Synovial tissue signatures enhance clinical classification and prognostic/treatment response algorithms in early inflammatory arthritis and predict requirement for subsequent biological therapy: results from the pathobiology of early arthritis cohort (PEAC)

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Lay title

Joint Biopsy Results Enhance Clinical Classification and Guide Prognosis/Treatment in Early Inflammatory Arthritis and Predict Requirement for Biologic Drugs: Results from Pathobiology of Early Arthritis Study (PEAC)

Lay Summary

The objective of this study was to establish whether analysis of tissue biopsies, from inflamed joints of people suffering from rheumatoid/inflammatory arthritis, can improve classification of the disease; and help more accurately predict prognosis, and the potential need for more advanced biologic drugs.

200 people diagnosed with early arthritis, who had yet to receive any treatment, were classified in to 3 groups as follows:

- 128 classified as rheumatoid arthritis (RA 1987 - American College of Rheumatology (ACR))
- 47 as undifferentiated arthritis
- 25 who met RA 2010 (ACR/European League Against Rheumatism criteria)

These people were recruited to the PEAC study.

Their treatment requirements at 12 months were determined and stratified as follows: conventional treatment (csDMARDS – Conventional Synthetic Disease Modifying Antirheumatic Drugs) vs advanced treatment (Biologic drugs) vs no conventional treatment.
Synovial (joint) tissue was obtained from each, via a minimally invasive, ultrasound guided biopsy from a joint which was painful and inflamed due to arthritis. These samples of tissue were then analysed for inflammatory cells and markers, gene expression and disease classification . Synovial tissue was classified into into 3 types :

1. lympho-myeloid – contains predominantly B-cells and/or plasma cells. These types of immune cell produce antibodies.
2. diffuse-myeloid – the predominant cells are macrophages. They are the first line of defence in the immune system, ingesting foreign bodies like bacteria, viruses and abnormal cells and producing cytokines , molecules that further stimulate the immune system
3. pauci-immune – has very few immune cells. Cells that support the synovium (fibroblasts) are predominant, hence this pathotype is also referred as the fibroid type

in order to ascertain in the early stage of disease, whether these analyses could offer some results that would help predict disease severity, and treatment requirements.

The results from the biopsy analysis showed that the RA 1987 group had significantly higher disease activity, joint tissue inflammation, more immune cells and genes associated with B and T (immune) cells, compared with the other two groups. After 12 months, a significantly higher proportion of the people classified as lympho-myeloid disease type required an advanced, biologic drug. These results meant that the accuracy of clinical prediction of the requirement of a biologic drug was increased from just under 80% to 89-90%.

It was therefore concluded that the analysis of inflamed joint tissue from people with early arthritis, yet to start treatment, is helpful in more accurately classifying their disease, and predicting the requirement of biologic drugs for their treatment.