9 |
| Metabolic syndrome, n (%) | 42 (16.5) | 9 (23.1) | 33 (15.3) | 0.7 |
| Diabetes, n (%) | 17 (6.7) | 1 (2.6) | 16 (7.4) | 0.9 |
| Dyslipidemia, n (%) | 61 (23.9) | 11 (28.2) | 50 (23.1) | 0.9 |
| Hypertension, n (%) | 62 (24.3) | 10 (25.6) | 52 (24.1) | >0.9 |
| Psoriasis (previous/current), n (%) | 104 (40.8) | 17 (43.6) | 87 (40.2) | 0.9 |
| IBD, n (%) | 4 (1.6) | 2 (5.1) | 2 (0.9) | 0.7 |
| Previous enthesitis, n (%) | 67 (26.3) | 15 (38.5) | 52 (24.1) | 0.7 |
| HLA-B27[b], n (%) | 109 (73.6) | 16 (72.7) | 93 (73.8) | >0.9 |
| Nonradiographic axSpA, n (%) | 36 (24.5) | 3 (14.3) | 33 (26.2) | 0.7 |
| Disease activity indices in patients with SpA | | | | |
| TJC, median (IQR) | 0 (0–1) | 0 (0–1) | 0 (0–1) | NA |
| TJC, mean (SD) | 1.0 (2.5) | 0.7 (1.3) | 1.1 (2.7) | >0.9 |
| SJC, median (IQR) | 0 (0–1) | 0 (0–1) | 0 (0–0) | NA |
| SJC, mean (SD) | 0.8 (2.1) | 0.7 (1.5) | 0.8 (2.2) | 0.9 |
| DAPSA, median (IQR) (patients with PsA) | 8 (2–16) | 6 (2–15) | 8 (3–16) | 0.9 |
| ASDAS, median (IQR) (patients with axSpA) | 1.4 (1.0–2.2) | 1.8 (1.3–2.2) | 1.4 (1.0–2.2) | 0.4 |
| BASMI, median (IQR) (patients with axSpA) | 1.8 (0.8–3.0) | 1.6 (1.0–2.9) | 1.8 (0.7–3.0) | >0.9 |
| BASFI, median (IQR) (patients with axSpA) | 0.6 (0.0–3.7) | 1.4 (0.0–5.6) | 0.5 (0.0–3.2) | 0.8 |
| BASDAI, median (IQR) (patients with axSpA) | 1.4 (0.4–3.6) | 2.1 (0.7–4.7) | 1.3 (0.4–3.5) | 0.7 |
| HAQ, median (IQR) | 0.1 (0.0–0.5) | 0.0 (0.0–0.5) | 0.1 (0.0–0.5) | >0.9 |
| Treatment of patients with SpA | | | | |
| NSAIDs, n (%) | 63 (24.7) | 8 (20.5) | 55 (25.4) | >0.9 |
| GCs (≥5 mg prednisolone), n (%) | 26 (10.2) | 4 (10.3) | 22 (10.2) | >0.9 |
| cs-DMARDs, n (%) | 95 (37.3) | 18 (46.2) | 77 (35.7) | 0.7 |
| b-DMARDs, n (%) | 142 (55.7) | 21 (53.8) | 121 (56.0) | 0.7 |
| TNFi, (%) | 113 (79.6) | 15 (71.4) | 98 (81.0) | |
| Anti-IL12/23, n (%) | 4 (2.8) | 2 (9.5) | 2 (1.7) | |
| Anti-IL17, n (%) | 23 (16.2) | 4 (19.0) | 19 (15.7) | |
| JAKi, n (%) | 0 | 0 | 0 | |
| Others (apremilast), n (%) | 2 (0.7) | 0 (0.0) | 2 (0.9) | |

- 付着部炎の理学所見がない患者 255人を, US所見がある群 (39人), ない群 (216人) に分けて群間比較.

- 患者の特徴, 疾患活動性, 治療, 血清学的所見に, 群間差はなかった.

# 理学所見のないSpAでの, US炎症とUS損傷の関連

**Table 6.** Association between ultrasound inflammatory lesions (entheseal thickening, hypoechoic areas, PD at the enthesis, active enthesitis) and structural lesions (bone erosions, enthesophytes, and calcifications) in patients with SpA without clinical enthesitis (n = 255)*

| | Univariate regression | | | | Multivariate regression | | | Multivariate regression with "active enthesitis" | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Overall N = 2,550 | Yes n = 658 | No n = 1,892 | P[a] | OR | 95% CI | P | OR | 95% CI | P |
| Enthesophytes | | | | | | | | | | |
| Thickening | 314 (12.3%) | 161 (24.5%) | 153 (8.9%) | <0.001 | 1.74 | 1.29–2.35 | <0.001 | | | |
| Hypoechoic area | 341 (13.7%) | 188 (28.6%) | 153 (8.9%) | <0.001 | 2.65 | 1.98–3.55 | <0.001 | | | |
| PD at the enthesis | 79 (3.1%) | 46 (7.0%) | 33 (1.7%) | <0.001 | 1.97 | 1.18–3.28 | 0.009 | | | |
| Calcifications | 210 (8.2%) | 108 (16.4) | 102 (5.4%) | <0.001 | 2.41 | 1.77–3.28 | <0.001 | 3.04 | 2.26–4.08 | <0.001 |
| Bone erosions | 83 (3.6%) | 47 (7.1) | 36 (1.9) | <0.001 | 2.15 | 1.33–3.50 | 0.002 | 3.16 | 1.99–5.05 | <0.001 |
| "Active enthesitis" | 56 (2.2%) | 35 (6.0%) | 21 (1.3%) | <0.001 | | | | 3.68 | 2.09–6.61 | <0.001 |
| | Univariate regression | | | | Multivariate regression | | | Multivariate regression with "active enthesitis" | | |
| | Overall N = 2,550 | Yes n = 210 | No n = 2,340 | P[a] | OR | 95% CI | P | OR | 95% CI | P |
| Calcifications | | | | | | | | | | |
| Thickening | 314 (12.3%) | 61 (29.0%) | 253 (10.8%) | <0.001 | 1.36 | 0.89–2.04 | 0.2 | | | |
| Hypoechoic area | 341 (13.7%) | 76 (36.2%) | 265 (11.3%) | <0.001 | 2.42 | 1.62–3.60 | <0.001 | | | |
| PD at the enthesis | 79 (3.1%) | 21 (10.0%) | 58 (2.5%) | <0.001 | 1.85 | 1.02–3.24 | 0.037 | | | |
| Enthesophytes | 658 (25.8%) | 108 (51.4%) | 550 (23.5%) | <0.001 | 2.44 | 1.79–3.32 | 0.038 | 2.45 | 1.38–4.19 | 0.002 |
| Bone erosions | 83 (3.6%) | 20 (9.5%) | 63 (2.7%) | <0.001 | 1.82 | 1.01–3.17 | <0.001 | 3.05 | 2.27–4.10 | <0.001 |
| "Active enthesitis" | 56 (2.2%) | 17 (8.1%) | 39 (1.8%) | <0.001 | | | | 3.20 | 1.68–5.85 | <0.001 |
| | Univariate regression | | | | Multivariate regression | | | Multivariate regression with "active enthesitis" | | |
| | Overall n = 2,550 | Yes n = 83 | No n = 2,467 | P[a] | OR | 95% CI | P | OR | 95% CI | P |
| Bone erosions | | | | | | | | | | |
| Thickening | 314 (12.3%) | 33 (39.8%) | 281 (11.4%) | <0.001 | 1.63 | 0.91–2.91 | 0.10 | | | |
| Hypoechoic area | 341 (13.7%) | 42 (50.6%) | 299 (12.2%) | <0.001 | 3.80 | 2.12–6.75 | <0.001 | | | |
| PD at the enthesis | 79 (3.1%) | 9 (10.8%) | 70 (2.8%) | 0.005 | 1.17 | 0.49–2.51 | 0.7 | | | |
| Enthesophytes | 658 (25.8%) | 47 (56.6%) | 611 (24.8%) | <0.001 | 2.25 | 1.39–3.66 | 0.001 | 2.41 | 1.34–4.14 | 0.002 |
| Calcifications | 210 (8.2%) | 20 (24.1%) | 190 (7.7%) | <0.001 | 1.81 | 1.00–3.16 | 0.043 | 3.19 | 2.01–5.09 | <0.001 |
| "Active enthesitis" | 56 (2.2%) | 9 (10.8%) | 47 (1.9%) | <0.001 | | | | 3.28 | 1.39–7.0 | 0.004 |

* "Active enthesitis" was considered as either PD at the enthesis Grade ≥1 + entheseal thickening and/or hypoechoic areas or PD at the enthesis Grade >1 (independent of the presence of entheseal thickening or hypoechoic areas).[21] CI, confidence interval; OR, odds ratio; PD, power Doppler; SpA, spondyloarthritis.
[a] Bonferroni correction for multiple testing.

- US炎症 (付着部肥厚, 低エコー, 付着部PD, "active enthesitis") と, US損傷 (骨棘, 石灰化, びらん) の関連を解析
- 理学所見がないSpAで, 単変量と多変量解析施行.
- US炎症所見とUS損傷所見に有意な関連が示された.

# まとめとDiscussion①

- 本研究はaxSpA/PsAを含む過去最大のSpAコホートであり，OMERACT定義の付着部炎US所見に準拠した最初の研究である.
- OMERACTのUS所見は非炎症性疾患や健常者でも報告されており，理学所見とUS所見の関連解析は意味がある.

- 今回の解析では，US所見と理学所見の一致度は，付着部の部位とUS病変所見によってばらつきがあった.
- 付着部PD，”active enthesitis”と理学所見との一致度が最も高かった.
- アキレス腱付着部は，評価した部位の中で最も一致度が低かった(理学所見での正確な評価が困難).

# まとめとDiscussion②

- 理学所見の陽性率が高く(38.3%), US所見は低い (“active enthesitis” 21.6%).
- US所見 or 理学所見の一方で付着部炎を検出した場合, 乖離が大きい.
- 理学所見で付着部炎のないSpA (255/413: 61.7%) の最大20%は, US検査で活動性炎症を示していた (付着部PD 19.6%, “active enthesitis” 15.3%).
- 理学所見で付着部炎があるSpA (158/413: 38.3%) の 68.4%で, USで”active enthesitis”を認めなかった (理学所見の過大評価).
- OMERACT US炎症所見とUS損傷所見は有意なUS所見は付着部レベルの局所的変化を反映する.
- SpA 患者の付着部炎の評価を, 理学所見だけに頼ることには限界があり, 超音波検査と理学所見を統合した包括的な評価ツールが必要である.