Figure 2: Changes of peripheral lymphocyte subsets after immunomodulatory combination treatment (n=156). Data were presented as mean±SD and statistical analysis was determined by two-tailed paired t-test. The absolute numbers of various peripheral lymphocyte subpopulations such as T, B, NK, CD4⁺T, CD8⁺T, Th1, Th2, Th17 and Tregs and the percentage of Tregs, Th1 and CD8⁺T significantly increased. *P < 0.05, **P < 0.01, ***P < 0.001.

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SAT0358 A ROLE FOR IL-4 AND IL-13 IN MODULATING THE IL-23/IL-17 AXIS IN ENTHESITIS

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Background: IL-4 and IL-13 are related Th2 cytokines, with documented roles in allergic inflammation such as atopic dermatitis (AD). Psoriatic Arthritis (PsA) is typically thought to be a result of Th1/Th17 driven response, and blockage of this pathway (IL-23, IL-17 and TNF) has proven successful. Despite this, there is a strong genetic risk association for IL-13 and PsA(1), however, the precise role of IL-13 in PsA is presently unknown. The enthesitis is the region where tendons or ligaments attach to bone, and inflammation of this site (enthesitis) is thought to be the cardinal lesion of PsA, whereas as Rheumatoid Arthritis inflammation is more synovial centric. Dupilumab is a monoclonal antibody that works by blocking the common receptor chain (IL-4α) shared by both IL-13 and IL-4. Recent studies have reported that AD patients receiving dupilumab have developed clinical enthesitis(2).

Objectives: To investigate whether IL-4 and IL-13 could modulate IL-23 production from entheseal myeloid cells and IL-17 production from entheseal T-cells.

Methods: Healthy entheses samples from patients undergoing surgery for non-inflammatory conditions such a lumbar decompression or scoliosis were obtained. Enthesis samples were digested and stimulated (Fig 1A) with LPS and anti-CD3 to induce IL-23 and IL-17 respectively. Samples were pre-treated with IL-4 and IL-13 to ascertain whether this modulated entheseal cytokine production.

Results: Both IL-23 and IL-17 were readily induced from entheses samples with IL-23 coming predominantly from entheseal myeloid resident cells (Fig 1B) and IL-17A from T-cells (Fig 1C). Pre-treatment of entheseal digested material with either IL-4 or IL-13 attenuated IL-23 secretion (Fig 1D). Neither IL-4 nor IL-13 was able to significantly attenuate IL-17 secretion from entheses T-cells, however IL-13 trended downwards and IL-4 surprisingly trended upwards (Fig 1E).

Conclusion: Our clinical and vitro data point towards a previously unknown role for IL-4 and IL-13 having a protective role in entheseal induction of IL23/17 axis cytokines. These findings point towards a novel explanation for IL-13 pathway SNPs in PsA and also a molecular explanation for why anti-IL4/13 therapy may induce entheseal pathology.

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SAT0359 THE ASSOCIATION BETWEEN IMAGING SUB-PHENOTYPES OF PSORIATIC ARTHRITIS AND GENE EXPRESSION PROFILES

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Background: Heterogeneity is a hallmark of psoriatic arthritis (PsA), which is reflected in diverse clinical, imaging and molecular features that may reflect disease course and response to treatment. We hypothesized that specific molecular pathways underlie the various manifestations of PsA.

Objectives: To create a model for accurate and biologically meaningful sub-phenotyping of PsA using imaging and molecular data. Specifically, we aimed to identify imaging sub-phenotypes in patients with PsA and determine their association with whole blood mRNA expression markers.

Methods: 55 patients with PsA ready to initiate treatment for active disease were prospectively recruited. An ultrasound assessment of the extent of musculoskeletal inflammation in 64 joints, 34 tendons and 16 entheses was performed. Sonographic inflammation (in greyscale and Doppler) of the following domains was graded for: a) synovitis; b) peri-tendonitis; c) tenosynovitis; and d) enthesitis. A global inflammatory score was calculated for each tissue domain. Peripheral blood was profiled with RNAseq, and gene expression data were obtained. Analyses were performed in two stages: 1) Unsupervised cluster analysis was performed using hierarchical and k-means to define imaging sub-phenotypes in PsA that reflected the predominant tissue involved; 2) Principal component analysis with ellipses was used to determine the association between imaging-defined clusters and peripheral blood gene expression profile.

Results: The patients could be divided into 3 groups based on unsupervised hierarchical and k-means clustering of images indicating the predominant involved tissue (Figure 1): 1) Enthesitis predominant (N=13 [24%]); 2) Peri-tendonitis predominant (N=11 [20%]); 3); Synovitis predominant (N=31 [56%]). Patients in the synovitis predominant group had more nail involvement, while those in the peri-tendonitis group had the highest number of clinically active joints (Table 1). Unsupervised clustering of gene expression data identified three clusters that partially overlapped with the imaging clustering (Figure 2). Overall, 344 genes were differentially expressed (p<0.05) in two of the three comparisons between the imaging clusters.

Table 1. Clinical Features by Imaging Clustering

Variable	Enthesitis predominant cluster (N=13)	Peritendonitis predominant cluster (N=11)	Synovitis predominant cluster (N=31)
Age (years)	47 (14)	49 (16)	45 (20)
Sex: Female	8 (61.5%)	5 (45.5%)	15 (48.4%)
PsA duration (years)	1.2 (1.5)	1.6 (11.5)	0.8 (3.7)
BMI	29.4 (6.8)	25 (8.1)	26.1 (8.4)
Nail lesions	3 (23.1%)	5 (45.5%)	17 (54.8%)
PASI	1.2 (2.7)	1.2 (3.2)	2.8 (7.8)
Tender joint count	6 (9)	11 (5)	3 (6)
Swollen joint count	2 (6)	10 (7)	3 (6)
Dactylitis	3 (23.1%)	4 (36.4%)	7 (22.6%)
Enthesitis count	3 (3)	1 (4)	0 (2)
Enthesitis	12 (92.3%)	7 (63.6%)	15 (48.4%)
hsCRP	2.9 (8.8)	8.5 (21.5)	3.6 (9.4)

Median (IQ range) and frequencies (%)
Bolded=Statistically different between the 3 groups (p<0.05)

Conclusion: We identified three different imaging clusters based on the predominant tissue involved in patients with active PsA. Distinct gene expression profiles may underlie these imaging clusters seen in PsA.