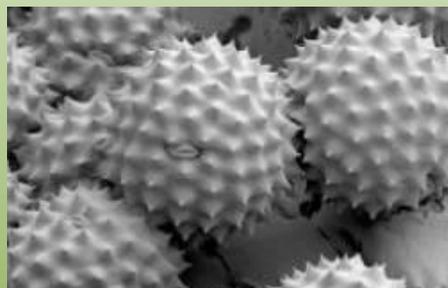




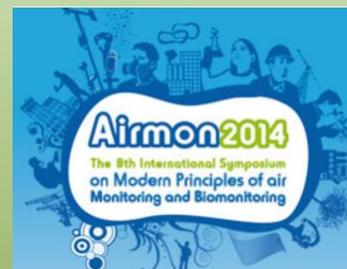
# Biological particles of the air and their health impact



M.Thibaudon<sup>1</sup> – G.Oliver<sup>1</sup> – U.Berger<sup>2</sup> – K.Bastl<sup>2</sup>

<sup>1</sup>RNSA, Brussieu, France

<sup>2</sup>Medical University of Vienna, Vienna, Austria



# Aerobiology: a multidisciplinary approach



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Dispersion  
&  
Transportation

Emission

Deposition

Source



Impact

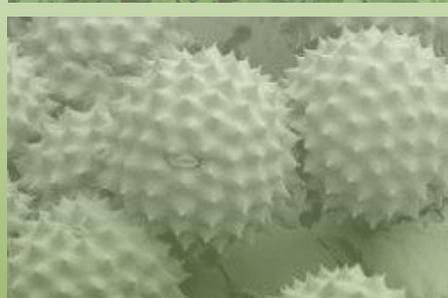
**Atchoum!**

Receiver



# Contents

- ✓ Aim of the study
- ✓ Materials and methods
- ✓ Clinical index results
- ✓ POLPAT study results
- ✓ PHD study results
- ✓ Conclusions
- ✓ Acknowledgment



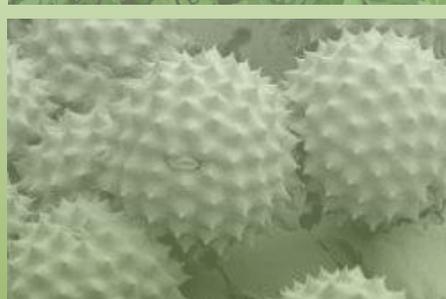
# Aim of the study

## ➤ State of the art :

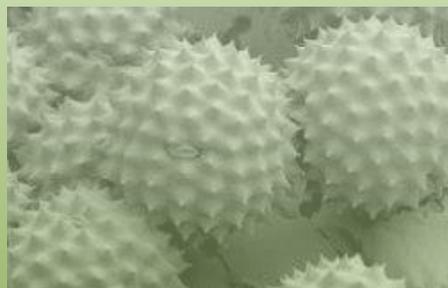
Ecological studies show a temporal association between the presence of some allergenic taxa like ragweed, birch, grasses, the consumption of anti-allergy drugs and hospitalizations for asthma.

## ➤ Aim of the study :

The aim of this study is to establish a relation between the pollen concentration and the symptom severity and to determine the threshold of sensibility of individual users.



# Materials and methods



# Exposure

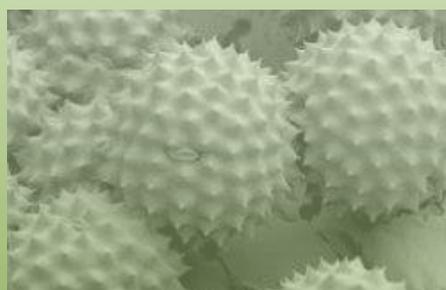
## Exposure: Metrology and pollen data:

- Daily ragweed pollen concentrations were obtained from the National Aerobiological Network Survey (RNSA).

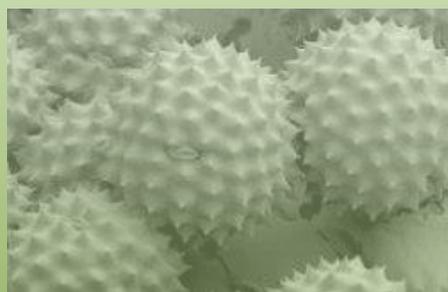


- Measurements were made with Hirst-type pollen traps.

- Pollen grains were identified and counted by trained analysts.



# Health impact : clinical index



RNSA Clinical Report							
RNSA - Clinical Report 2008				Dr.	Week 31 - City of		
Pollinic Symptoms	Yes <input type="radio"/>	No <input checked="" type="radio"/>	Number of pollinoses <input type="text"/>	Evolution / previous week	Increase <input type="radio"/>	Stagnation <input checked="" type="radio"/>	Decrease <input type="radio"/>
Symptom Gravity	Null		Weak	Mean	Strong		
Conjunctivitis	<input checked="" type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
Rhinitis	<input checked="" type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
Cough	<input checked="" type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
Asthma	<input checked="" type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
Cutaneous signs or other	<input checked="" type="radio"/>		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	

x1  
x2  
x1  
x1  
x1

Symptom Gravity	Null	Weak	Mean	Strong
Conjunctivitis	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Rhinitis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Cough	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asthma	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Cutaneous signs or other	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- « Mean » conjunctivitis:  $2 \times 1 = 2$
- « Strong » rhinitis:  $3 \times 2 = 6$
- « Weak » cough:  $1 \times 1 = 1$
- « Mean » asthma:  $2 \times 1 = 2$
- « Null » cutaneous signs:  $0 \times 1 = 0$

Clinical index for:  
 - a doctor  
 - a town  
 - a region  
 - the country

Clinical index  $\longrightarrow$  11 / 18

# POLPAT study

## ➤ Health impact :

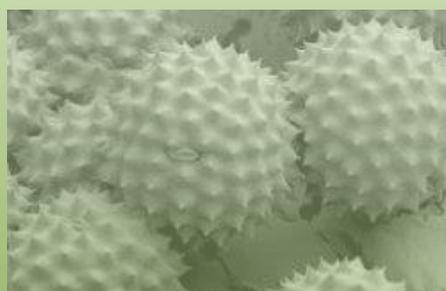
The patients were asked to complete a diary with ocular, nasal, and bronchial symptoms during the pollen seasons of ragweed, birch and grass.

They were asked to record their own symptoms each evening. The severity of ocular, nasal and bronchial symptoms were recorded on scale from 0 to 3 (0=no symptoms, 1=light symptoms, 2=moderate symptoms, 3=severe symptoms).

## ➤ Quality of life :

The quality of life was also a variable assessed by patients on a scale from 0 (bad quality of life) to 10 (good quality of life).

RNSA provided the rate of pollen, Météo-France meteorological parameters, ADEME PM<sub>10</sub>, NO<sub>2</sub>, and O<sub>3</sub>.



# PHD – Scores symptoms – Study



pollendiary.com

rnsa@rnsa.fr

- Data Entry
- Visualisation
- History
- Settings
- Regions
- User Administration
- Logout

**Immer informiert mit der Pollen App!**

Version 2.0 jetzt verfügbar!

Unser gratis Pollen App bietet Ihnen aktuelle Werte für ganz Österreich und Deutschland, und nützliche Informationen rund ums Thema Pollenallergie für unterwegs.

Klicken Sie **hier** für weitere Informationen.

## Data Entry - March 20, 2014 (yesterday)

Overall Symptom Score very poor normal very good



☹ ☺

**Location**

Country: France ▼

Place:

**Eyes**

<b>Problems</b>	<input checked="" type="radio"/> None <input type="radio"/> Mild <input type="radio"/> Moderate <input type="radio"/> Severe	<b>Symptoms</b>	<input type="checkbox"/> Itching <input type="checkbox"/> Foreign body sensation <input type="checkbox"/> Redness <input type="checkbox"/> Watering
-----------------	---	-----------------	--

**Nose**

<b>Problems</b>	<input checked="" type="radio"/> None <input type="radio"/> Mild <input type="radio"/> Moderate <input type="radio"/> Severe	<b>Symptoms</b>	<input type="checkbox"/> Nose Itching <input type="checkbox"/> Sneezing <input type="checkbox"/> Nose Running <input type="checkbox"/> Nose Blocked
-----------------	---	-----------------	--

**Lungs**

<b>Problems</b>	<input checked="" type="radio"/> None <input type="radio"/> Mild <input type="radio"/> Moderate <input type="radio"/> Severe	<b>Symptoms</b>	<input type="checkbox"/> Wheezing <input type="checkbox"/> Shortness of Breath <input type="checkbox"/> Cough <input type="checkbox"/> Asthma
-----------------	---	-----------------	--

**Medicines**

<input type="checkbox"/> None <input type="checkbox"/> Eye Drops <input type="checkbox"/> Nose Drops (or Spray) <input type="checkbox"/> Anti-Allergy Tablets <input type="checkbox"/> Homeopathic Remedy <input type="checkbox"/> Other	Please mark the medicines you have taken, or "None" if no medicine was necessary.
---	---

**Comments**

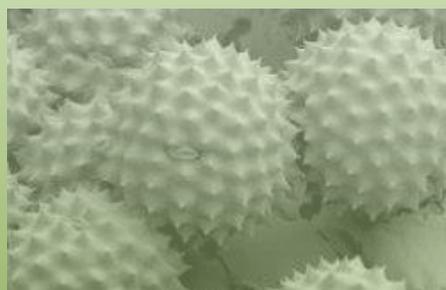
**PHD = Pollen Hayfever Diary**

### PHD interests :

- Establish scores symptoms arising directly from the patient felt.
- Establish individual levels of sensitivity of patients and averages of health impact of the exposure to ragweed pollens on an area.

# PHD study – Materials and methods

- For this study, information on the user's location (biogeographical regions), pollen data were also provided by RNSA pollen traps.
- Health impact was assessed based on the entries of Patient's Hay fever Diary (PHD) users, who fill in their overall feeling, organ specific symptoms and medication use on a web-based platform. All data were included to calculate a symptom score (from 0 to 26).
- **PHD = A recording daily symptoms in patients allergic to correlate exposure and health impact.**



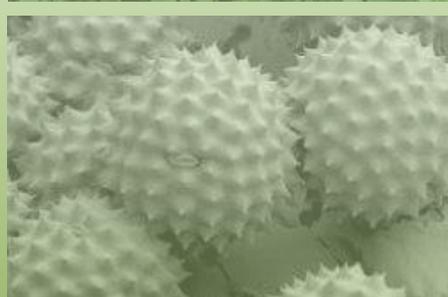
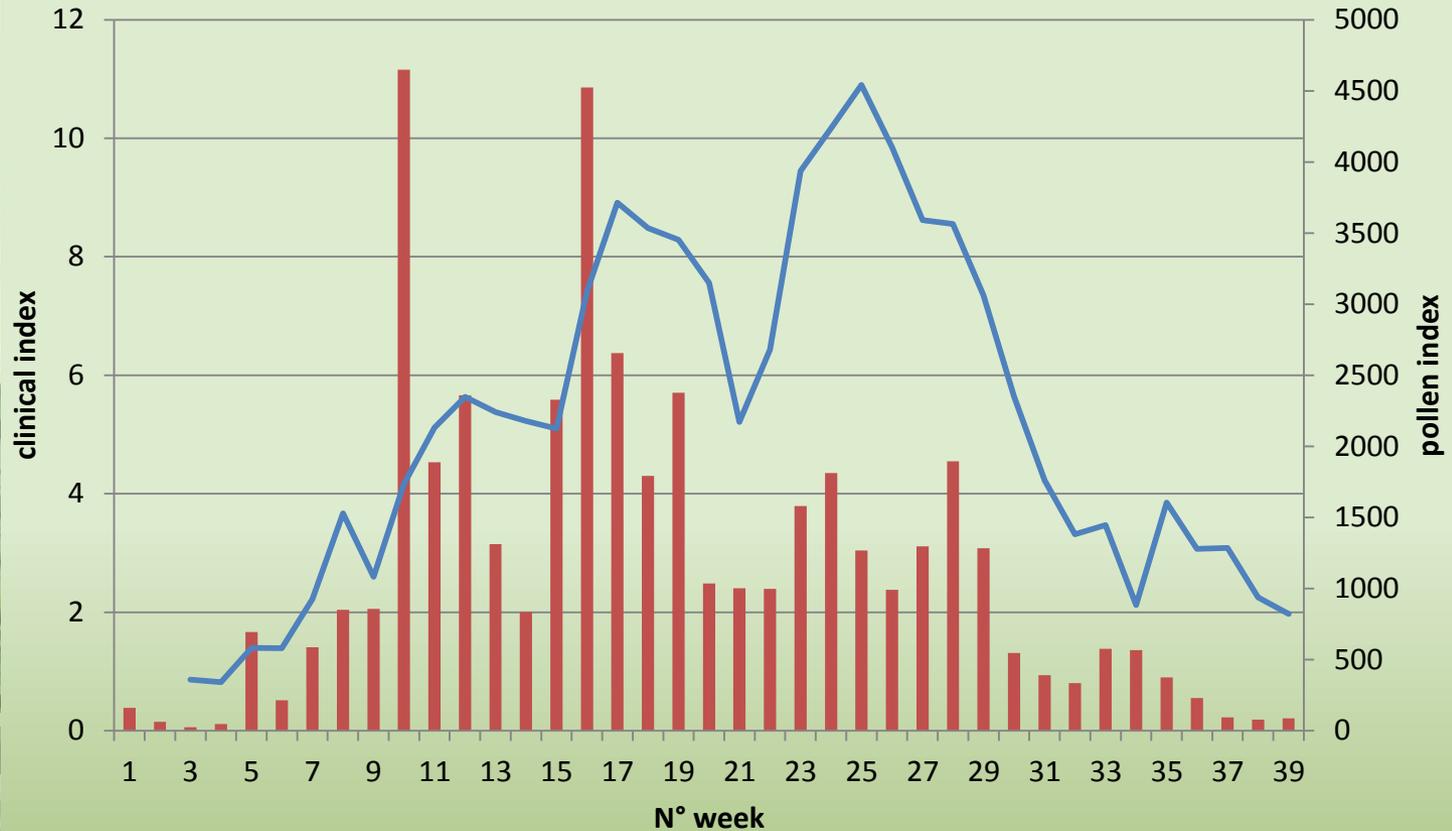
**PHD = Pollen  
Hayfever Diary**



# Clinical index - Results

## Clinical index and pollen index for France - 2013

■ pollen index    — clinical index



# POLPAT study - Results – Exposure – Birch and grass panel



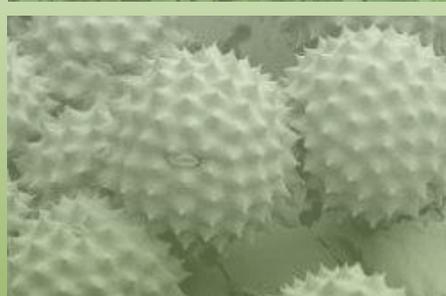
Table 1 Birch panel	Birch $\leq$ cut off OR (95%CI)	Birch $>$ cut off OR (95%CI)
Nasal symptoms (cut off = 110)	<b>2.01</b> (1.36-3.00)	0.99 (0.90-1.09)
Ocular symptoms (cut off = 70)	<b>4.80</b> (2.14-10.80)	0.97 (0.87-1.07)
Bronchial symptoms (cut off = 70)	<b>2.97</b> (1.30-6.75)	0.91(0.80-1.04)

Table 1 shows that during the whole birch pollination, for each increase of 10 grains/m<sup>3</sup>, the percentage of patients with moderate to severe symptoms also increased (odds ratio, standard deviation.)

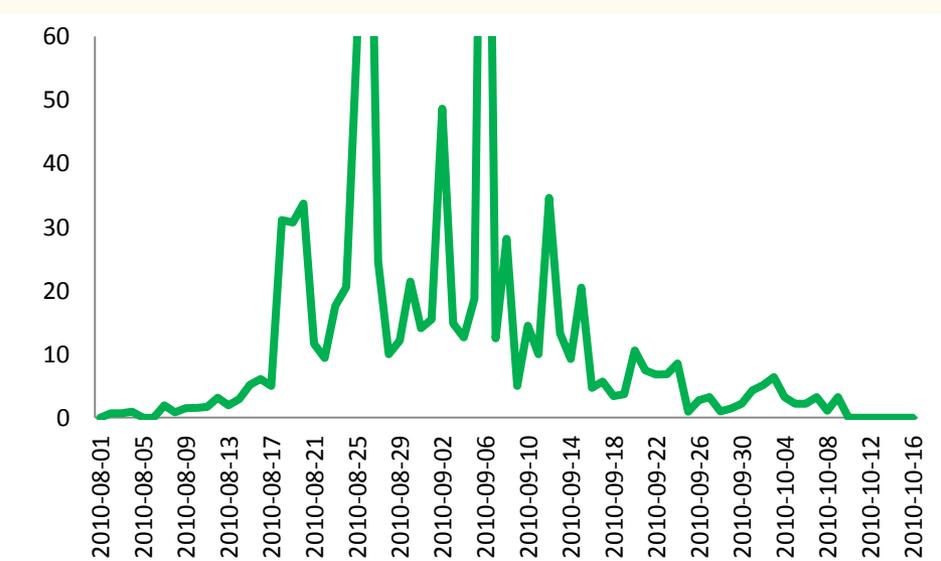
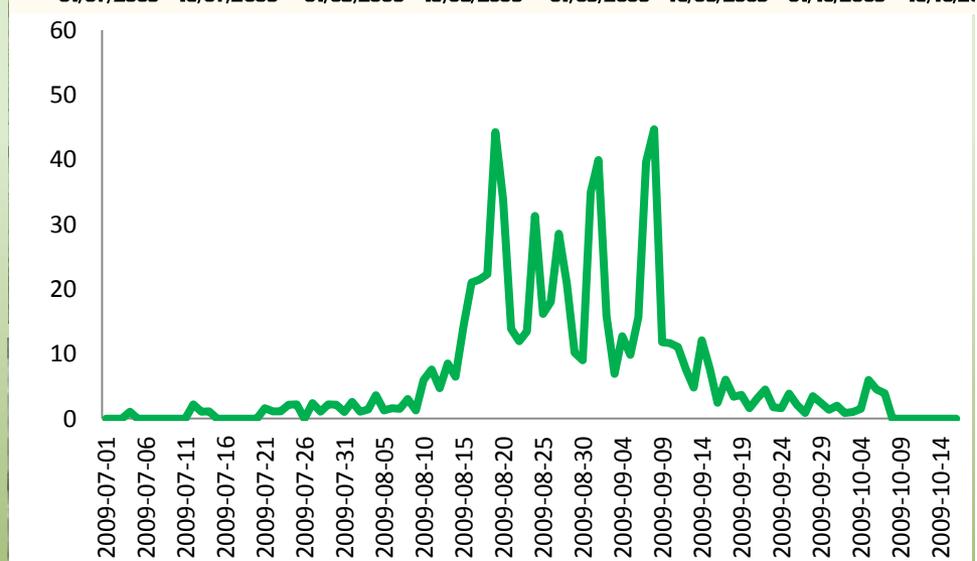
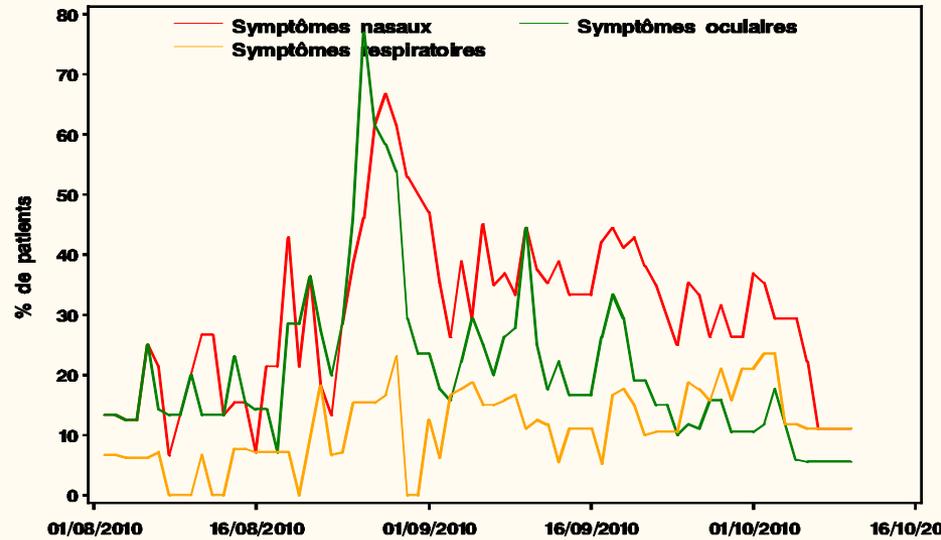
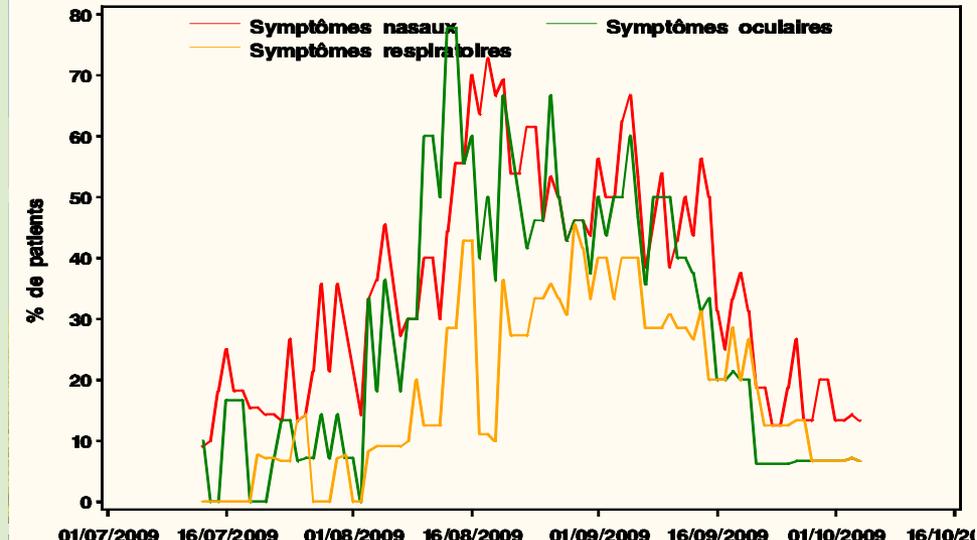


Table 2 grass panel	Total population	With perennial sensitization	Without perennial sensitization
Nasal symptoms	<b>2.68</b> (1.23-5.82)	<b>4.22</b> (1.39-12.81)	<b>2.37</b> (0.85-6.55)
Ocular symptoms	<b>1.86</b> (0.55-6.30)	NA	

For nasal symptoms, the relationship is higher in people with perennial sensitization (OR **4.22** [1.39-12.81]) than in people without perennial sensitization (OR **2.37** [0.85-6.55]). With regard to nasal and ocular symptoms, there is a priming effect and co-priming early in the season without a threshold, then a linear response up to a plateau.



# POLPAT study - Results – Exposure – Ragweed panel



(Ragweed 2009)

(Ragweed 2010)



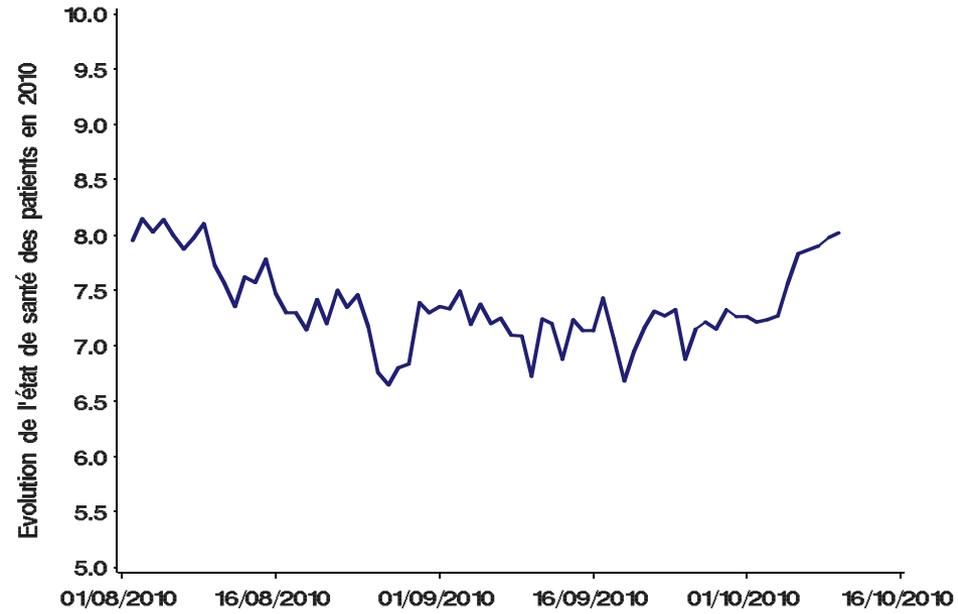
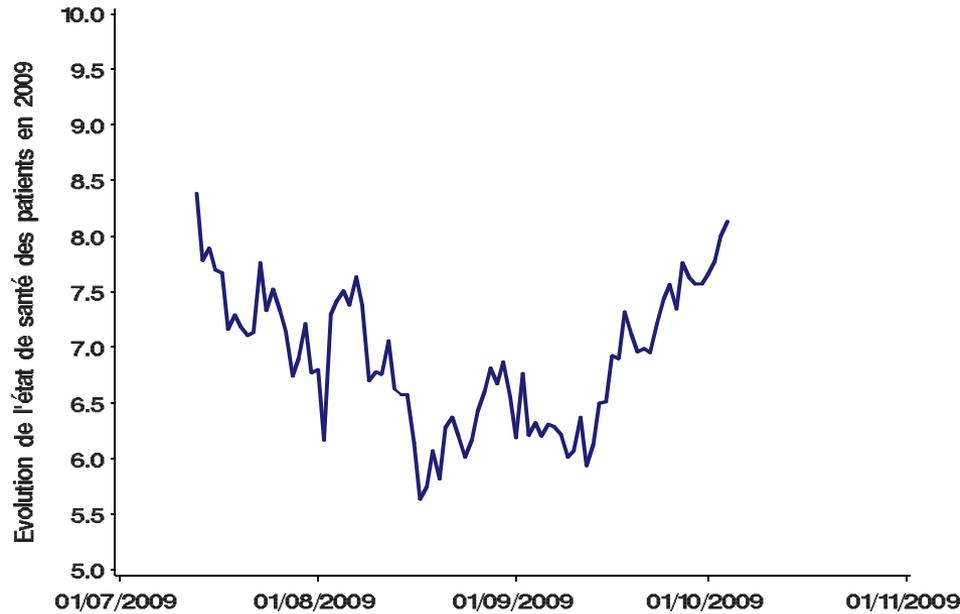
# POLPAT Study - Results – Health impact – Ragweed panel

Symptoms/Years	2009	2010
Ocular symptoms	1.324	1.049
Respiratory symptoms	1.139	1.027
Nasal symptoms	1.426	1.247



In 2009, there was an average increase of **32.4%** in the prevalence of moderate to severe ocular symptoms and **13.9%** for respiratory symptoms and **42,6%** for nasal symptoms for an increase of **10 grains/m<sup>3</sup>** pollen. This increase was lower in 2010

# POLPAT study – Results – Quality of life – Ragweed panel

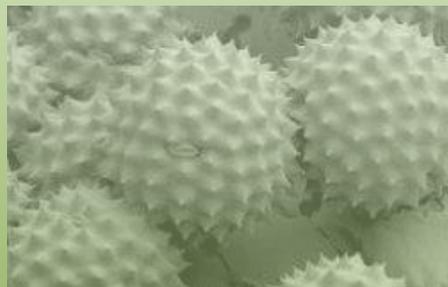


**(Graph 1 : Quality of life in 2009 )**

**(Graph 2 : quality of life in 2010)**

For each increase of 10 grains/m<sup>3</sup>, the quality of life, measured on a scale of 0 to 10, decreased significantly (0.099 point in 2009 and 0.020 points in 2010).

There was a significant and negative relationship between quality of life and concentrations of ragweed pollen, and this relationship was stronger in 2009 (Graphs 1 and 2). Quality of life deteriorates significantly when ragweed pollen increases.

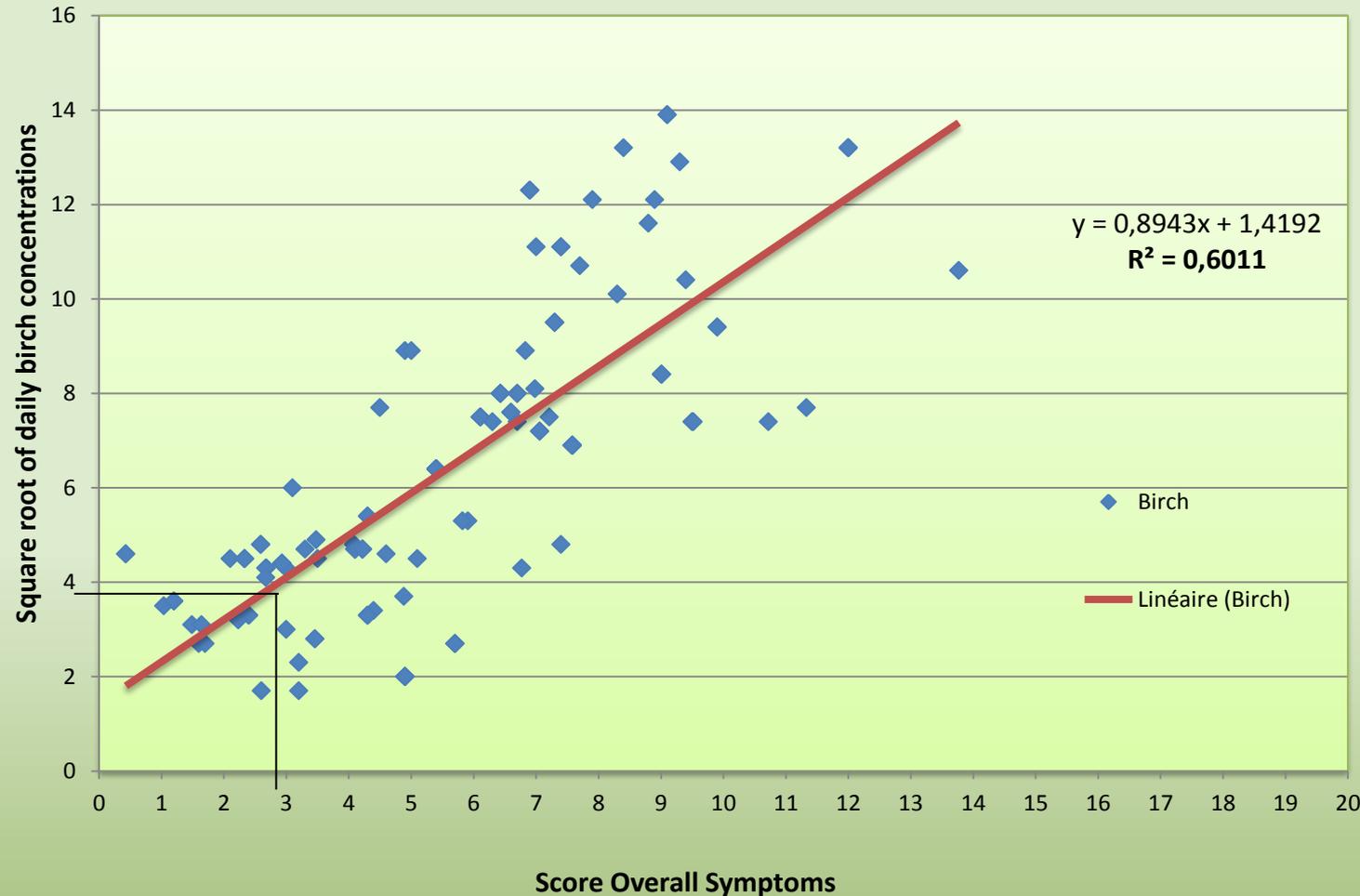




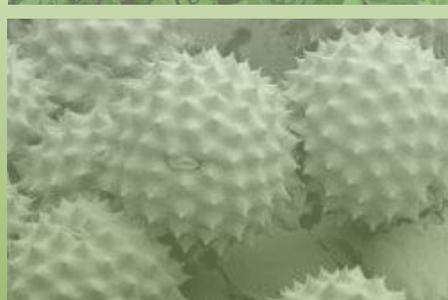
# PHD – Scores symptoms – Study – Results

## Birch

Birch pollen according to score overall symptoms- 2010 à 2012



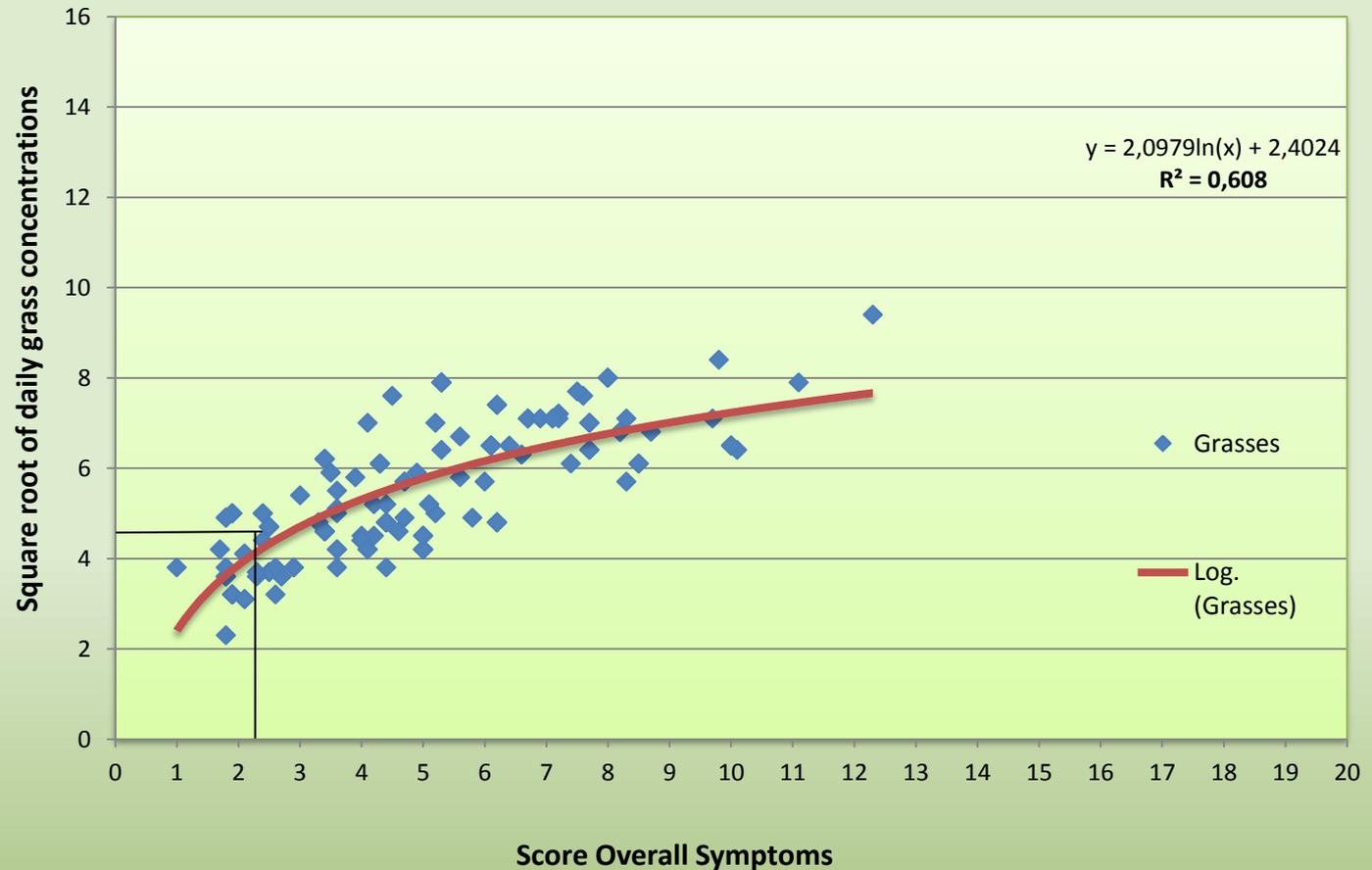
*Birch pollens and score-symptom in France (2010-2012)*



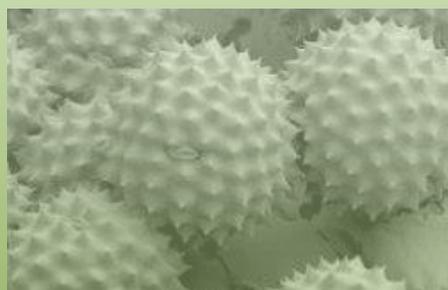
# PHD – Scores symptoms – Study – Results

## Grass

Grass pollen according to score overall symptoms - 2010 à 2012

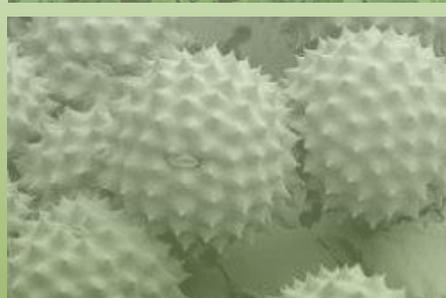


*Grass pollens and score-symptom in France (2010-2012)*



# Conclusions

- In POLPAT study, Clinical response among sensitized patients shows a linear and significant relationship, between the increase in ragweed or birch or grass pollen and nasal and ocular and respiratory symptoms. Quality of life deteriorates significantly when ragweed pollen increases.
- The PHD and POLPAT studies give insight into the relation between health condition and pollen exposure of pollen allergy sufferers and confirm that only few pollen grains are enough to trigger symptoms. There is a dose-response relationship between the ragweed pollen exposure and the symptom severity.
- Participation of many institutions and decision makers among them the RNSA, health authorities, medical institutions and botanical and ecological research communities is needed to cover a major topic like pollen allergy.



# Acknowledgement

Many thanks to all those who have helped in any way to achieve these studies.

Thanks to all our colleagues and partners from Météo France, Météo Suisse and ADEME.

Thank you to all patients who were volunteers for these studies and all the statisticiens and analysts who worked to achieve these results.

