Prevention and Treatment of Allergies: Ayurvedic and Allopathic Perspectives

Icy D'Silva

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Department of Food Science

UNIVERSITY of GUELPH

Guelph, Ontario N1G 2W1

CANADA

Ayurveda and Allopathy

Ancient

Complementary alternate medicine

Modern

Whole picture

Details

Pañchamahãbhũta

Recombinant DNA Technology

Ayurveda

- Caring for all humanity
- 'Herb' preparations
- Traditional principles
- Personalized
- New potencies of disease prevention and remedies

Allopathy

- New discoveries and insights
- New initiatives
- Chemical pharmacology
- Detailed sub-atomic structures
- Active ingredients

Similarities between Ayurveda and Allopathy

- Safe and effective use
- Balancing and regulating internal body systems
  - Vãta/pitta/kapha (ayurveda)
  - Chemical pathways / feedback systems (allopathy)
- Physical therapy

Ayurveda and allopathy are beginning to embrace each other

Health is achieved through balance and regulation of the internal systems

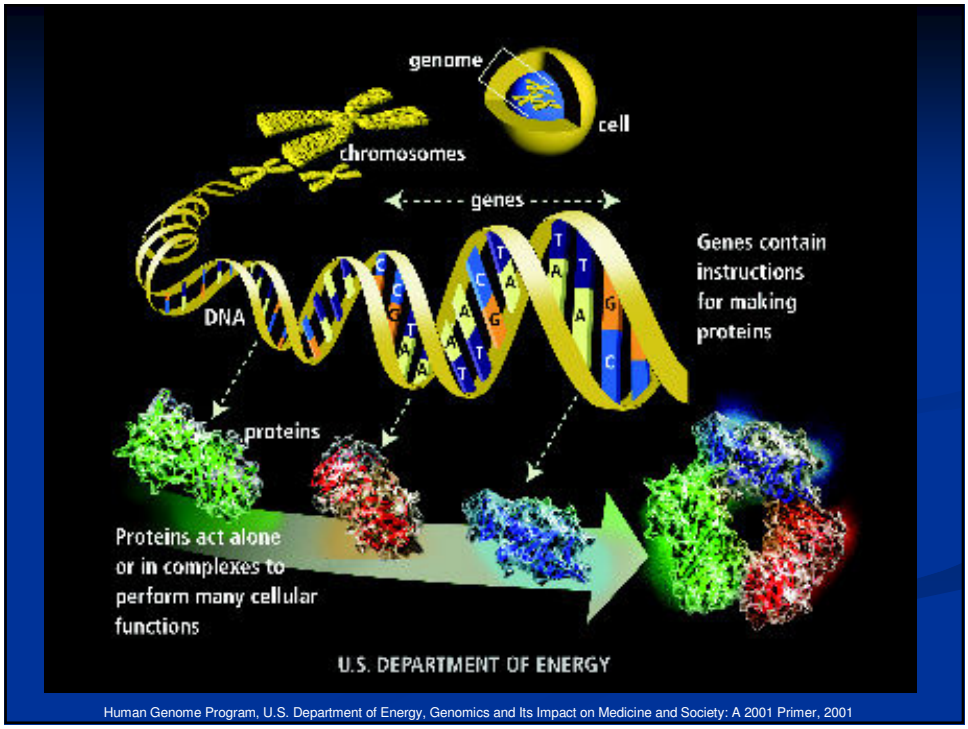
Ayurveda as the ‘Last Resort’

- Terminal patients turn to ayurveda only as the ‘last resort’ to prolong life
- Drug-drug, drug-herb and herb-herb interactions

Challenges facing Ayurveda

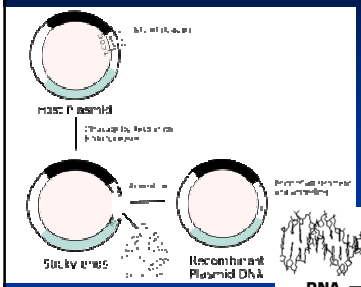
- Educational
- Cultural
- Social
- Environmental
- Legal

There is a Need for Integration of Ayurveda and Allopathy

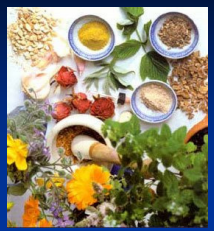


Human Genome Program, U.S. Department of Energy, Genomics and Its Impact on Medicine and Society: A 2001 Primer, 2001

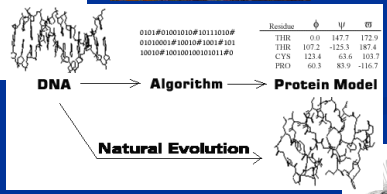
Recombinant Technology



http://en.wikipedia.org

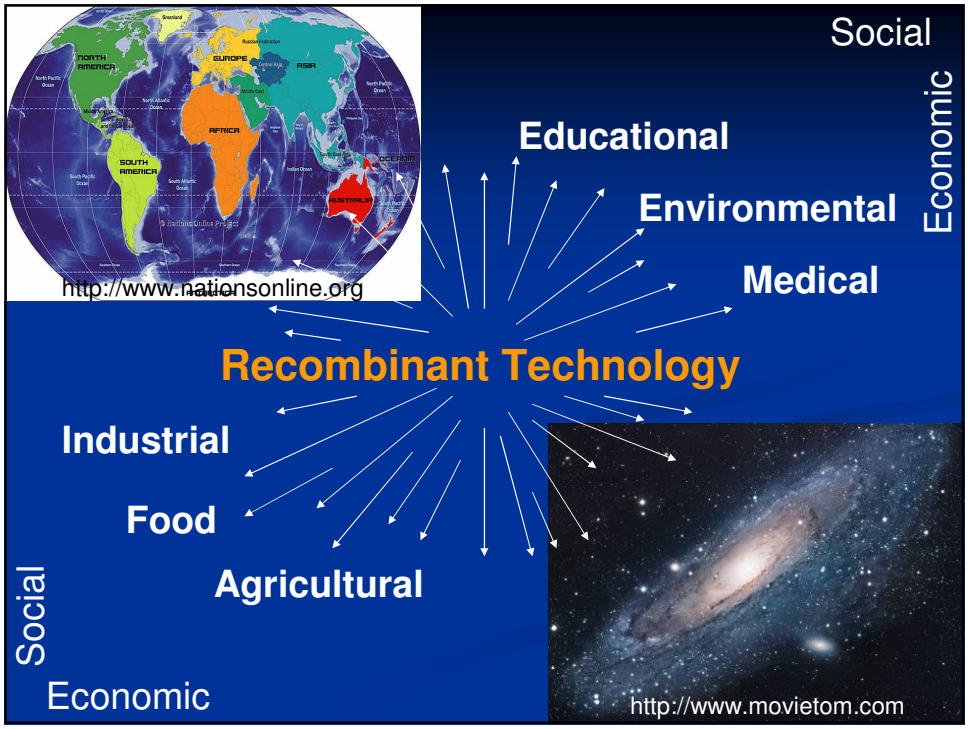


Proteomics



http://www.imb-jena.de

Genomics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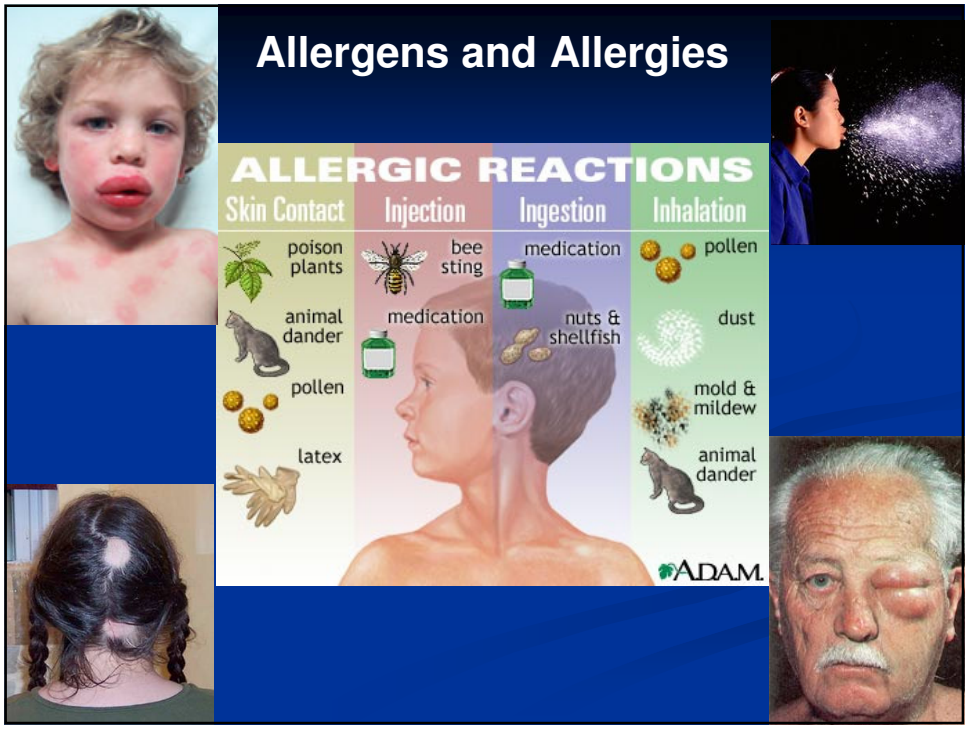
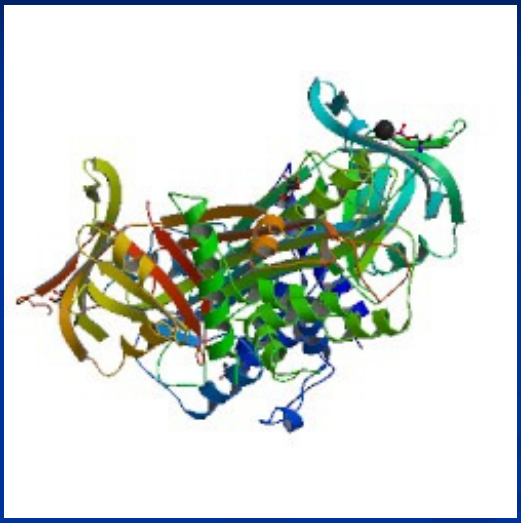

Allergens and Allergies
ALLERGIC REACTIONS
Skin Contact
Injection
Ingestion
Inhalation
poison plants
animal dander
pollen
latex
bee sting
medication
medication
nuts & shellfish
pollen
dust
mold & mildew
animal dander
A.D.A.M.

Food Allergies

- Adverse immune reactions to food
- 20% of population in economically developed countries
- Affect 8% of children and 4% of adults in North America
- More than 180 foods are reported to cause allergies
- Can be life-threatening
- Economic loss to the food industry
- Loss to the Canadian economy and World economy




Hen Egg Ovalbumin



http://www.beta.rcsb.org

RECOMBINANT OVALBUMIN

(rOVA)

RECOMBINANT OVALBUMIN MUTANTS

(rOVAm)

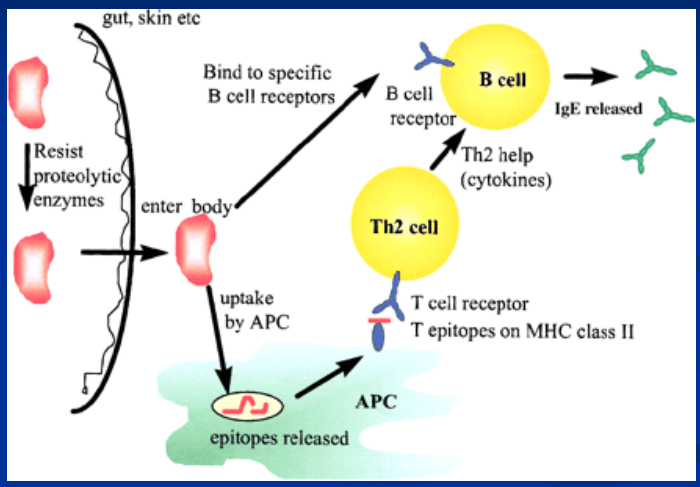
Amino Acids of OVA for Site-Directed Mutagenesis

```
  1   MGSIGAASME FCFDVFKELK VHHANENIFY CPIAIMSALA MVYLGAKDST
 51   RTQINKVVRF DKLPGFGDSI EAQCGTSVNV HSSLRDILNQ ITKPNDVYSF
101   SLASRLYAEE RYPILPEYLQ CVKELYRGGL EPINFQTAAD QARELINSWV
151   ESQTNGIIRN VLQPSSVDSQ TAMVLVNAIV FKGLWEKTFK DEDTQAMPFR
201   VTEQESKPVQ MMYQIGLFRV ASMASEKMKI LELPFASGTM SMLVLLPDEV
251   SGLEQLESII NFEKLTEWTS SNVMEERKIK VYLPRMKMEE KYNLTSVLMA
301   MGITDVFSSS ANLSGISSAE SLKISQAVHA AHAEINEAGR EVVGSAEAGV
351   DAASVSEEFR ADHPFLFCIK HIATNAVLFF GRCVSP
```

Site-Directed rOVAm for Desensitization

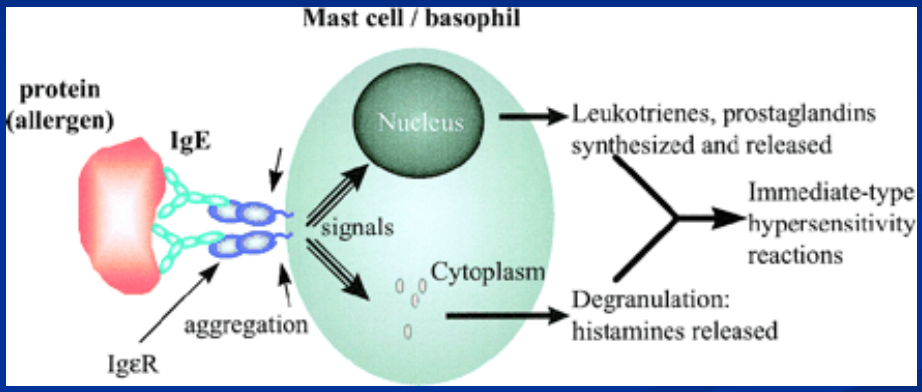
Mutant Serial Number	Construct	Mutations	Mutated Amino Acid Number	OVA IgE Epitope Number	Organism with the Construct
Mutant-1	pGAPZαA/ova	Single	R59G	1	*P. pastoris*
Mutant-2	pGAPZαA/ova	Double	S104G / D305G	3 / 6	*P. pastoris*
Mutant-3	pGAPZαA/ova	Double	V58D / K280E	1 / 5	*P. pastoris*
Mutant-4	pGAPZαA/ova	Single	R59G	1	*E. coli*
Mutant-5	pGAPZαA/ova	Double	S104G / D305G	3 / 6	*E. coli*
Mutant-6	pGAPZαA/ova	Double	V58D / K280E	1 / 5	*E. coli*
Mutant-7	pET-22b(+)/ova	Double	R59G / D305G	1 / 6	*E. coli*
Mutant-8	pET-22b(+)/ova	Triple	R59G / K280E / F307S	1 / 5 / 6	*E. coli*

Induction of Allergic Sensitization



Russell *et al.* (2000) Toxicol. Sciences 55, 235-246.

Allergy



Russell *et al.* (2000) Toxicol. Sciences 55, 235-246.

V58D / K280E Pp and R59G / K280E / F307S Ec – H

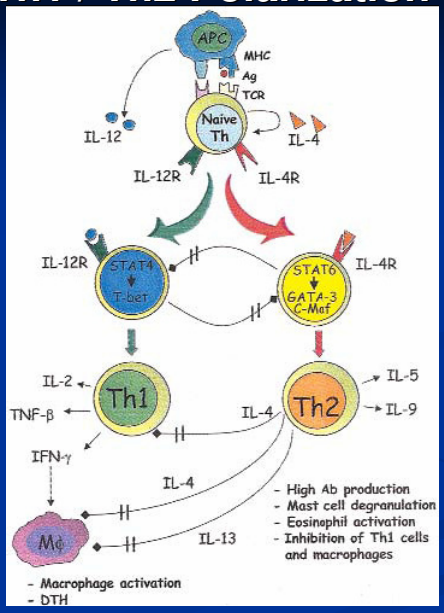
Total IgE ↓, Specific IgE ↓

Total IgG ↑, Specific IgG ↑, Specific IgG1 ↓, Specific IgG2a ↑

Histamine ↓

Th1 / Th2 Polarization

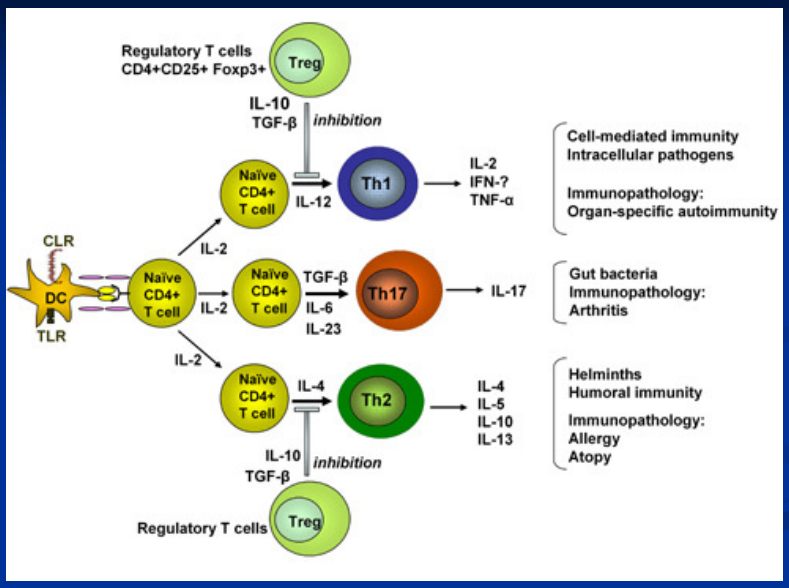
IL-2
IL-12
IFN-γ
IL-18
TNF-α



IL-4
IL-5
IL-13

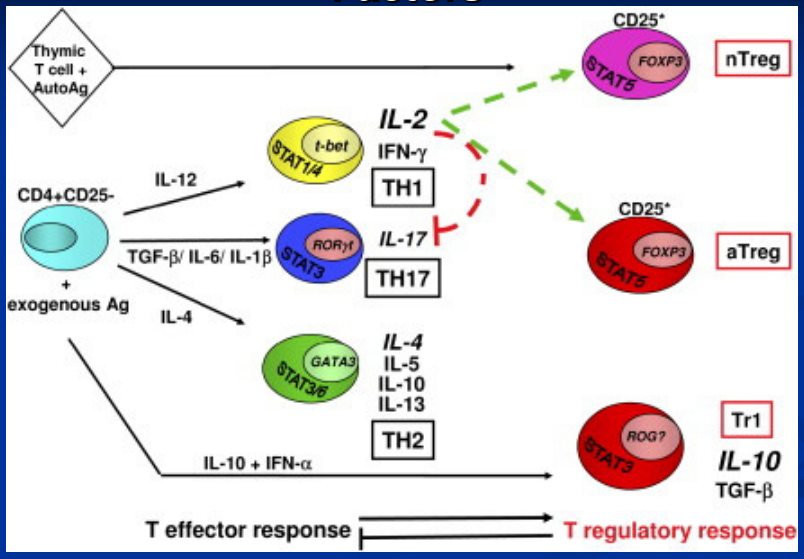
Romagnani (2004) J. Allergy Clin. Immunol. 113, 395-400.

Th17 Cells and Treg Cells



Cooke (2006) Rev. Diabetic Stud. 3, 72-75.

Teff Cells, Treg Cells and Transcription Factors



Bacchetta *et al.* (2007) J. Allergy Clin. Immunol. 120, 227-235.

V58D / K280E Pp and R59G / K280E / F307S Ec – H

Th1: IL-12 ↑, IFN-γ ↑

Th2: IL-4 ↓, TNF-α ↓

Treg: IL-10 ↑, TGF-β ↑

V58D / K280E Pp and R59G / K280E / F307S Ec – H

Th1: IL-12 ↑, IFN-γ ↑, IL-2 ↑, IL-18↓, T-bet ↑, FoxP3 ↑

Th17: IL-6 ↓, IL-23 ↓

Th2: IL-4 ↓, IL-5 ↓, IL-13 ↓, GATA-3 ↓

Treg: IL-10 ↑, TGF-β ↑

V58D / K280E Pp and R59G / K280E / F307S Ec – H

Total IgA ↑, Specific IgA ↑

V58D / K280E Pp and R59G / K280E / F307S Ec – H

PPL: $CD4^+CD25^+$ ↑, $CD4^+\gamma\delta^+$ ↑

IEL: $CD4^+CD25^+$ ↑, $CD4^+\gamma\delta^+$ ↑, $CD8^+CD25^+$ ↑, $CD8^+\gamma\delta^+$ ↑

LPL: $CD4^+CD25^+$ ↑, $CD4^+\gamma\delta^+$ ↑, $CD4^+FoxP3^+$ ↑

V58D / K280E Pp and R59G / K280E / F307S Ec – H

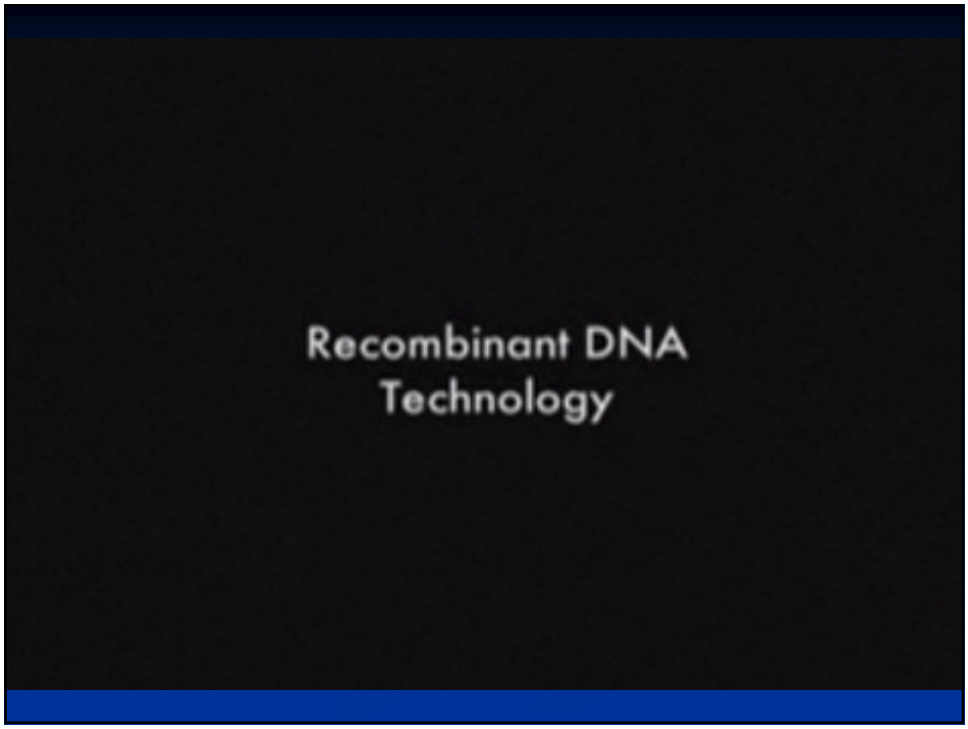
Th1 / Th2 balance → Th1 pathway

Teff / Treg balance → Treg pathway

Summary

- There is a need to integrate ayurveda and allopathy
- Recombinant molecules are effective in reducing the dosa imbalance
- By integrating ayurveda and allopathy through recombinant technology, the benefits of healthy and hygienic living for society will be more fully realized

Thank You


Recombinant DNA
Technology