METHODS FOR PREDICTING THE RESPONSE TO METHOTREXATE AND TREATING RHEUMATOID ARTHRITIS

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INVENTION NOVELTY

Researchers at UCSF have developed methods of treating Rheumatoid arthritis and for predicting the response of patients to methotrexate.

VALUE PROPOSITION

- Inter-individual differences in human gut microbiome aid the prediction of MTX efficiency
- MTX-induced microbiome shifts reduce inflammatory potential

TECHNOLOGY DESCRIPTION

Rheumatoid arthritis (RA) is an autoimmune disease that leads to inflammation and destruction of joints, as well as other organs. Nearly all newly diagnosed RA patients are initiated on methotrexate (MTX); however, up to 50% of patients do not achieve a clinically adequate outcome. The major target of MTX, dihydrofolate reductase (DHFR), is conserved across all domains of life. In addition to mammalian DHFR, MTX can directly bind DHFR from multiple bacteria. The potential for MTX to act therapeutically by inhibiting gut microbiome remains unexplored, despite the broad impacts of the gut microbiome on immunity. Further, emerging evidence suggests the microbiome is associated with RA.

APPLICATION

- Prognostic tool for RA treatment response prior to drug initiation in new-onset RA
- Reducing inflammation in the gut and/or joints of a patient based on the susceptibility of the patient's gut microbiome to methotrexate

STAGE OF DEVELOPMENT

The inventors have developed prognostic tools and methods of treating inflammation in the gut and/or joints of a patient based on the susceptibility of the patient's gut microbiome to methotrexate. They employ metagenomic sequencing methods and metabolomics analysis to evaluate the association between microbiome-driven MTX depletion and clinical response. They demonstrate MTX-induced changes in microbial community structure were associated with patient response. Their work provides biomarkers for accelerating the stable initiation of therapy and a first step toward determining which bacterial taxa contribute to, or

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OTHER INFORMATION

KEYWORDS

immunotherapy

CATEGORIZED AS

- Medical
  - Diagnostics
  - Disease: Autoimmune and Inflammation

RELATED CASES

2019-178-0

interfere with, treatment outcomes.

RELATED MATERIALS

- Methotrexate impacts conserved pathways in diverse human gut bacteria leading to decreased host immune activation - 01/12/2021
- The Pretreatment Gut Microbiome Is Associated With Lack of Response to Methotrexate in New-Onset Rheumatoid Arthritis - 12/13/2020

PATENT STATUS

Patent Pending

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