Adaptation of humans to new environments - from space to the patient

Translation of knowledge and technology from a clinical scientists´ perspective:

the Stress-responses and Immune Network

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Mail

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WORKSHOP ON HUMAN SPACE TECHNOLOGY
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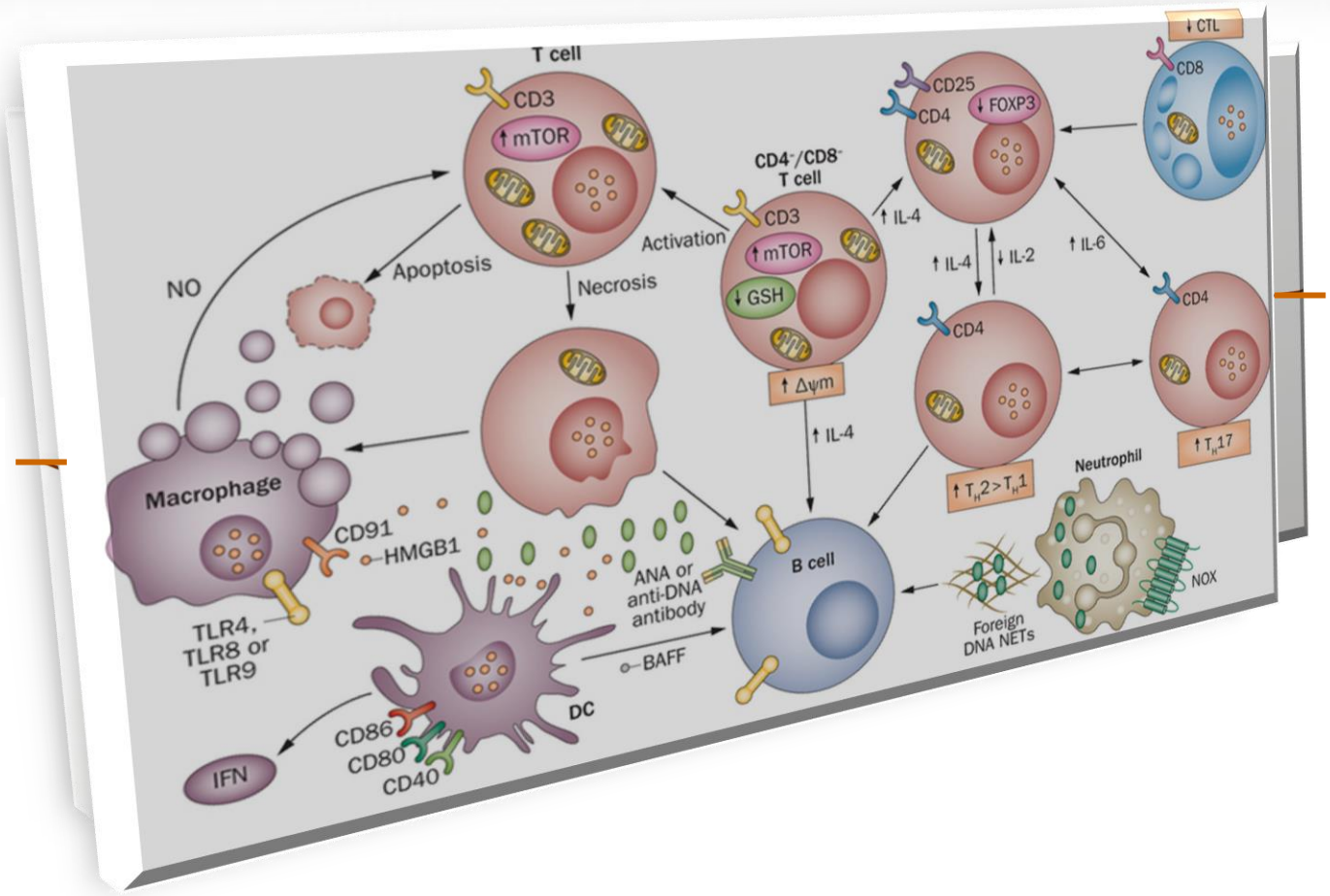
Immun-Networks

Stress



Stress responses

Nature Reviews Rheumatology Volume: 9, Pages: 674–686 (2013)

Immunity and Health

The Immunsystem of Tomorrow?

LMU

On Earth

Increase of Immune-associated disease

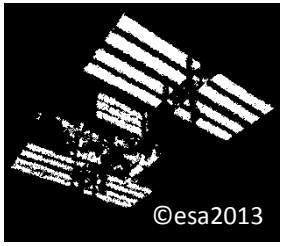
->„Worldwide, the **rise** in prevalence of **allergic diseases** has continued in the industrialized world for more than 50 years (AAAAI)"

-> „**Autoimmune disease** prevalence is **rising** (NIH)"

-> "The **incidence of sepsis is increasing** in all areas of the world where epidemiology studies have been conducted" (GS Martin)

Changes of immune competence by mobility, new environmental and social stresses?

In Space



Imbalance of immune functions

-> ca. 50 % of space crew (Apollo) and 40 % of long duration crew (MIR/ISS) showed significant immune changes

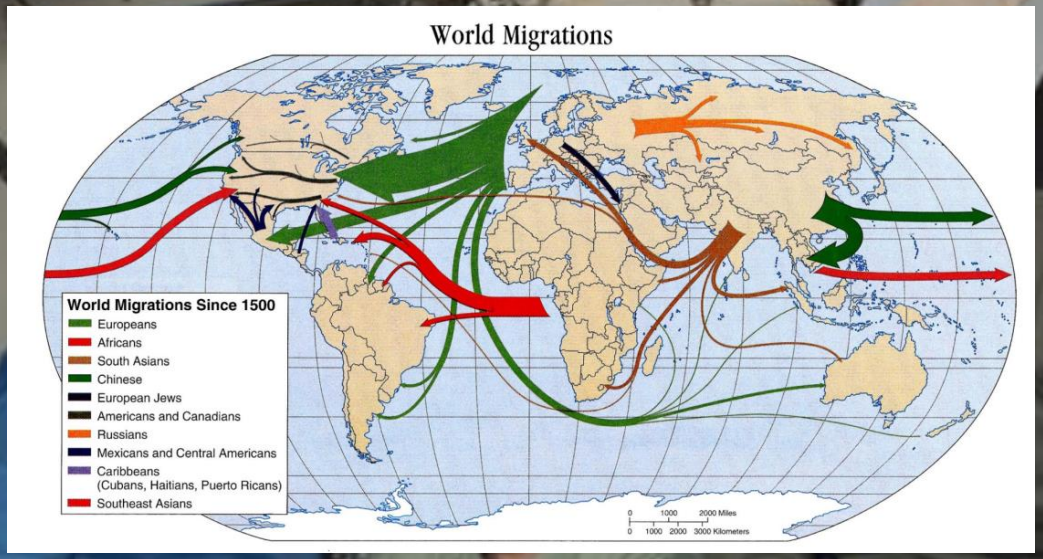
-> Astronauts are subjected to very new environmental stressor

Need to understand **changes in a few** to enable safe Space Exploration

AND

To understand stress associated immune **adaptation of many**

Environmental challenges



Monitoring disease

Translation of knowledge and technology from a clinical scientists´ perspective
- MONITORING AQUIRED IMMUNE DEFICIENCY -

HIV

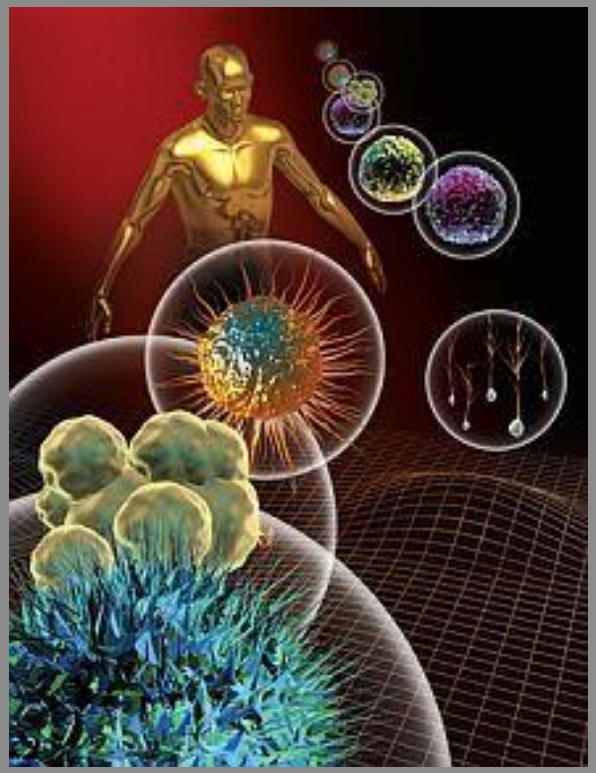
-monitoring of disease states and therapy in HIV positive patients (a pilot study)

HoSPACE

-was part of a prospective, randomized, multicentric clinical trial in patients suffering from severe inflammation (SISPCT full trial)

-using a battery of immunology assays
Evolved from ESA/IBMP, ESA/NASA and NASA projects to monitor immune-dys function in 76 sepsis patients

Registered with www.clinicaltrials.gov (NCT00832039)



Monitoring disease

Translation of knowledge and technology from a clinical scientists´ perspective
- NON-INVASIVE MONITORING OF INFLAMMATION -

Propionaldehyde:
-healthy volunteer during parabolic flight (blue boxes =6)
- healthy volunteers (dark grey boxes, n=17),
- intensive care unit population(light grey boxes, n=12),
- patients after lung/heart–lung transplantation(white boxes, n=7)
Kruskal-Wallis ranksum test with post hoc Nemenyitest; #P<.001

Dolch ME, Choukèr A et al Free Radic Biol Med. **2015** Aug;85:157-64
Dolch ME, Frey L et al J Breath Res. **2008** Sep;2(3):037010.

Embedding research for Space into research on Earth

The Immunsystem of tomorrow?

- Looking beyond the borders-

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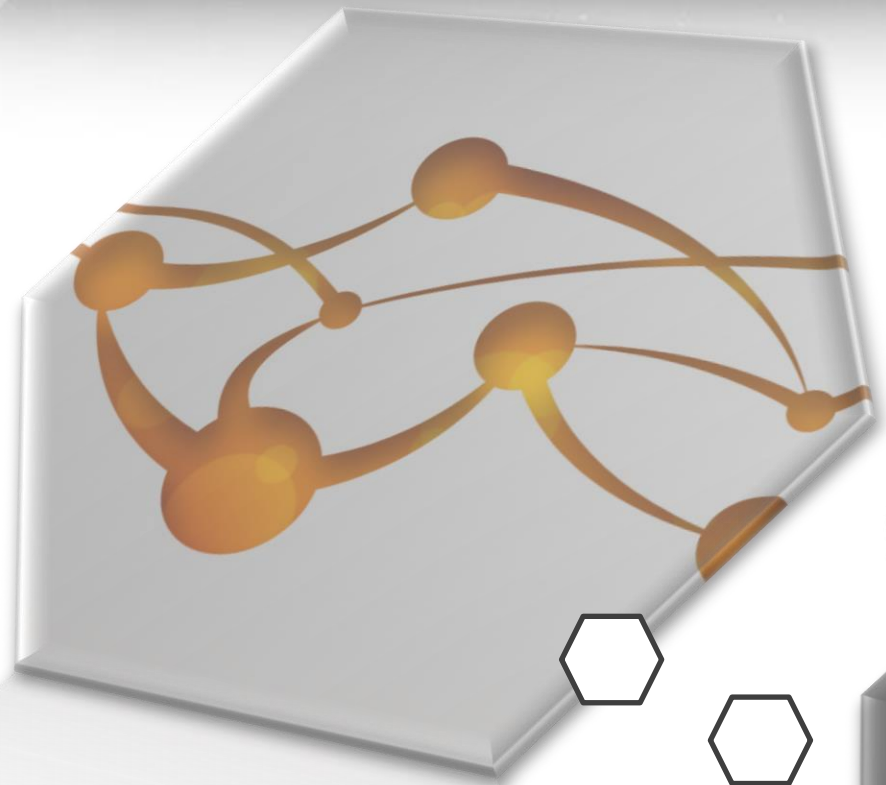

esa

NASA

Interdisciplinary & International network for **space** and **Earth** **benefits and progress** in applied **(bio-)technologies**

IBMP

CHINESE ACADEMY OF SCIENCES

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