

AEROBIOLOGY
SCHWEIZERISCHE GESELLSCHAFT
SOCIÉTÉ SUISSE
SOCIETÀ SVIZZERA

Joint SSA / SSAI Symposium 2019

SYMPOSIUM AEROBIOLOGY AND IMMUNE RESPONSE

AIR POLLUTION AND THE IMMUNE SYSTEM

Symposium 12 Aerobiology Room B3

AIR POLLUTION AND THE IMMUNE SYSTEM

Chairs: Pierre Gumowski (Geneva, CH)
Massimiliano Fontana (Mendrisio, CH)

- ❖ ***Prof. Jing Wang, EMPA, Dübendorf, Switzerland***
Size-resolved endotoxin and oxidative potential of atmospheric particles
- ❖ ***Prof. Barbara Rothen, Adolphe Merkle Institute, Fribourg, Switzerland***
Hazard assessment of inhaled particulate matter – clinical aspects and experimental designs to study immune effects

WHY AEROBIOLOGY AND POLLUTION ?

IN THE EARLY DEVELOPMENT OF CLINICAL ALLERGOLOGY,
ESTABLISHING **CORRELATIONS BETWEEN THE ENVIRONMENT** AND
THE SYMPTOMS OF THE PATIENTS HAS BEEN **THE PRIMARY GOAL**
OF ALLERGY INVESTIGATIONS.

*«To understand the human soul and body, one has to
apprehend the universality of what surrounds him ...».
from Hippocrates «The Old medicine»*

GOALS OF THE SWISS SOCIETY OF AEROBIOLOGY:

- ❑ SUPPORT WITH **LOCAL OBSERVATIONS** AND CLINICAL DATA'S THE SWISS NETWORK OF POLLEN STATIONS [METEOSWISS]
- ❑ PROMOTE EDUCATION ON POLLEN TAXA AND OTHER PARTICLES PRESENT IN THE AEROSOL
- ❑ PROMOTE STUDIES AND RESEARCH ON THE EFFECTS OF CHANGES IN THE ENVIRONMENT
- ❑ ESTABLISH **CORRELATIONS BETWEEN THE ENVIRONMENT** AS A WHOLE WITH THE SYMPTOMS OF THE PATIENTS

Markus Gassner

Observations on the extended pollen immissions of “*Alnus x spaethi*” a modified Alnus tree implanted in city environment [pollution resistant]

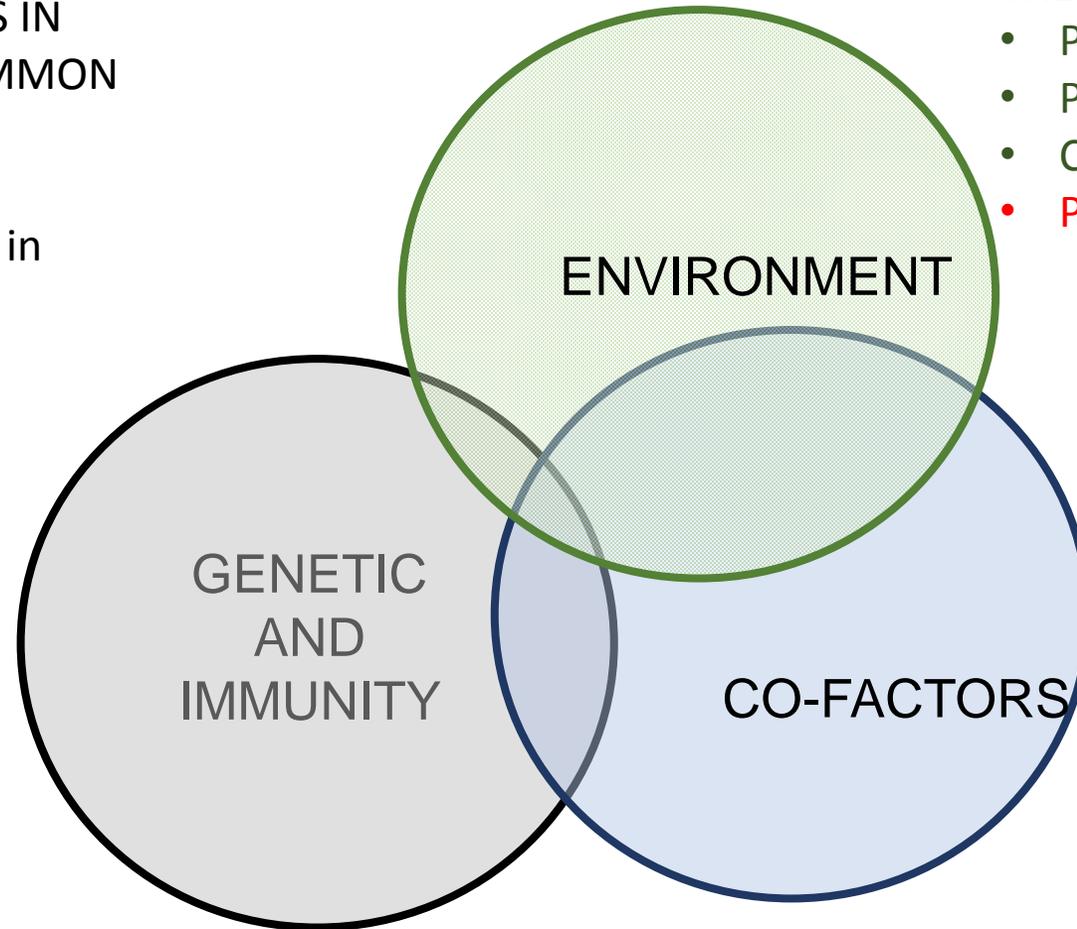
INVESTIGATING REACTIONS TO AIRBORNE PARTICULES: MORE THAN JUST TESTING ALLERGENS

INCREASE IN ALLERGIES AS WELL AS IN INFLAMMATORY DISEASES IS A COMMON EVIDENCE.

Everywhere in the world: in Occidentalised countries as well as in developing countries !!

IS IT JUST AN ENVIRONMENTAL PROBLEM`?

- **HOW DOES THE IMMUNE SYSTEM ADAPT TO THE HUMAN ACTIVITIES ?**
- **CAN IT REALLY ADAPT OR DOES IT JUST REACT ?**

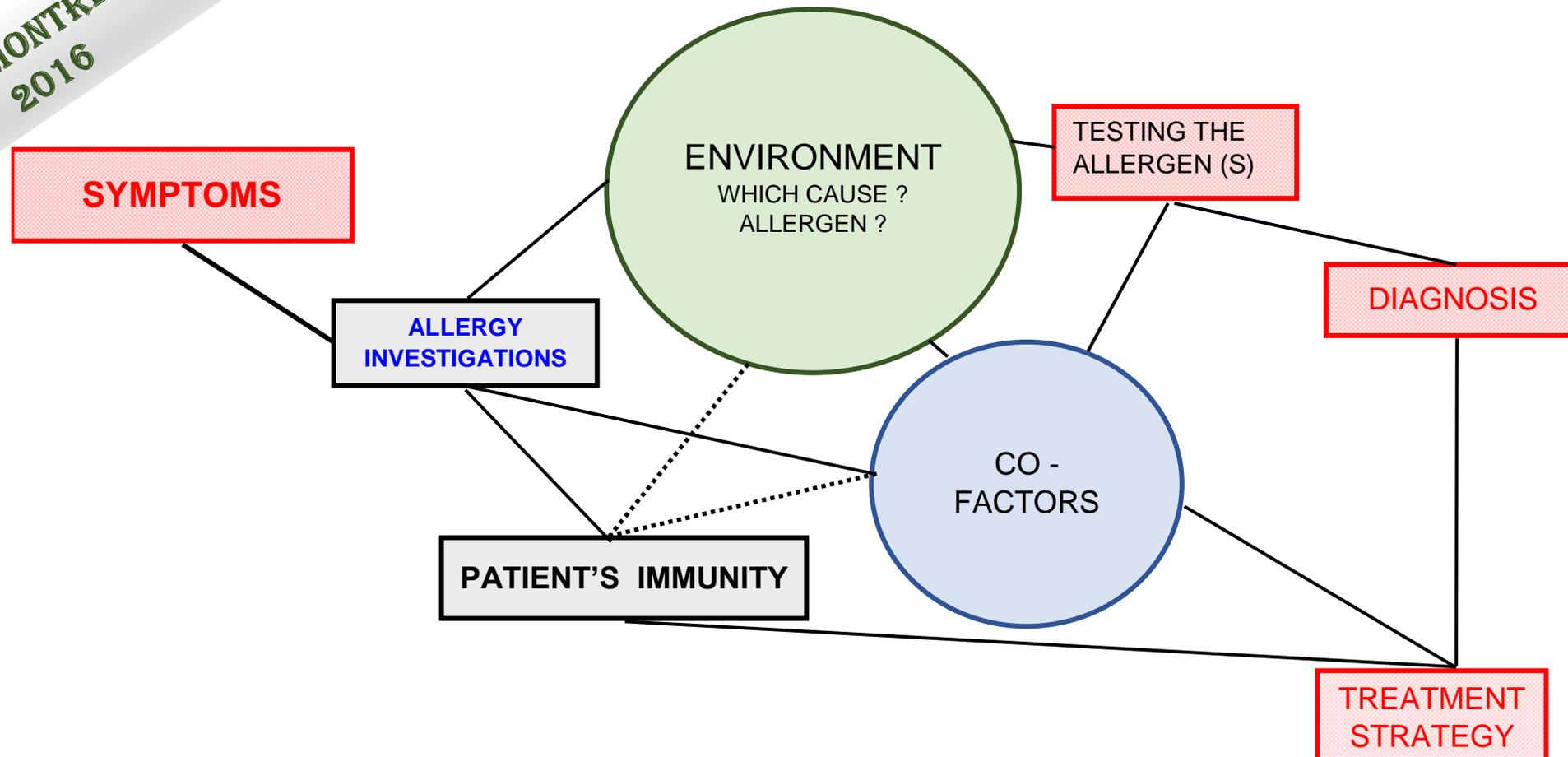


- THE ENVIRONMENT CHANGES
- POLLEN AEROSOLS CHANGE
 - POLLEN QUALITY CHANGES
 - CLIMATE CHANGES
 - **POLLUTION CHANGES**

- TOXINS
- INDOOR POLLUTION
- MICRO-ORGANISMS
- NANO-PARTICULES
- MICROBIOTE
- HYGIENE HYPOTHESIS
- VACCINES ADJUVANTS
- OCCIDENTAL DIET
- MEDICAL INTERVENTIONS
-

INVESTIGATING ALLERGIES: « A COMPLEX POLICE INQUIRY »
WHERE THE ALLERGIST HAS TO BE AN INVESTIGATOR, A FORINSEC EXPERT
AND A PROSECUTOR ALL TOGETHER.

SSAI MONTREUX
2016



Environment
? Allergen ?

Dr Måns Österberg, Ångelholm, Sweden

From the allergen source to the (nearly) ready to use allergenic extract ...

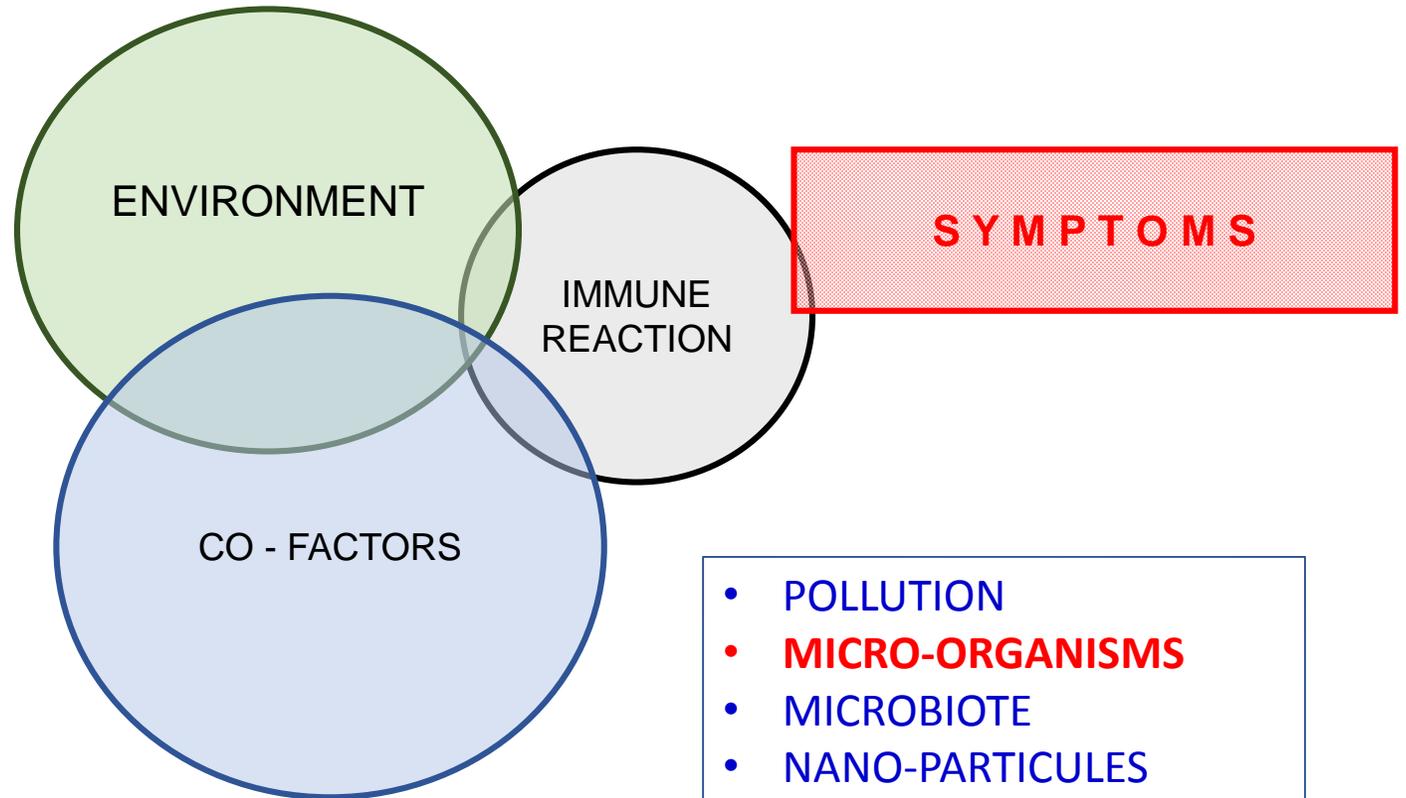
Well characterized specific IgE allergens and molecular allergy does not explain all !

- *Patients with elevated in vitro IgE sensitization can have weak to moderate allergic symptoms*
- *Patients with weak in vitro IgE sensitization can have very severe allergic reactions*

**SSAI MONTREUX
2016**

UNDERSTANDING THE MODULATION OF AN ALLERGENIC REACTION

THE ROLE OF CONCOMITANT ENDOXINS EXPOSURE

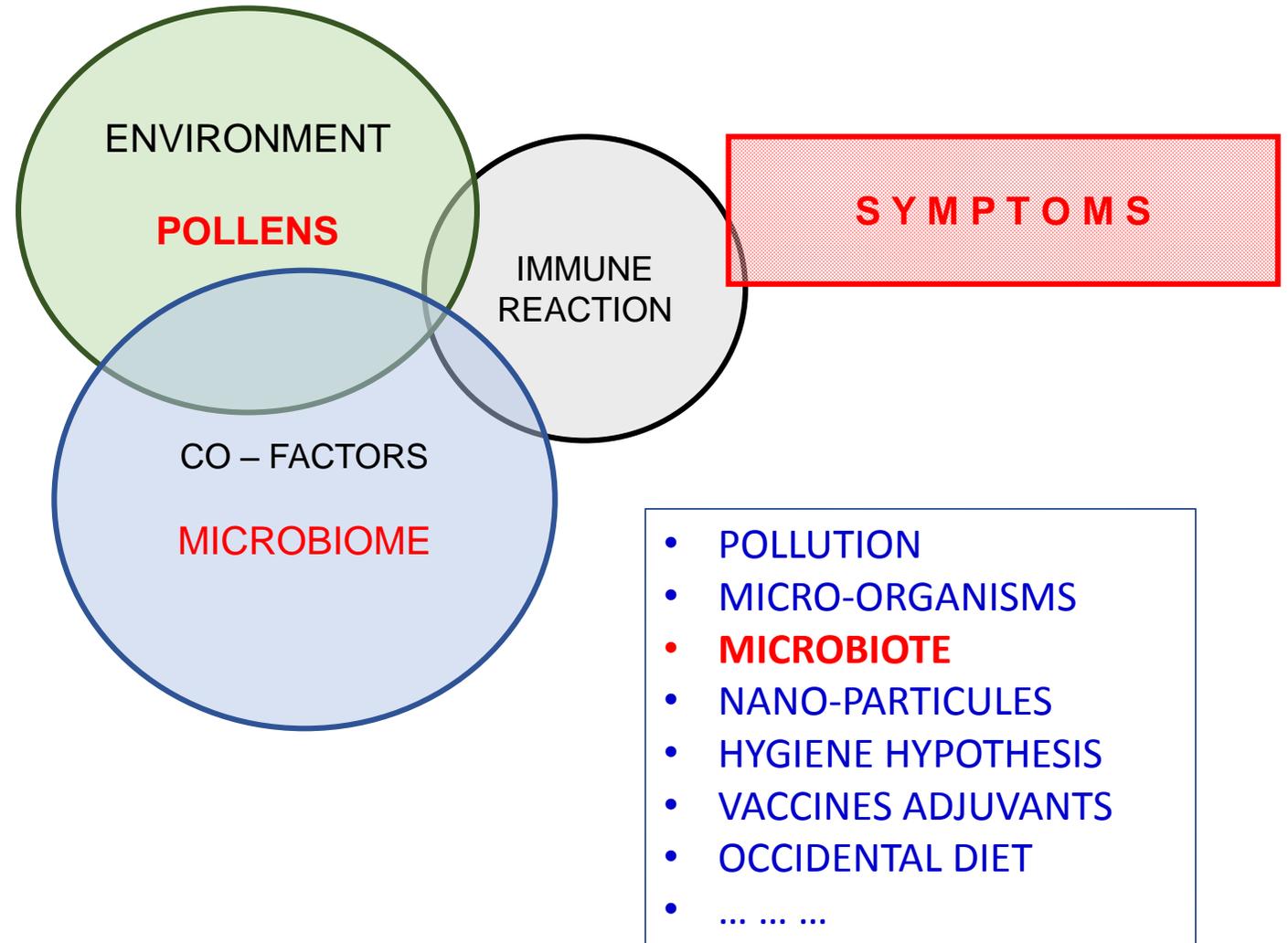


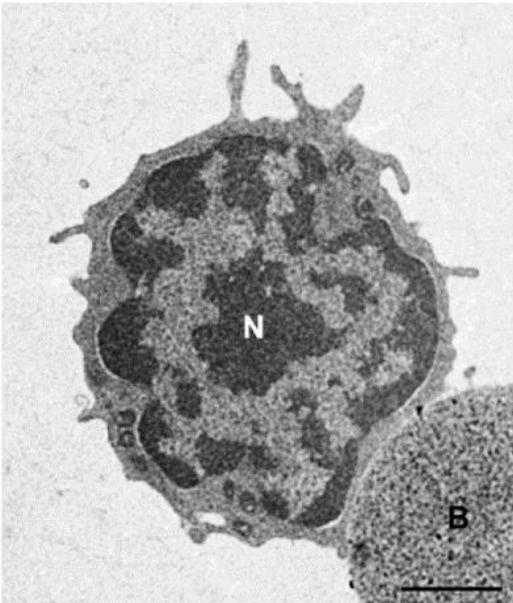
- POLLUTION
- **MICRO-ORGANISMS**
- MICROBIOTE
- NANO-PARTICULES
- HYGIENE HYPOTHESIS
- VACCINES ADJUVANTS
- OCCIDENTAL DIET
-

SSAI INTERLAKEN
2018

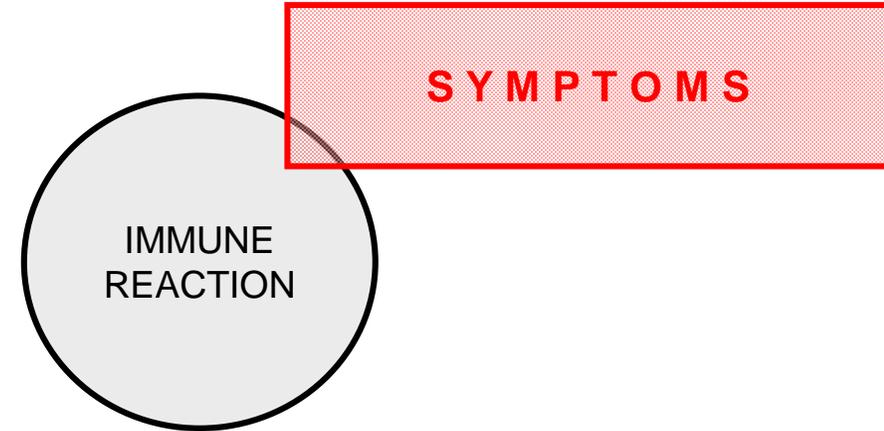
Prof Jeroen BUTERS
Münich, Germany

**Pollen become aggressive
by the microbiome they
carry: the story of Davos
and Munich”.**





*Prof. Nataliya YEREMENKO,
Amsterdam, NL*



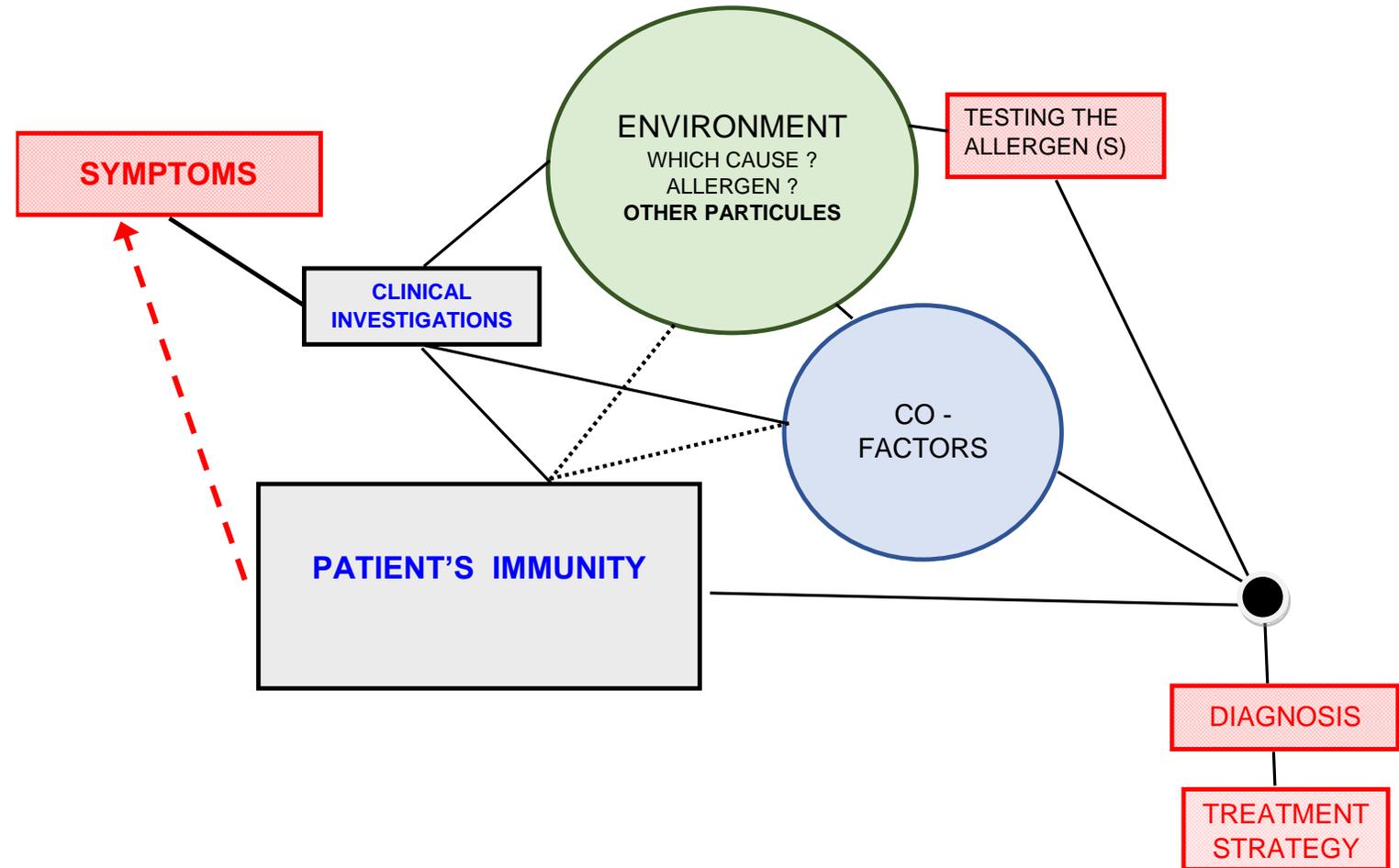
Mast cell are involved in inflammation
and participate in joint inflammation

INVESTIGATING AEROBIOLOGICALLY INDUCED INFLAMMATIONS:
 « A COMPLEX POLICE INQUIRY »
 WHERE THE IMMUNO-ALLERGIST HAS TO BE AN INVESTIGATOR, A
 FORINSEC EXPERT AND IS STILL A PROSECUTOR ALL TOGETHER.

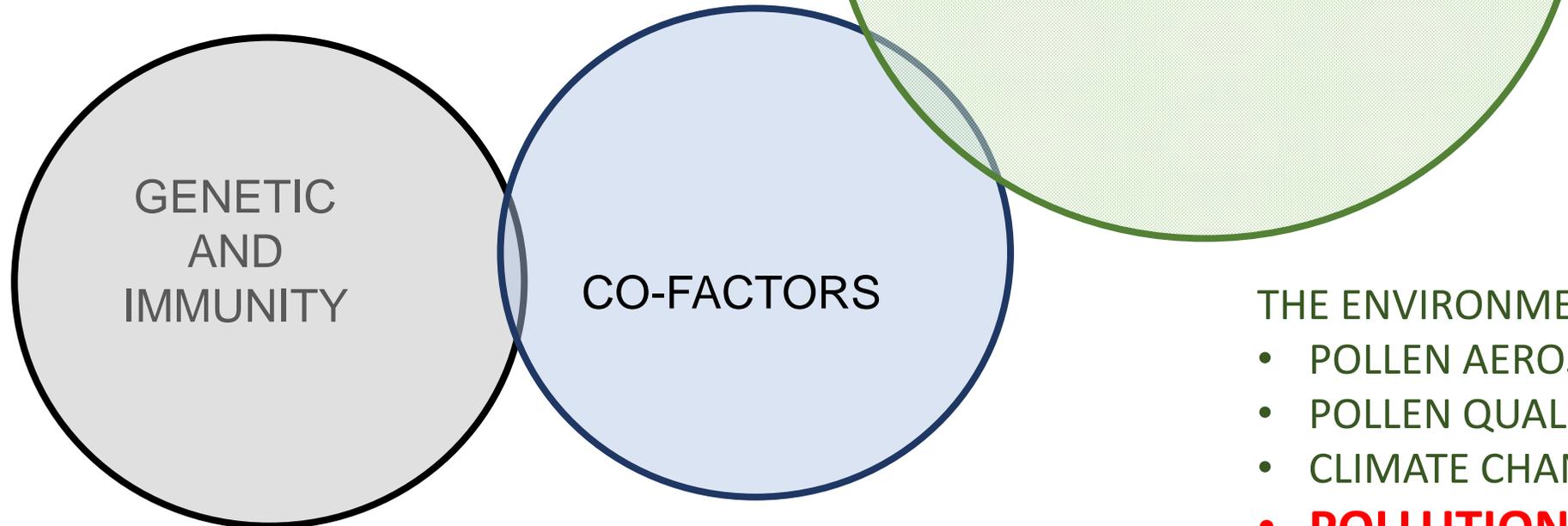
starting
 2000 → 2010 → 2018

**CUMULATED EVIDENCE FOR THE
 CRITICAL ROLE OF THE HOST
 MUCOSAL INTERFACE WITH THE
 ENVIRONMENT**

- LOCAL and SYSTEMIC EFFECTS ON THE IMMUNE BEHAVIOUR
- INTERFERENCE WITH THE PROGRAMMED IMMUNE DEVELOPMENT ?

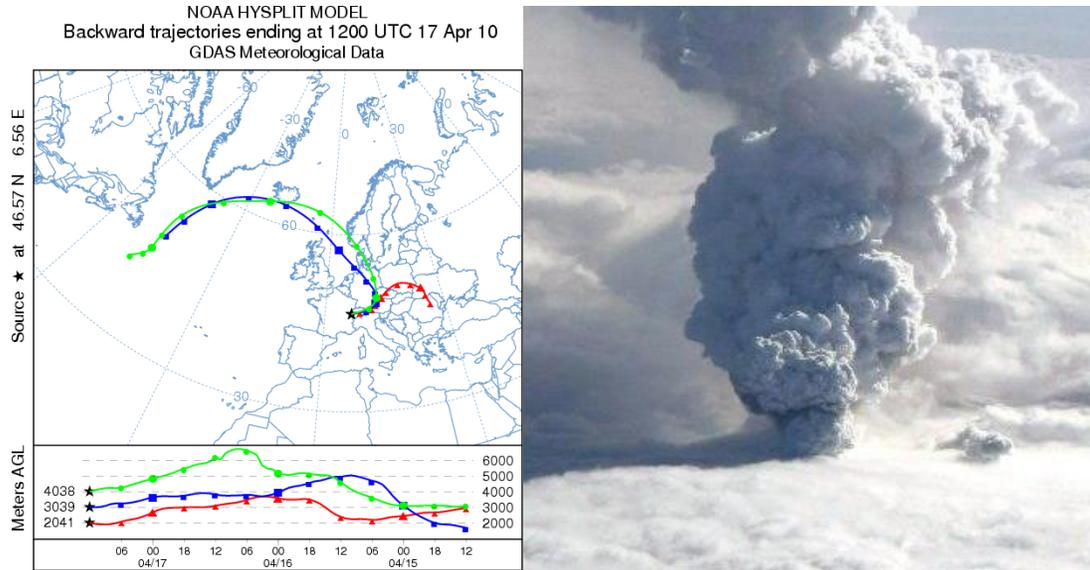


INVESTIGATING REACTIONS TO AIRBORNE PARTICULES:
MORE THAN JUST TESTING ALLERGENS



- THE ENVIRONMENT CHANGES
- POLLEN AEROSOLS CHANGE
 - POLLEN QUALITY CHANGES
 - CLIMATE CHANGES
 - **POLLUTION CHANGES**

AIR POLLUTION IF MOSTLY RESULTING FROM HUMAN ACTIVITY IS ALSO A NATURAL PHENOMENON



During this episode, sudden exacerbations of symptoms were reported by patients suffering from chronic ocular inflammation and by allergic patients with pollen conjunctivitis. These exacerbations could not be related to any other possible cause such as change in pollen concentration.

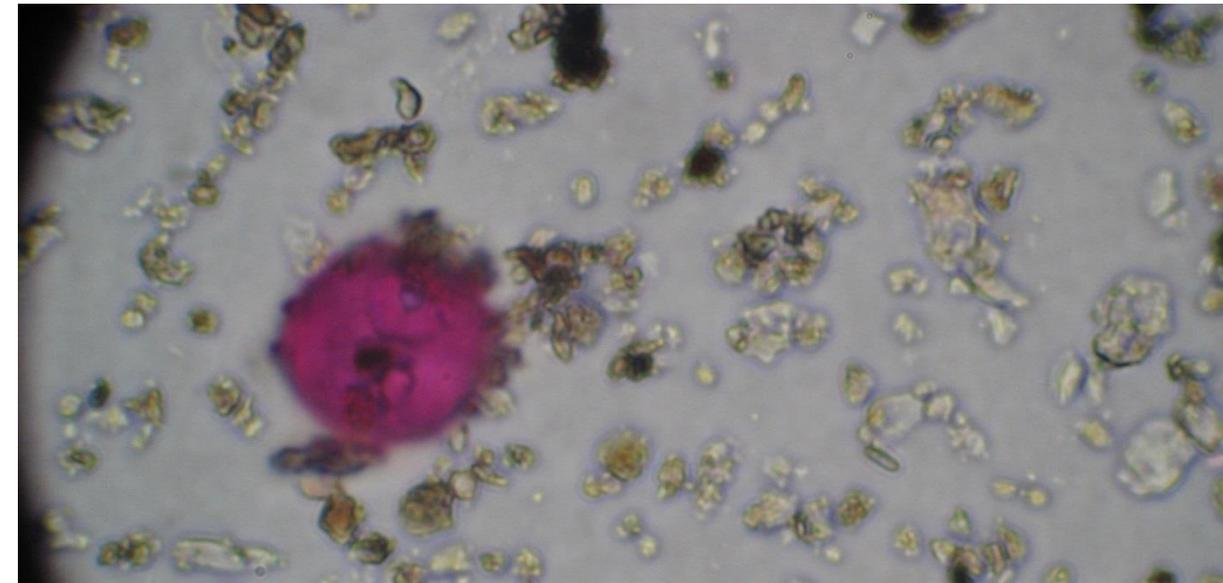


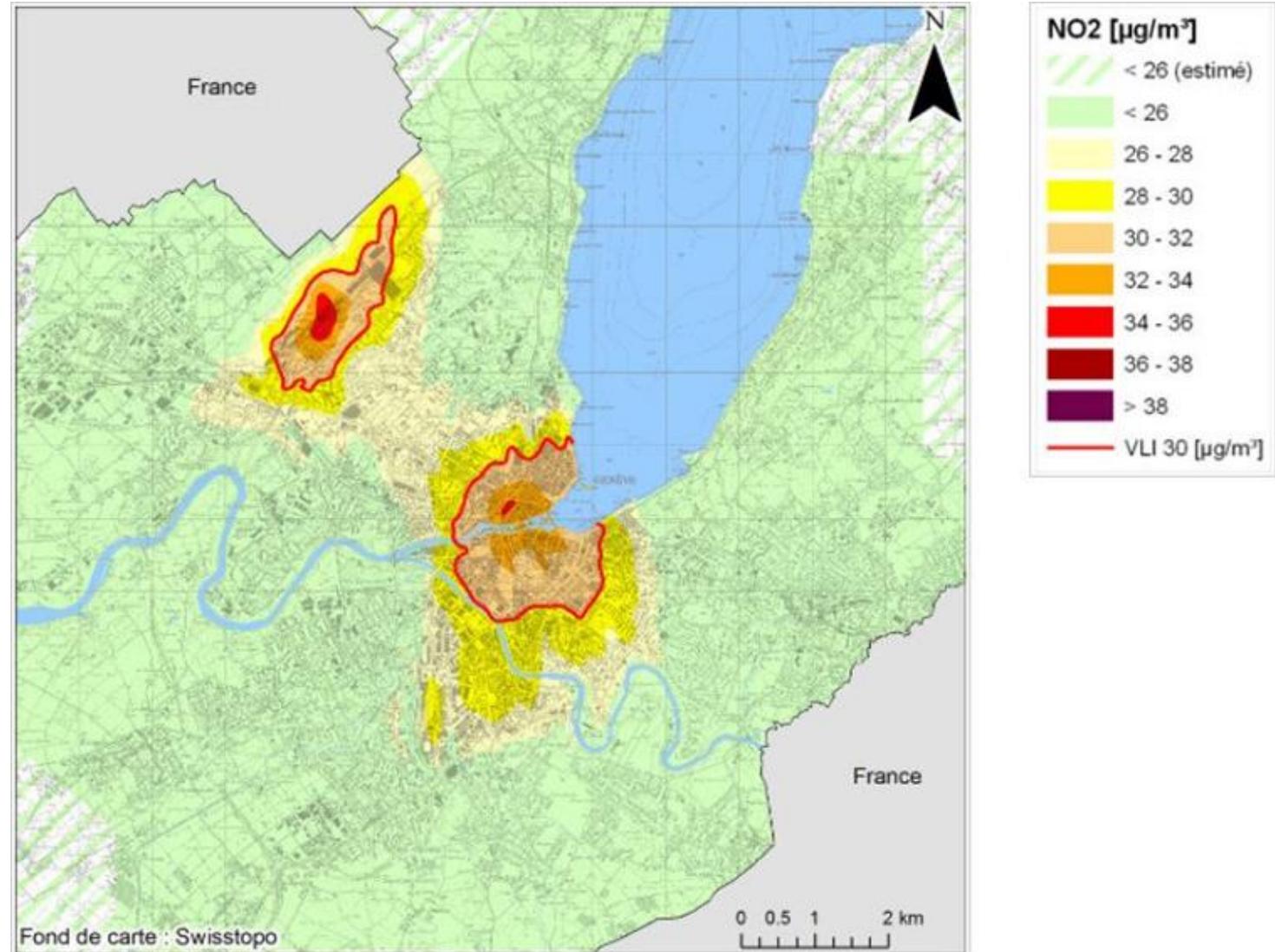
Fig. 3: Particles of Icelandic volcano ash (size: 1 to 5 microns) on the Hirst slide; pink colored: birch pollen grain.

Modified from:
 Bernard CLOT¹, Regula GEHRIG¹, Barbara PIETRAGALLA¹, Todor DINOEV²,
 Valentin SIMEONOV², Bertrand CALPINI¹, Pierre GUMOWSKI³.
Detection of ash from Icelandic volcano Eyjafjallajökull in Switzerland 2010

POLLUTION IS RELATED TO THE GEOGRAPHICAL SITUATION

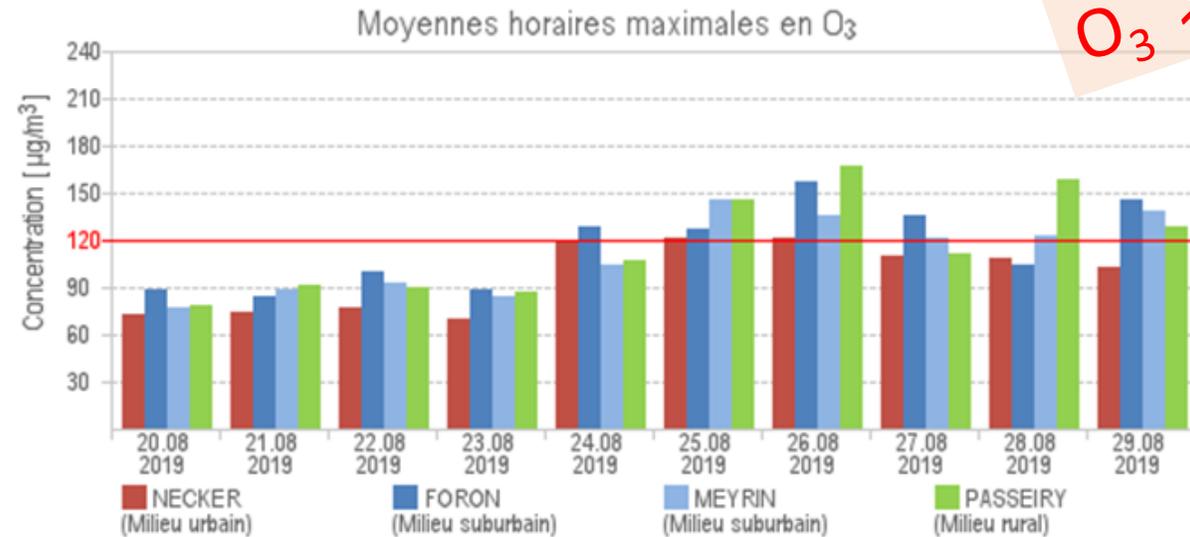
GENEVA:

- A small canton
- Densely populated
- Surrounded by mountains
- A lake, 2 large rivers
- A heavy car traffic
- An airport
- The junction of 3 major highways

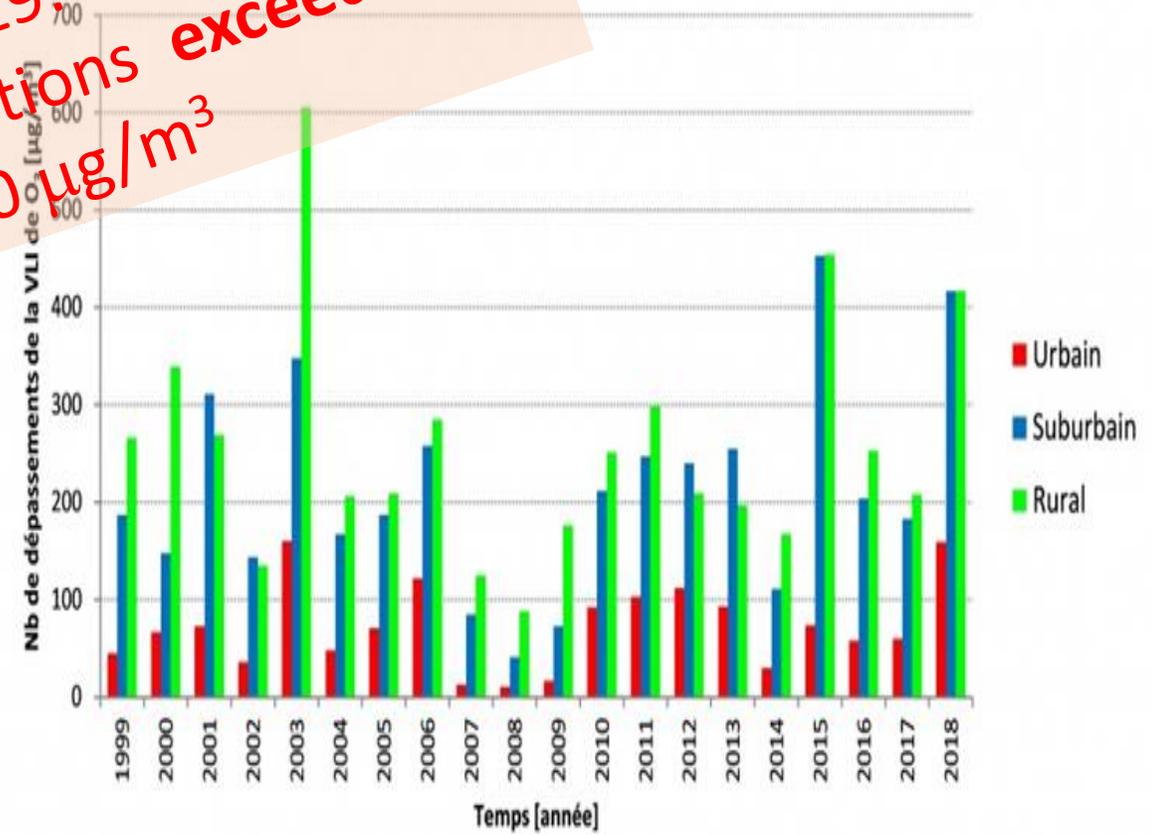


POLLUTION IS RELATED TO THE GEOGRAPHICAL SITUATION

Geneva aera



In July 2019:
 133 situations exceeding
 $O_3 > 180 \mu\text{g}/\text{m}^3$



TICINO

□ Dr Massimiliano Fontana

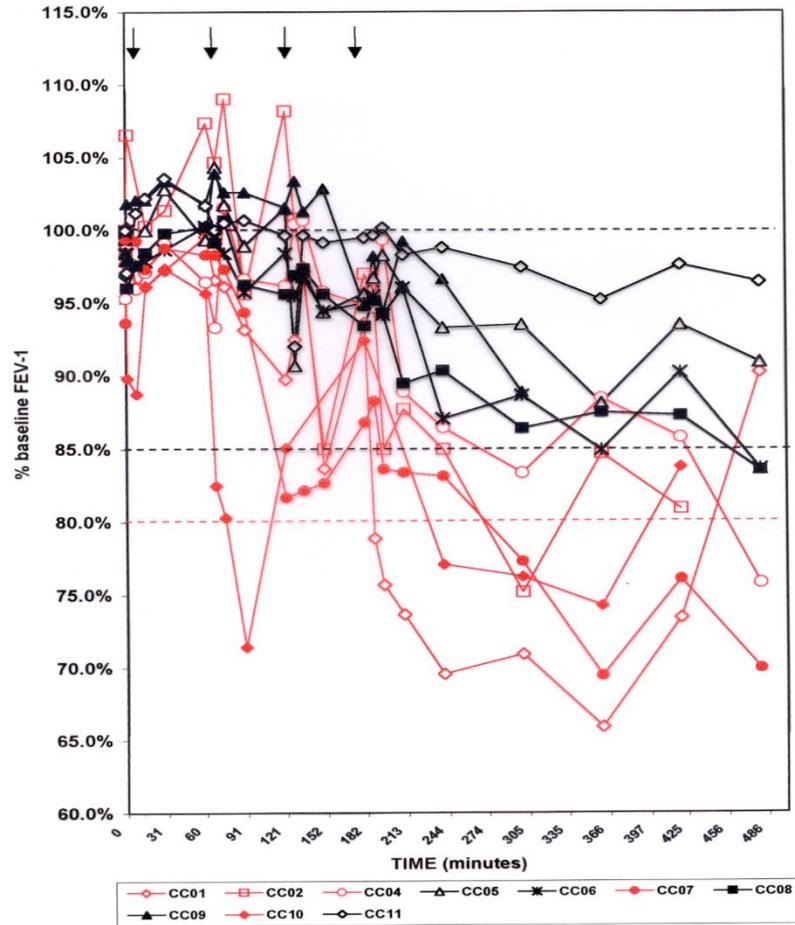
□ A story of industrial composting in Tessin:

□ A source of air pollution and a marker of past pollution

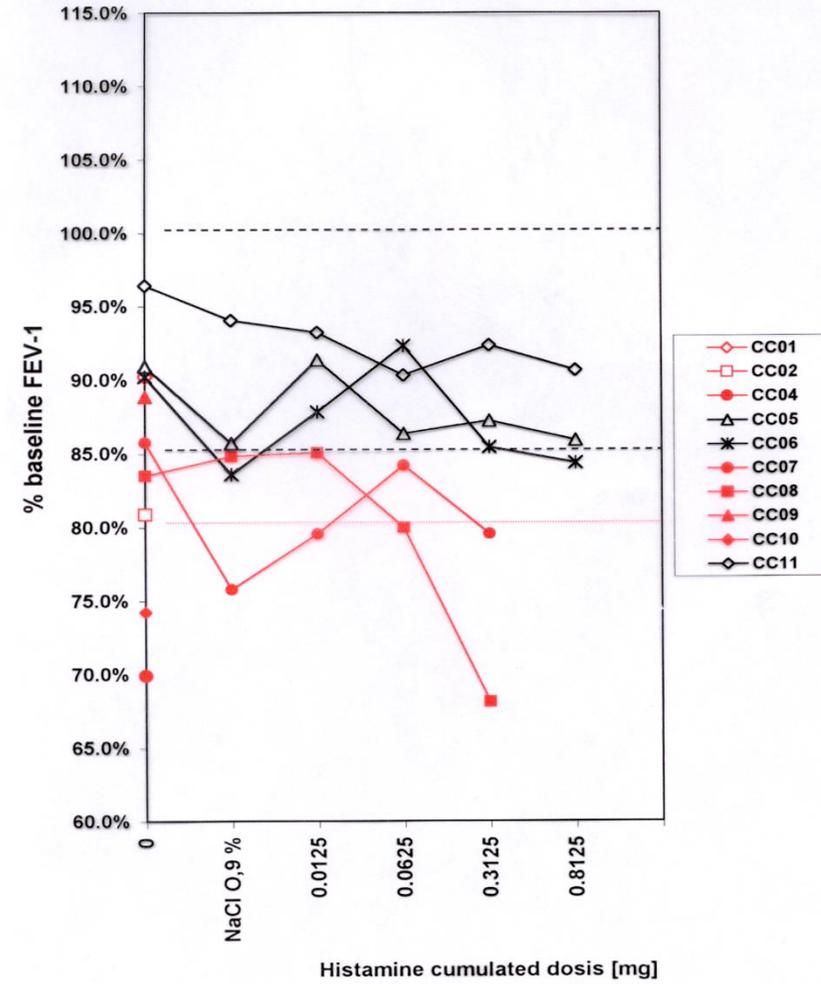
- *Selldorf P, Gandolla M, Beffa T, Aragno M, Stlettler B, Schlunegger, Gumowski PI, 1991*
 - *Beffa T, et al 1991, 1992*



FEV-1 after inhalation challenge
LPS



FEV-1 after histamine challenge 8 hours
after antigen inhalation challenge
LPS



INDUSTRIAL COMPOSTING

A source of air pollution and a marker of past pollution

- *Beffa T, et al 1991, 1992*

Chemical analysis of compost produced from agricultural vegetable waste from farms along the «Gothard» highway

- *Not recommended for gardening and vegetable culture*
 - *High concentrations of lead*
 - *High concentrations of various metals (asbestos: originating from brakes)*
 - *High concentrations of tyre dusts (small particules,, ...)*
 - *.....*

Pollution atmosphérique, climat et allergies

Dr méd. Massimiliano Fontana", Prof. em. Dr méd. Brunello Wüthrich^{b*}

Servizio di Allergologia e Immunologia Clinica Ospedale Regionale di Mendrisio Beata Veraine;
Spécialiste en Dermatologie et Vénérologie, spécialiste en Allergologie et Immunologie
clinique. Zollikerberg



Massimiliano Fontana



SWISS MEDICAL FORUM – FORUM MÉDICAL SUISSE 2019;19(35–36):580–583

- La pollution atmosphérique peut favoriser le développement de sensibilisations et pathologies allergiques respiratoires et même alimentaires.
- Il existe une association entre polluants atmosphériques, climat (effet de serre) et allergies respiratoires et cela à différents niveaux comme un calendrier de pollinisation plus précoce et prolongé, l'augmentation des quantités de pollens et le stress sur les plantes avec par conséquent une libération accrue d'allergènes dans l'environnement.
- **Politique et économie devraient tenir compte de ces facteurs.**

