Evolutionary Strategies: Atopy, the Immune System, and Botanicals

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Atopy

- Atopy is a state of hypersensitivity to certain antigens

- Common in affluent areas of the world

- Product of evolutionary strategies employed by the immune system coupled with the drastic changes in our lifestyle

- Increasingly disparate relationship of humans to their environment?
Atopy

- Most of the research conducted on atopy is epidemiological in nature and emphasizes maternal and infant lifestyle.

- Atopy is a product of a variety of health inputs.

- Therapeutics strategies revolve around supporting these health inputs.

- The practice of the herbalist is particularly well-suited to a condition as diverse in cause and varied in treatment as atopy.
Evolutionary Roots of Atopy

- Atopy is characterized by increased production of IgE antibodies to specific allergens found in the environment.
- It is associated with:
  - allergies
  - allergic rhinitis
  - allergic asthma
  - eczema
- Occurs in up to 30% - 40% of the population in affluent countries (Vartiainen et al., 2002).
- These conditions are currently at epidemic proportions in Westernized countries and ranking as the first cause of chronic disease in children (Grammatikos, 2008).
An allergy is an immune-mediated reaction to an otherwise innocuous antigen.

An increase IgE response to trivial antigens:
- Type-1 hypersensitivity response (atopic, anaphylactic, allergic)
- Genetic (and hence familial) component

Rapid increase in these conditions over the past two decades:
- more than a simple genetic polymorphism?
- environmental cause?
- Increased exposure or decreased prevention?
  - (Kummeling et al.)
The Hygiene Hypothesis
Hygiene Hypothesis

- Explains the inverse relationship between allergic and autoimmune conditions and the exposure to a variety of antigens early in life.

- Both pathogenic and commensal organisms coupled with the unique genetic tendencies of the individual have been seen to play a role.

- A variety of exposures have been shown to reduce the later onset of autoimmune / atopic conditions:
  - large family size
  - infectious disease exposure
  - farm animals
  - daycare attendance
Immune regulation and the hygiene hypothesis

- A proposed mechanism:
  - Infections induce production of IL-10 from T-cells
  - IL-10 is an “anti-inflammatory” cytokine
    - produced by CD4+ CD25+ regulatory T-cells (T-reg)
    - down-regulates Th-1 cytokines and is know for general “immune dampening”

- Exposure to microbes boosts the regulatory networks necessary to moderate inflammatory immune response.

- What about more innocuous antigens?
Building pathways...

- There is immunological influence from the overall microbial exposure.

- Toll-like receptors (TLR) are induced by a number of external structural components of bacteria (especially LPS), fungi, and helminthes.

- The exposure of an antigen to a TLR induces the development of an early detection system of foreign particles.

- The immune adaptive mechanisms help to mature regulatory pathways.

- Botanicals which are known to be immune-potentiating or modulating also work by inducing a TLR response.

- This suggests that our immune system is heavily influenced by the initial recognition of these pathogenic particles.

  (Braun-Fahrländer et al., 2002; Reese et al., 2007; Grammatikos, 2008; Rhule et al., 2008)
Some herbal medicines could be added here.
Astragalus membranaceus

- ↑ macrophage activity
- ↑ Antibody response
- B cells / macrophage stimulation but not T-cells
- ↑ NO induction
- ↑ cytolytic function macrophages
- Dramatic effects in prevention
- Increased gut flora
- Decreased harmful flora
Epidemiological Observations in Atopy
Anthroposophic lifestyle and atopy

- Anthroposophic lifestyle:
  - widely accepted in the medical literature
  - more natural diet (organic and/or vegetarian)
  - restricted use of vaccinations and antibiotics
  - natural or complementary healthcare
  - Steiner or alternative schooling
  - similar community

- Particularly during childhood
- Inverse relation between the number of characteristic features of an anthroposophic lifestyle and risk of atopy

- More than 30 papers on this topic
  - (Alfven et al., 2006; Alm et al., 1999; Floistrup et al., 2006; Kummeling et al., 2005).
Breastfeeding, pregnancy, and atopy

- Breastfeeding and maternal behavior and diet during pregnancy appear to affect the chances of developing atopy.
- Reduced occurrence of allergies and asthma:
  - if an infant solely breastfed until 6 months of age (Schneider et al., 2007)
  - infants whose mother consumed higher amounts of Ω-3 polyunsaturated fatty acids (Ω-3PUFAs)
    - most commonly in the form of fish and fish oil (Das, 2006; Dunstan et al., 2003).
    - In one study, lower levels of the Ω-3 PUFA eicosapentaenoic acid (EPA) was found to be present in the cord blood of babies who went on to develop atopy than those who did not (Byberg et al., 2008).
Fatty acids and atopy

- Dietary sources in an individual can affect the odds of developing atopy:
  - relationship of $\Omega$-3 PUFAs to the consumption of $\Omega$-6 PUFAs
  - There have also been studies to the contrary (potentially confused by the poor quality of many $\Omega$-3PUFAs consumed?)
  - (Devereux & Seaton, 2005; Upham & Holt, 2005).
- Most profound effects are during gestation.
Diet and atopy

– KOALA birth cohort study in the Netherlands:
  – 2558 infants with an anthroposophic lifestyle vs. a conventional lifestyle
  – An increased delay to the introduction of cow milk products was associated with a higher risk for eczema.
  – In addition, a delayed introduction of other food products was associated with an increased risk for atopy development at the age of 2 years
  – (Kummeling et al., 2005; Snijders et al., 2008)

– Antioxidant consumption and development of atopic conditions
  – negative associations with:
    – vitamin A
    – vitamin C
    – selenium consumption
    – vitamin E (also specific to elevated IgE levels)
    – Fruit consumption was associated with a 30% decrease in asthma symptoms.
  – Devereux & Seaton (2005)
Enteric flora and atopy

- Commensal flora plays a significant role in the shaping and guiding of our immune system and its response to antigens.

- Perinatal administration of probiotics reduced the incidence of atopic eczema in children followed for 4 years
  - (Kalliomaki et al., 2003; Kalliomaki et al., 2007).

- Children with a lifestyle of reduced antibiotic usage and a diet high in lactobacilli fermented foods demonstrated an increase in enteric flora and the diversity of flora present
  - (Alm et al., 2002).

- No direct relationship has been established between atopy and microflora.
  - (Penders et al., 2007)
Hygiene and atopy

- Immunomodulatory role of saprophytic bacteria in the soil
- Innate immune system recognizes these bacteria when encountered at respiratory and gut mucosal surfaces.
  - A number of microorganisms and their components have been found to increase the production of IL-10 induced by T-reg cells.
  - Additionally, there is clearly a reduced exposure to soil for most individuals, particularly those living in urban environs.
- Infection with helminths has been shown to reduce incidence of asthma
  - (Ponte et al., 2007)
- Early and consistent exposure to dogs and cats appears to have a protective effect from asthma, eczema and allergies, although there is also evidence to the contrary
  - (Upham & Holt, 2005)
Stress and atopy

The impact of stress on the development and expression of atopy
Rosalind J. Wright\textsuperscript{a}, Robyn T. Cohen\textsuperscript{b} and Sheldon Cohen\textsuperscript{c}

Summary

Psychological stress may be conceptualized as a social pollutant that, when 'breathed' into the body, may disrupt biological systems related to inflammation through mechanisms potentially overlapping with those altered by physical pollutants and toxicants.

– (Wright \textit{et al.}, 2005, p23).
Pathophysiology of Atopic Conditions
Pathophysiology

- Atopy is an allergic hypersensitivity which typically affects parts of the body not directly exposed to the otherwise innocuous antigen.
  - allergic conjunctivitis
  - eczema (atopic dermatitis)
  - allergic rhinitis
  - asthma
Pathophysiology

- Increased serum concentration of Ig-E, typically the least abundant immunoglobulin.

- Ig-E is associated with atopic, allergic and anaphylactic responses.

- Ig-E develops a persistent, high-affinity receptor relationship with a specific antigen in the environment.
  - It elicits an immune response by binding to the Fc receptor on mast cells and basophils, which in turn become primed to release a number of proinflammatory substances
    - histamine
    - certain interleukins (IL)
    - leukotrienes
  - (Grammatikos, 2008; McFadden et al., 2008; Taylor et al., 2007).
Pathophysiology

– Consistent levels of exposure to the antigen are common.

– These pro-inflammatory reactions cause many of the symptoms we associate with atopic conditions:
  – local skin inflammation in eczema
  – lower airway constriction and hyper responsiveness in asthma
  – increased inflammation and secretion of mucus in allergic rhinitis
  – (Aalberse, 1996; Braun-Fahrlander et al., 2002).

Image from Wikipedia
Skin Barrier Dysfunction and Systemic Sensitization to Allergens Through the Skin

Jessica Strid* and Stephan Strobel
⇒ Altered skin homeostasis and induction of Th2-dominanted responses
C

Pathogens

⇒ Skin injury and induction of Th1-dominated responses

Dermis
Clinical Assessment
Assessment of the individual

- The health and wellness of a client can be seen as the unique product of their health inputs.

- Diet
- Psychological wellness
- Mental and emotional health
- Stress
- Environmental exposures
- Genetic tendencies
- Sleep
- Digestion
- Movement
- Spirituality
Assessment in Atopic Conditions

- Particular experience of the individual
- It should not be assumed that their experience mirrors the typical diagnostic criteria for the condition.
- Inquiry into:
  - Childhood health and exposure
  - Initial occurrence
  - Frequency / seasonal / situational / triggers
  - Things which improve or aggravate their condition
  - Previously tried therapeutics or times when absent
  - Foundational health inputs
  - Local exposure of the area
- Physical, energetic, or traditional methods of assessment
- Visible examination when appropriate
Therapeutic Strategies
Treatment Overview

– The goals of treatment:
1. Overall terrain health and wellness
2. Restoring and maintaining the skin barrier function
3. Minimizing inflammation
4. Breaking the itch-scratch cycle
5. Treating possible external triggers
6. Treating secondary infections that may propagate AD
Overall Terrain

- Connection the the environment.
  - seek a lifestyle and attitude closer to the earth
  - children and adults “play in the dirt” through activities or gardening
  - spend time interacting in and observing nature
  - creating a connection between individual beings and the earth
  - consume “earth fresh” foods

- Much of the epidemiological evidence presented is relatively therapeutically irrelevant

- Therefore, many of the therapeutics are focused on the individuals’ particular experience.

- Work to support change in the client in order to derive maximum health through the core health inputs.
Diet

- The diet is pivotal in atopy, as is the adherence
- Appropriate level of change for the individual
- Evaluation of food intolerances and allergies
  - Limit or eliminate exposure
- Rich in quality, predominantly plant-based lipids with a balance of Ω-3 fatty-acids and Ω-6 fatty acids.
  - Supplementation with fish oil as a possibility
  - Liberal use of other high quality oils
- Rich in fresh fruits and vegetables in a variety of colors
Diet

- Add potent anti-oxidant foods
  - abundance of fresh herbs and spices
  - walnuts and other fresh nuts
  - berries
  - fresh, local fruits and vegetables
- Protein sources should be diverse and quality,
  - legumes
  - grass-fed, wild, or free-range animals
- Whole, intact grains which are well tolerated
- Moderation, diversity, and consciousness
Inputs: Digestion and Assimilation

- Availability of nutrients
- Contribution to the psychological wellbeing of an individual
- Reduction or elimination of allergens
- Client specific strategies which can be applied:
  - Bitters
  - Aromatics
  - Demulcents
  - Carminatives
  - Hepatosupportive
  - Alteratives
Support for the lungs

- In damp lungs
  - *Inula helenium*
  - *Grindelia spp.*
  - *Anemopsis*
  - *Commiphora*

- In dry lungs
  - *Drosera rotundifolia*
  - *Lobelia*
  - *Sanguinaria*

- Demulcents
  - *Glycyrrhiza glabra*
  - *Ulmus rubra* (cultivated)
  - *Althaea officinalis*

- Lipids
  - Dietary oils and fats
  - Fish oils

- Antispasmodic
  - *Lobelia inflata*
  - *Ammi visnaga*
Psychological wellness and stress

- Crucial to any state of wellness is the *feeling* of health.
  - Internal stress not external stress.

- A general assessment of the clients overall mood, dominant emotions and stress response can be made.

- The current use of coping strategies should also be investigated.

- Link between digestion and stress.
- Client specific application of:
  - Nervines
  - Neurotrophorestoratives
  - Adaptogens
Environmental exposures

- Client’s current lifestyle

- Chemical exposure in the home and work place

- Simple, cost effective methods of exposure reduction should be employed
  - reducing or limiting the use of household chemicals
  - consuming less synthetic or packaged foods
  - Quality air and water
  - Lower exposure (ie. chlororine)

- Increase the client’s detoxification:
  - increase bowel movements to optimal frequency
  - encouraging regular sweating
  - drinking adequate water
  - exercising frequently
Restoring and maintaining the skin barrier function

- **Topical lipids**
  - Cocoa butter
  - Shea butter
  - Joboja oil
  - Sea buckthorn
  - Sesame

- **Form**
  - Cream
  - Oil
  - Liniment
  - Gel

- **Topical herbs and eo’s**
  - Berberis oil / cream
  - Matricaria reutita
  - Helichrysum sp
  - Boswella carterii
  - Lavandula angustifolia
  - Rosa damascene
  - Rosmarinus officinalis
Jade Shutes Topical Gelly

- Aloe vera gel
- Calendula infused oil
- German chamomile hydrosol
- Lavender / Thyme linalol or T-tree Hydrosol

Add in:
- German chamomile eo
- *Rosa damascena* absolute
- *Melaleuca quinquina* eo
Minimizing inflammation

- Alternatives
  - Scrophularia spp
  - Juglans nigra
  - Phytolacca Americana
  - Rumex crispus
  - Trifolium pratense
  - Arctium lappa
  - Taraxacum officinale
  - Silybum marianum
  - Silymarin

- Inflammation modulators
  - Fresh herbs in cooking
  - Walnuts
  - Berries
  - Sambucus canadensis
  - Curcuma longa
  - Zingiber officinale
Anti-inflammatory Aromatic Oils

- Ocimum basilicum
- Cedrus deodara
- Matricaria recutita
- Foeniculum vulgare var. dulce
- Helichrysum italicum
- Lavandula angustifolium
- Citrus reticulata
- Commiphora myrrha
- Cirtus aurantium var. amara
- Rosa damascena
- Rosemarinus officinalis
- Achillea millefolium
Breaking the Itch- Scratch Cycle

- Demulcents
  - Glycyrrhiza glabra
  - Ulmus rubra (cultivated)
  - Althaea officinalis

- Hydrosols
  - German chamomile
  - Lavender
  - Peppermint
  - Witch hazel

- Mucosal antiinflammatories
  - Scutellaria baicalensis
  - Glycyrrhiza glabra
  - Euphrasia spp (cultivated)
  - Calendula
Treating secondary infections

- Infused herbal oils:
  - Calendula
  - Chickweeds
  - Plantain
  - St. John’s Wort

- Essential Oils:
  - Tea tree oil
  - Turmeric
  - Lavender
  - Thyme
  - ....so many others!
Aromatherapy and Respiratory Allergic Response

– Some of Andrea Butje’s favorites include:
  • Balsam Fir (Abies balsamea)
  • Peppermint (Mentha x piperita)
  • Eucalyptus (Eucalyptus globulus)
  • Eucalyptus dives (Eucalyptus dives)
  • Frankincense (Boswellia carterii)
  • Tea Tree (Melaleuca alternifolia)
  • Laurel Leaf (Laurus nobilis)

  – From http://www.aromahead.com/blog/2015/03/23/spring-time-look-aromatherapy-allergy-relief/ on 10/15/16
Roundtable Cases

Allergic rhinitis
- 34yo female with seasonal allergies. Dry, swollen respiratory mucosa, inflammation and congestion. Secondary skin irritations and dryness. Fatigue.

Atopic dermatitis
- 9yo male with atopic dermatitis on arms and trunk. Worse in winter. Severe itchiness and bleeding resulting in occasional infection.
In Summary

– Herbal medicine embraces the concept of a connection between people, plants, and the environment.

– Employ this connection when conceptualizing both the causes of atopy and the therapeutic strategy for the individual.

– Nurturing both the core health inputs and the relationship to nature as well as working with symptomatic care.

– Bring the body back into balance with itself.
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