Sore Joints and Bad Breath: What is Going on?

Felipe Andrade, M.D., Ph.D.
Associate Professor of Medicine
Autoimmune Diseases: When your body turns on you

Normal Immune Response

Foreign antigen

Antibodies are made

Antibodies clear foreign antigens

Autoantibodies attack different organs

Autoimmune Disease

Immune system forms antibodies to self-antigens

Inflammation and tissue damage

Antibodies remain and protect
Systemic autoimmune rheumatic diseases

Systemic Lupus Erythematosus

Rheumatoid Arthritis

Scleroderma

Sjögren’s Syndrome

Vasculitis

Myositis
Rheumatoid Arthritis

- Rheumatoid arthritis (RA) affects 1% of the adult population worldwide.

- About 1.3 million Americans have RA, mainly women over 40.

- RA is associated with increased mortality.
Rheumatoid Arthritis: The interaction between genetics, immunology and environment
Rheumatoid Arthritis: An infectious disease from the New World?

Evidence of RA in skeletal remains in Alabama 3,000 – 1000 BC

RA entered the Old World between 1492 - 1785
Rheumatoid Arthritis and Periodontal Disease

“Infection from carious teeth has been considered as one of the causes of rheumatoid arthritis.”

- J. Lambert, 1908

Dunbar LL. JAMA 1895, 24:75-77
Lambert J. Bulletin of the Committee for the Study of Special Diseases 1908, 2:83-94
Kumar PS. J Physiol 2017, 595:465-476
Over 1000 different bacteria have been detected in the oral cavity.

How to identify those bacteria associated with RA?

Ge et al. PLoS ONE 2013,8:e65520
Peterson et al. PLoS ONE 2013,8:e58487
Mark Welch et al. Proc Natl Acad Sci U S A. 2016,113:E791-800
Patients with RA have antibodies to citrullinated proteins

Proteins normally “dress in different costumes” (modifications) to diversify their function.

Citrullination is a modification (“a costume”) in proteins that is attacked by antibodies in RA.
Periodontitis mirrors citrullination in the RA joint

Citrullination is abundant both in the RA joint and periodontal disease

Konig et al. Sci Transl Med 2016, 8:369ra176
What bacteria may be the cause of citrullination in periodontal disease?

*Aggregatibacter actinomycetemcomitans* (Aa)
Almost half of patients with RA had evidence of infection by Aa

196 patients with RA

More than 90% of Aa positive patients are genetically susceptible to RA and are positive for autoantibodies

92/196; 47%
Aa is a candidate bacterial trigger of autoimmunity in RA

- Aa infection
- RA genetic susceptibility
- Periodontal disease
- No susceptibility
- Autoantibodies
- RA
- Only periodontal disease
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