



# Immunologic status of agricultural workers in the region of Lombardy, Northern Italy

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## INTRODUCTION

Farming is associated with a wide variety of hazardous exposures including physical, chemicals and biological agents. Animal farmers are exposed to dust which contains microorganisms, mycotoxins, endotoxins, animal feed particles, allergens and chemical agents. Organic dust exposure is known to cause allergic and non-allergic rhinitis, and organic dust toxic syndrome. Available data suggest that these diseases preceded, in an asymptomatic phase, by changes in some cellular and immune parameters. This study was undertaken to evaluate the relationship between biological occupational health hazards and selected serum cytokines among agricultural workers in north of Italy.

## MATERIALS AND METHODS

One hundred subjects working in agricultural enterprises in the region of Lombardy, were enrolled into the study in 2010. Blood samples were obtained from all the participants by venipuncture during the routine activities of periodical health surveillance of agricultural workers carried out by our Center. Serum cytokines including interleukin IL-6, IL-8, IL-10, IFN $\gamma$  and tumor necrosis factor- $\alpha$  (TNF $\alpha$ ) were measured. Cytokines were assessed by commercially available enzyme-linked-immunosorbent assay (ELISA). Data processing and statistical analysis was performed with using the SPSS 18 software (SPSS Inc., Chicago, IL, USA).

## RESULTS

All individuals recruited in this study were divided into two groups. The exposed group was consisting of breeders (n=65, 68%) and among them 29 (44.6%) were swine breeders and 36 (55.4%) were cattle breeders. The control group (n=31, 32%) was made up of agricultural workers not involved in animal breeding (non breeders).

The mean age of the subjects involved was 41.5 (range 19-70 years). Fifty-seven workers (59.4%) were Italian, 16 (16.7%) came from other European countries, 14 (14.6%) from Asia, 7 (7.3%) African and 2 (2%) from South America.

Compared to control subjects, increased TNF- $\alpha$ , IL-8, and IL-10 levels were found in animal breeders and the difference was statistically significant ( $p < 0.05$ ) between the two groups (breeder/non breeder workers) (Table1).

Table 2 shows that swine breeders cytokines (IFN $\gamma$  and IL10) are increased compared to the cattle breeders.

**Table 1. laboratory results (cytokines) of the population under study (breeders and non-breeders).**

Cytokine	Job	Median	P
IFN $\gamma$	Breeder	10.8	0.32
	NB	10.5	
TNF $\alpha$	Breeder	190.1	<b>0.001</b>
	NB	150.6	
IL10	Breeder	45.3	<b>0.013</b>
	NB	34.6	
IL8	Breeder	40.6	<b>0.000</b>
	NB	29.7	
IL6	Breeder	5	0.27
	NB	4.8	

**Table 2. laboratory results (cytokines) of the population under study according to type of breeding.**

Cytokine	Type of breeding	Median	P
IFN $\gamma$	swine	11	<b>0.047</b>
	cattle	10.35	
TNF $\alpha$	swine	210.8	0.062
	cattle	174.6	
IL10	swine	78	<b>0.02</b>
	cattle	38.6	
IL8	swine	51.7	0.11
	cattle	38.5	
IL6	swine	5.25	0.16
	cattle	4.8	

## DISCUSSION AND CONCLUSIONS

The results of this pilot study suggested that animal breeders had higher concentrations of serum cytokines in compared with farmers who are not in contact with animals.

This relation was statistically significant for some serum cytokines (TNF- $\alpha$ , IL-8, and IL-10). Our data are in agreement with literature and suggest that, animal breeders might be at higher risk of developing diseases related with occupational exposure to biological agents and organic dusts, such as inflammations, allergies, and toxic organic dust respiratory syndrome. Moreover, swine breeders seem to have an higher immune response. A second working hypothesis generated by this study is that the measure of selected blood cytokines may be useful to identify early signs of effect of worker's exposure to organic dusts and biological agents and indicate the need of preventive interventions.