Chlamydia pneumoniae and Rosacea
By: Dan Fries

Numerous studies have produced results that suggest that rosacea, and indeed many of the other chronic inflammatory (or autoimmune) diseases, are potentially caused by pathogen infection:

American Society For Microbiology News: Potential Role of Infections in Chronic Inflammatory Diseases

In particular, many studies suggest that Chlamydia pneumoniae (Cpn) may be at root responsibility for many of these diseases, and as a persistent gram-negative bacterial with both an intra-cellular and extra-cellular form, it has also been shown to elicit unusually high levels of cathelicidin activity:

Pubmed: Involvement of the antimicrobial peptide LL-37 in human atherosclerosis

And at least one study has linked Cpn with rosacea directly:

"Chlamydia pneumoniae and Acne Rosacea

Oral azithromycin has been used successfully to treat rosacea, a chronic skin disease that requires long-term therapy. A study was undertaken to determine if C. pneumoniae could play a causative role in acne rosacea. A series of 10 adults presenting with acne rosacea were selected to receive azithromycin alone for the treatment of acne rosacea. C. pneumoniae was detected in cheek biopsy specimens in 4 of 10 patients by immunoperoxidase stain (using monoclonal antibody to C. pneumoniae) and serum antibody against C. pneumoniae was detected in 8 of 10 patients. Fernandez-Obregon and Patton showed that all patients treated with azithromycin (250 mg three times a week) showed moderate to marked improvement of their rosacea without any undesirable side effect. These preliminary data imply a possible link between C. pneumoniae and acne rosacea as well as suggest a need for further investigation with clinical trials (22)."

The detection numbers in this study are amazing considering the number of false negatives that current Cpn testing usually return. This study can be found in the following link:
I believe the reference (22) is wrong in the above link, and that it actually belongs to the following:


Other studies suggest that infection with Cpn can lead to pustular rashes (acute generalized exanthematous pustulosis) and increased VEGF production as in the case with wet age-related macular degeneration. These of course are most likely caused as by-products of the chronic inflammation associated with this pathogen, but I point them out since papule and pustule rashes and increased VEGF production are also symptoms in rosacea:

Pubmed: Acute generalized exanthematous pustulosis: first case associated with a Chlamydia pneumoniae infection

http://www.medicalnewstoday.com/medicalnews.php?newsid=33314 Medical News Today: Chlamydia pneumoniae present in eyes with 'wet' age-related macular degeneration

Studies have also shown that cathelicidins themselves seem to be involved in producing the bumps and pimples associated with rosacea as well as in promoting the angiogenesis associated with the disease:

http://www.rosacea.org/weblog/2006/08/28/is_rosacea_like_an_allergy/index.php Rosacea.org: Is Rosacea Like an Allergy?

Pubmed: An angiogenic role for the human peptide antibiotic LL-37/hCAP-18

Still other studies suggest that persistent Cpn infection of epithelial cells can produce a chronic inflammatory response resulting in production of a host of cytokines and growth factors:

"Clinical persistence is probably a key concept in *C. pneumoniae* infection pathogenesis. Microbial persistence is a state of infection during which the host immune response does not eliminate the pathogen, thereby resulting in continuing damage to the host. Persistent infection may amplify airway inflammation in asthma and chronic obstructive pulmonary disease (COPD), but also in extrapulmonary diseases such as atherosclerosis, multiple sclerosis and Alzheimer's disease.

Stephens 13 has recently revised the possible pathogenic mechanisms of *C. pneumoniae* infection. He underlines that *C. pneumoniae* can induce an inflammatory process elicited by infected host cells that is necessary and sufficient to account for chronic and intense inflammation and the promotion of cellular proliferation, tissue remodelling and scarring, the ultimate causes of disease sequelae.
The cellular responses of epithelial cells, the primary home for *C. pneumoniae*, can be reliably induced upon acute, chronic and persistent infection. The cellular processes of the epithelial cells, elicited by chlamydial infection, cause the influx of inflammatory neutrophils, T-cells, B-cells and macrophages that are stimulated by the pro-inflammatory cytokine and chemokine environment. These cells become activated in both antigen-nonspecific and, for re-infection, antigen-specific responses to produce their own repertoire of cytokines and growth factors. The induction of host cell cytokines will promote foci of inflammatory responses in addition to promoting cellular proliferation, tissue remodelling and healing processes that, if persistent, result in scarring.

The full text of the study can be found in the following link:

http://erj.ersjournals.com/cgi/content/full/23/4/499  European Respiratory Journal: Chlamydia pneumoniae: crossing the barriers?

Finally, studies suggest that chlamydiae have a unique development cycle that can lead to the type of persistent infection that could cause chronic inflammatory diseases:

“The chlamydiae are an evolutionarily distinct group of eubacteria sharing an obligate intracellular lifestyle and a unique developmental cycle that has been well characterized under favorable cell culture conditions. This cycle begins when infectious, metabolically inert elementary bodies (EB) attach to and stimulate uptake by the host cell. The internalized EB remains within a host-derived vacuole, termed an inclusion, and differentiates to a larger, metabolically active reticulate body (RB). The RB multiplies by binary fission, and after 8 to 12 rounds of multiplication, the RB differentiate to EB asynchronously (78). At 30 to 84 h postinfection (PI), depending primarily on the infecting species, EB progeny are released from the host cell to initiate another cycle (78, 122).”

The full text of the study can be found in the following link:

http://iai.asm.org/cgi/content/full/72/4/1843  Infection and Immunity: Chlamydial Persistence: beyond the Biphasic Paradigm

Most interestingly, David Wheldon, Microbiologist and FRCP in the U.K. has reported great results in halting and reversing progression of MS through treating Cpn infection with long-term antibiotic therapy:

http://www.davidwheldon.co.uk/ms-treatment.html  David Wheldon MB FRCPPath: Empirical antibacterial treatment of infection with Chlamyphila pneumoniae in Multiple Sclerosis

Charles Stratton, MD at Vanderbilt University has reported similar results in treating patients for Cpn infection with long-term antibiotic therapy:

https://medschool.mc.vanderbilt.edu/facultydata/php_files/part_dept/show_faculty/show_partpathology.php?id3=971  Vanderbilt University Medical School Faculty Information: Stratton, Charles W., M.D.

Since it may be difficult to convince the medical community to prescribe long-term use of doxycycline, azithromycin, and metronidazole for non-life threatening diseases such as rosacea, the potential use of
N-acetyl cysteine (NAC), a thiol antioxidant, to dissolve the disulphide bonds of the extra-cellular EB form of Cpn and winnow down the infection over time seems very promising:

http://www.davidwheldon.co.uk/NAC.html David Wheldon MB FRCPaht: N-acetyl cysteine

I believe the information contained in this report necessitates further study involving Cpn as a possible cause for rosacea, potentially as the lead pathogen, capable of inducing a chronic inflammatory response that can lead to co-infections with other pathogens already linked to rosacea (h. pylori, demodex mites, s. aureus, c. albicans, etc) that may only help exacerbate the symptoms of this disease.