



Final Report – CR16-0016

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InBio Project Number:	CR16-0016
Date Of Report:	09 th September 2016
Project Aims:	Product Assessment – Allergen removal To assess the efficacy of the Novaerus air purifier to reduce airborne allergens.

1. Background

Following the completion of the CR16-0012 project and a teleconference that took place on 16th August 2016, Jessica Dobbin (Novaerus) requested that Indoor Biotechnologies Ltd. prepared a new proposal and a quote for further testing of the efficacy of the Novaerus air purifier device to reduce airborne allergens. The project proposal CR16-0016 was drafted as a follow-up of work performed previously in the project CR16-0012. The tests performed for this report were performed as described in the CR16-0016 proposal. The primary difference between CR16-0012 and CR16-0016 was that the testing time was extended from 1 hour to 2 hours.

The Novaerus air purifier and the power supply that were delivered to Indoor Biotechnologies Ltd. on 15 June 2016 were also used in CR16-0016 project.

2. Experimental Approach

Stock dust was prepared as described in the proposal (3a) and the levels of Der p 1, Der f 1, Mite Group 2, Fel d 1, Can f 1 and Bet v 1 were quantified using Indoor Biotechnologies' SOPs and MARIA® assay.

The control samples (n=3) and the test samples (n=3) were collected for 2 hours as described in the proposal, using the same experimental setup as in the previous project.

The experimental setup is illustrated in Figure 1 below.

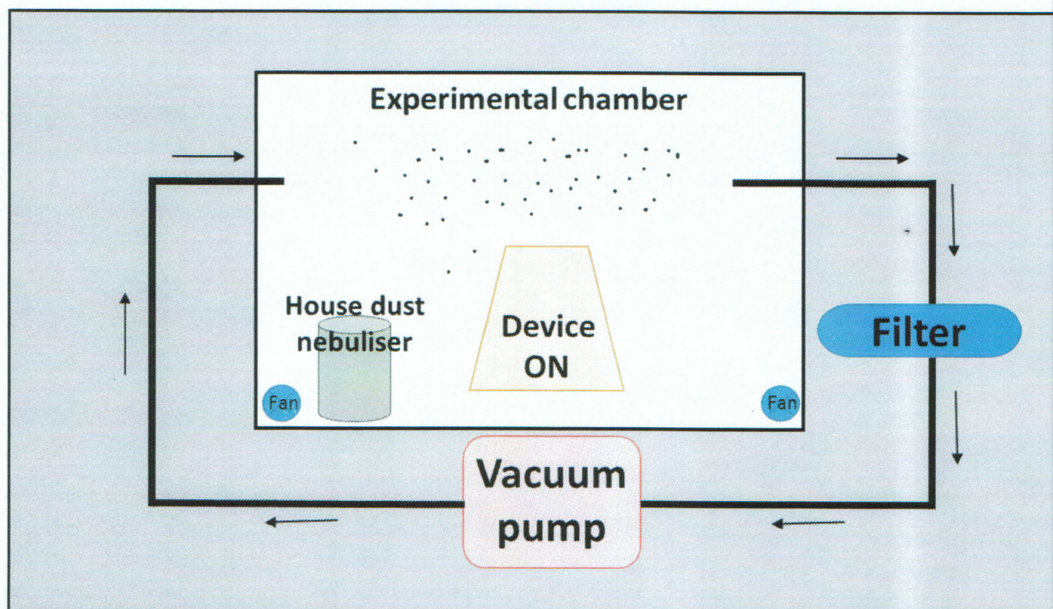


Figure 1. Experimental setup for assessment of efficacy of Novaerus air purifying device in reduction of airborne allergens.

Allergens from the 6 samples (filters) were then extracted following Indoor Biotechnologies' Standard Operating Procedure 004 ver1.2.

3. Results

The allergen content in the extracted filter samples was quantified using Indoor Biotechnologies' MARIA assay. For quality control purposes, one sample was replicated on the plate. The variability between replicates was on average 0.5% (data not shown), indicating that the assay performed well. Levels of Der f 1 from the stock dust in the control samples were below the limit of detection (<0.06ng/filter), therefore this allergen was excluded from analysis.

To assess the efficacy of the Novaerus air purifier to reduce airborne allergens, the average amount of Der p 1, Mite Group 2, Fel d 1, Can f 1 and Bet v 1 from the 3 test runs and the 3 control runs was calculated (Figure 2 and Table 1). The values from each of these runs are shown in Figure 3 and Table 2.

The average percentage allergen reduction was then determined (Table 1 and Figure 4).

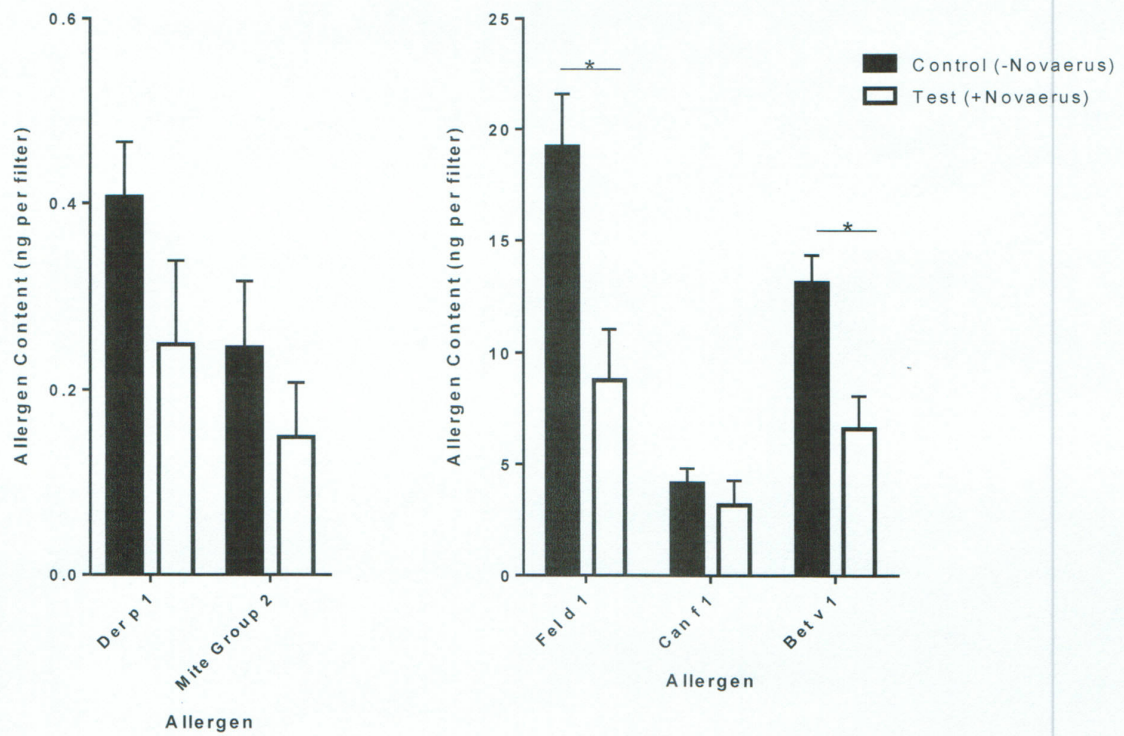


Figure 2. Average amounts of allergens recovered from 3 control runs (without Novaerus air purifier) and 3 test runs (with Novaerus air purifier). Results are expressed as mean values +/- SEM. * = statistically significant difference ($p < 0.05$) as analysed by student's t test.

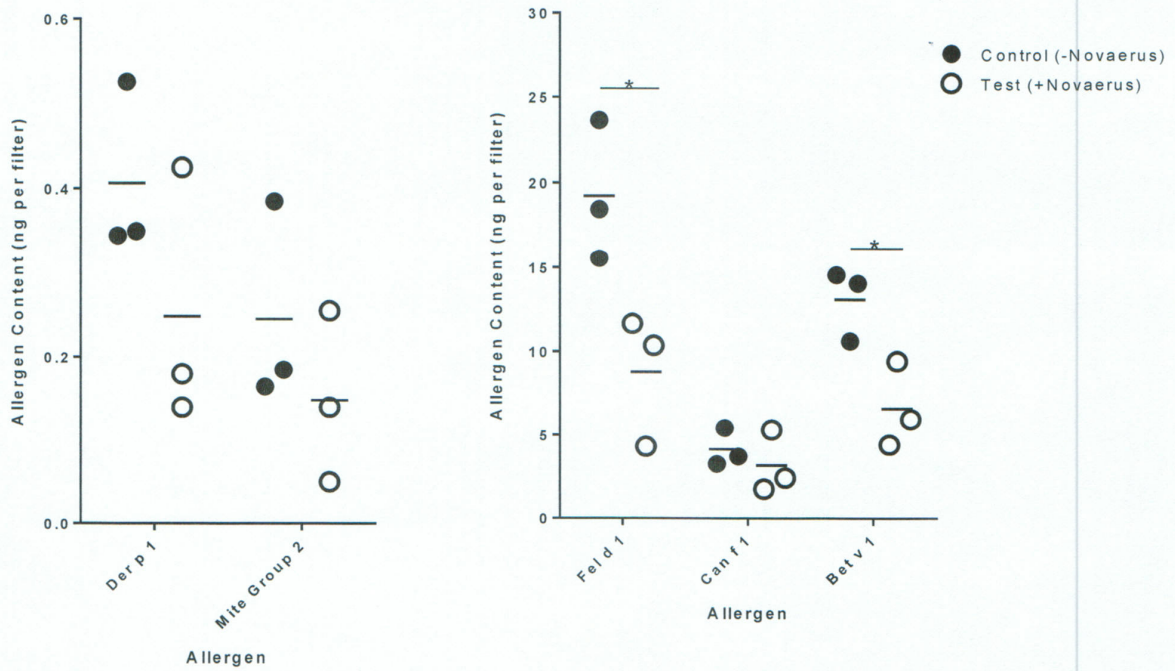


Figure 3. Amounts of allergens recovered from 3 control runs (black circles) and 3 test runs (open circles). Results also show the mean value for each allergen. * = statistically significant difference ($p < 0.05$) as analysed by student's t test.

ALLERGEN	Average amount of allergen recovered from <u>control</u> runs (ng/filter)	Average amount of allergen recovered from <u>test</u> runs (ng/filter)	% Allergen reduction
Der p 1	0.41	0.25	38.93
Mite Group 2	0.25	0.15	39.46
Fel d 1	19.22	8.78	54.33
Can f 1	4.14	3.17	23.54
Bet v 1	13.09	6.61	49.53
			Average % allergen reduction = 41.16%

Table 1. Average amounts of allergen recovered from 3 control runs (without Novaerus air purifier) and 3 test runs (with Novaerus air purifier) and the subsequent average percentage (%) allergen reduction observed when using the air purifier as compared to control.

ALLERGEN	Amount of allergen recovered (ng/filter)					
	Control run 1	Control run 2	Control run 3	Test run 1	Test run 2	Test run 3
Der p 1	0.53	0.35	0.35	0.18	0.43	0.14
Mite Group 2	0.39	0.17	0.19	0.14	0.26	0.05
Fel d 1	15.56	18.44	23.65	4.31	11.66	10.36
Can f 1	5.44	3.72	3.26	1.76	5.32	2.42
Bet v 1	14.59	14.07	10.62	5.96	9.44	4.42

Table 2. Amount of allergen recovered from 3 control runs (without Novaerus air purifier) and 3 test runs (with Novaerus air purifier).

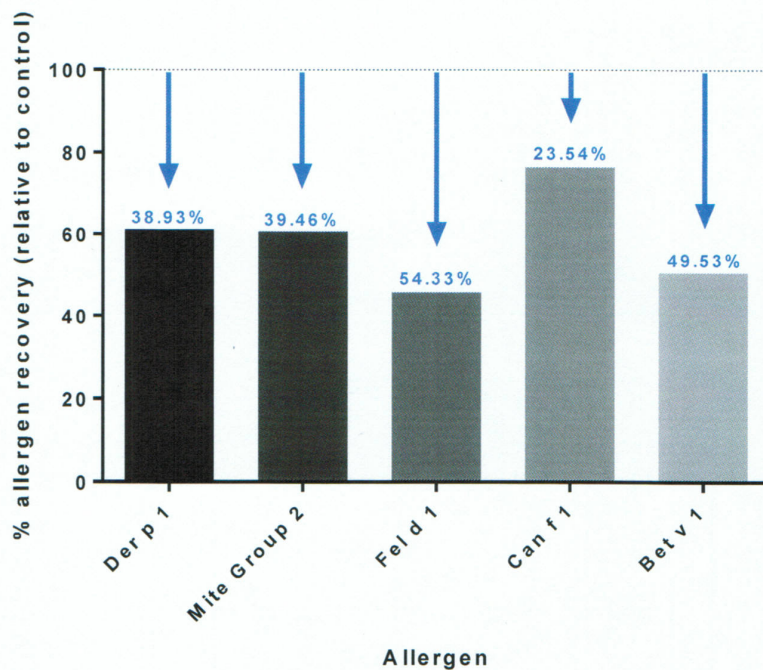


Figure 4. Average percentage (%) allergen recovery of test runs relative to control runs (starting value of each control allergen was set to 100% as depicted by - - - line). Numbers in blue represent the average percentage (%) allergen reduction when the Novaerus air purifier was in use.

The results show that in this experimental set up, the Novaerus air purifier reduces levels of all allergens analysed. Levels of Fel d 1 and Bet v 1 showed a statistically significant reduction ($p < 0.05$) in amount of allergen recovered as compared to controls. Statistical significance is likely to have been obtained for the other allergens with more experimental runs. The amount that each allergen was reduced by ranged from 54.33% (Fel d 1) down to 23.54% (Can f 1). On average the percent

allergen reduction over a 2 hour time course was more than 40%. Previous experiments (CR16-0012) showed that on average the percent allergen reduction over a 1 hour time course was approximately 30%.

Conclusions:

1. The Novaerus air purifier reduced the levels of all 5 airborne allergens analysed (Der p 1, Mite Group 2, Fel d 1, Can f 1 and Bet v 1).
2. The largest reduction in allergen level was seen in cat allergen (Fel d 1) at 54.33%.
3. The lowest reduction in allergen levels was seen in dog allergen (Can f 1) at 23.54%.
4. The overall average allergen reduction was 41.16%.
5. The results indicate that the allergen reduction was higher when using the Novaerus air purifier for 2 hours vs. 1 hour (as in the previous project CR16-0012).

Indoor Biotechnologies Approval

This signature below indicates that the Project Coordinator approves the Final Report.

M. Oliver

Signature

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Date

MARIA OLIVER
ON BEHALF OF
A. KUKIŃSKA-PIJŃKA