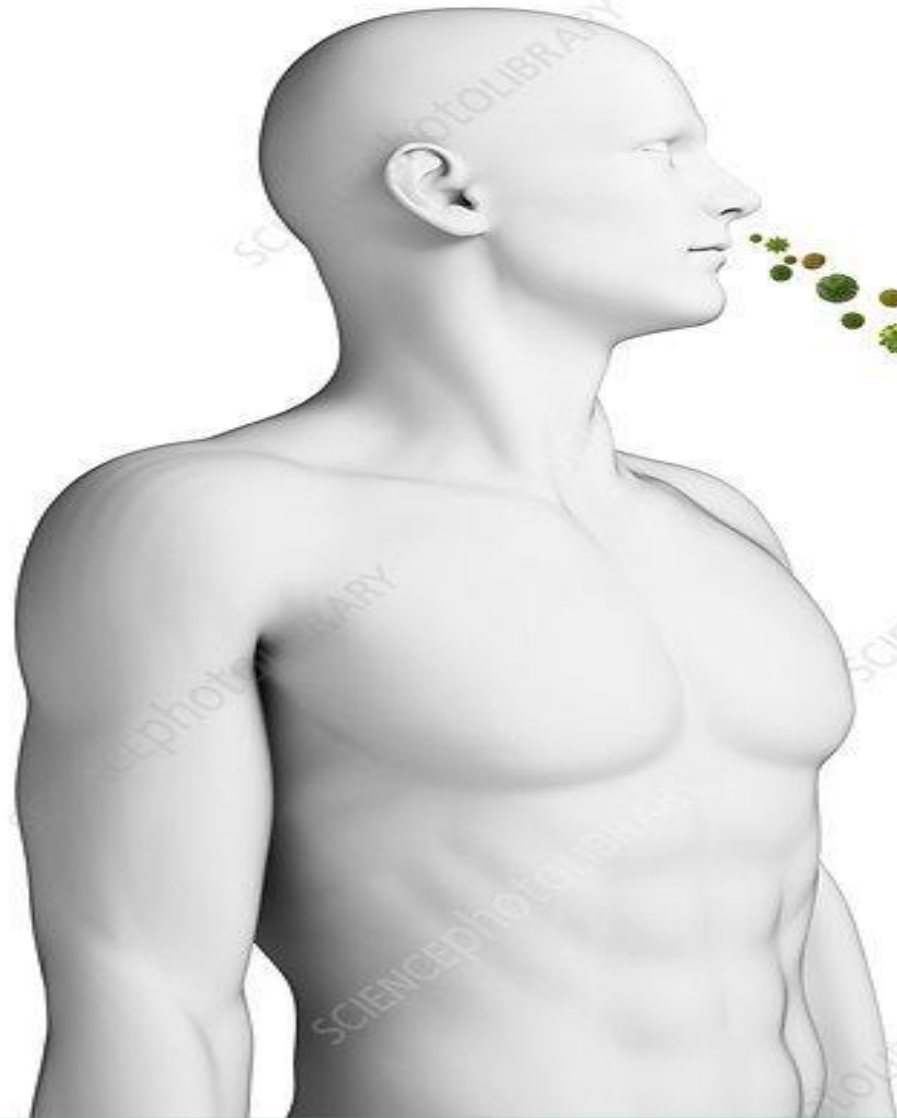




CORRELATING PARTICLES, HEALTH, AND MICROBIAL GROWTH



Richard Johnson, CEO
Air Allergen & Mold Testing
rjohnson@airallergen.com
Office Number 770 938 4861



Food processing removes some of the nutrients, vitamins and fiber present in the food

Cheap artificial sugars, salt and preservatives in processed foods have less fibre quantity & don't add any nutrition benefits, it **slows down digestion**

The salts, phosphates and other artificial ingredients in the processed food leads to kidney and other health problems



Processed foods are **HIGHLY ADDICTIVE** and make you crave them frequently.

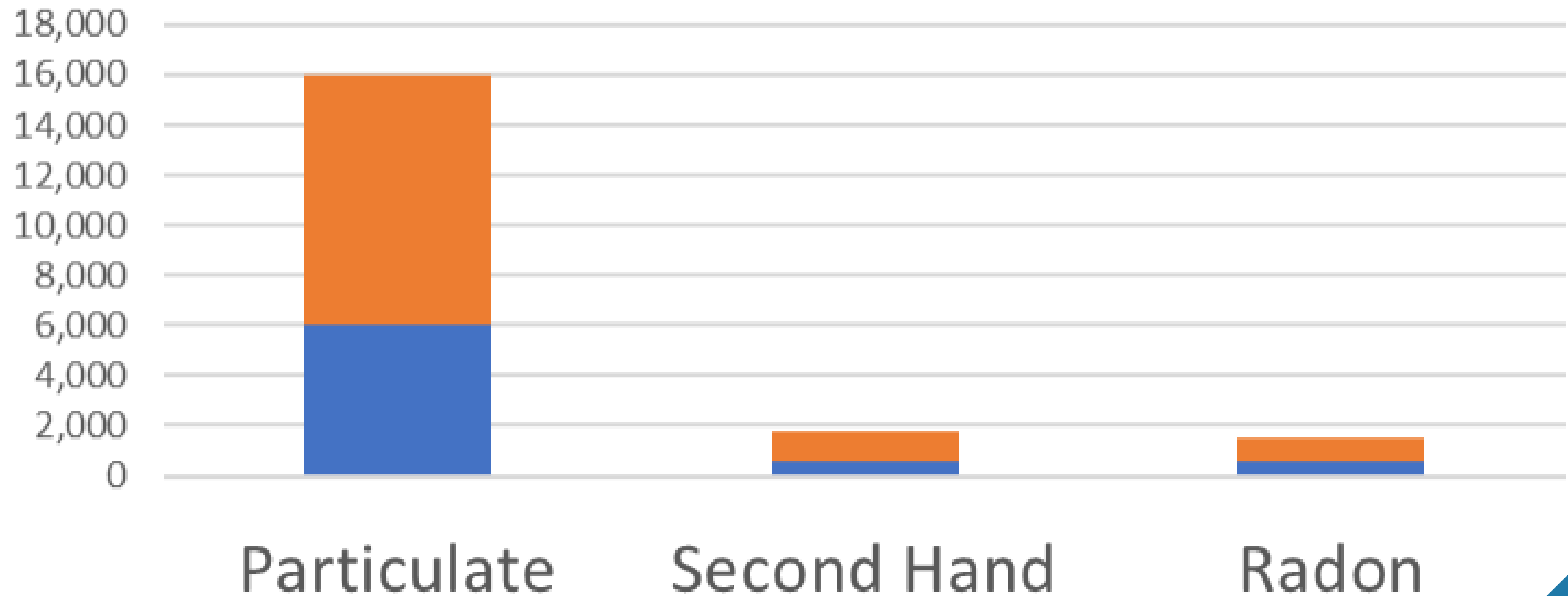


Some processed dairy products, dried fruits etc contains Sulphite which causes a range of health diseases like headache, skin rashes, irritable bowel syndrome etc.

Processed food kills natural taste and colour of foods. In order to restore the natural flavour, manufactures add cheap artificial sugar, salts, fats, colours and preservatives that create **GASTROINTESTINAL** problems, **HORMONAL** Problems, **NERVOUS SYSTEM** problems etc



Adjusted Life Years



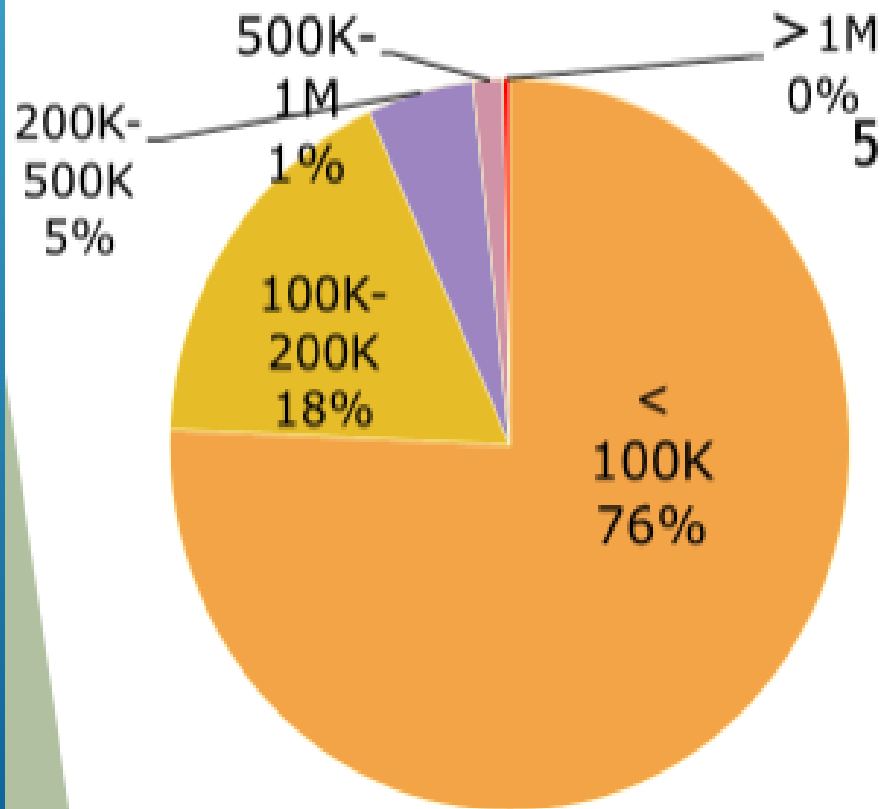
Indoor Chemical Pollution

Chemical pollution in the indoor air is often 2 to 5 times that in the outdoor air with spikes to 100 times. *Study Commissioned by the National Institute of Health.*

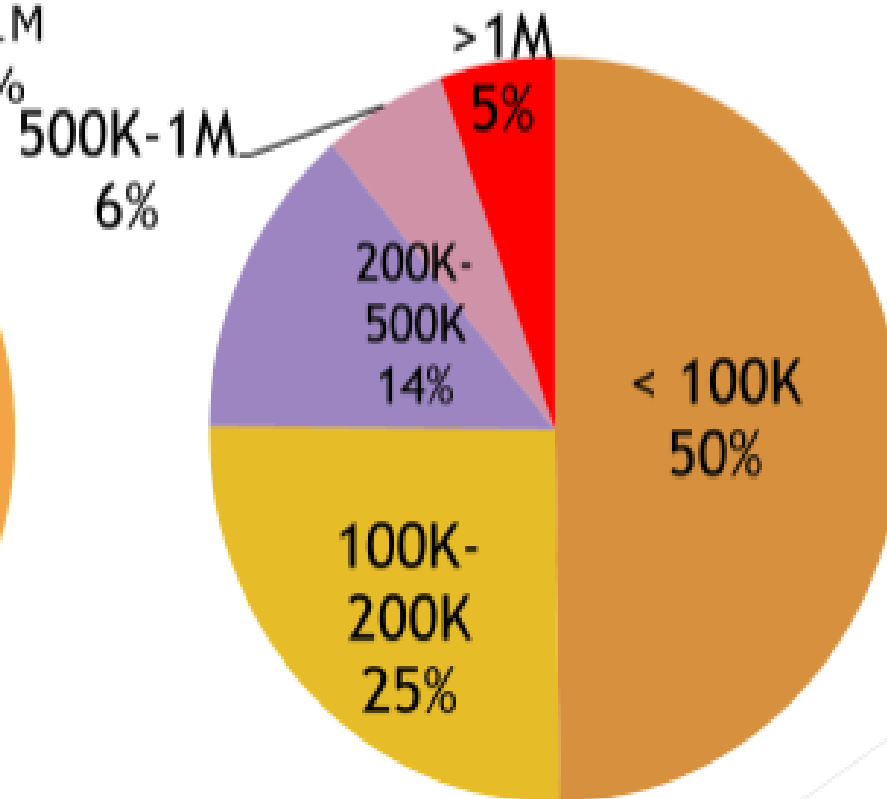
Researchers from George Washington University pooled data from dust samples taken from homes in 14 states. They found 45 potentially toxic chemicals that are used in many consumer and household products. Ten harmful chemicals were found in ninety percent of the samples including a known cancer-causing agent.

Outdoor vs. Indoor particulate

Outdoor Air Samples



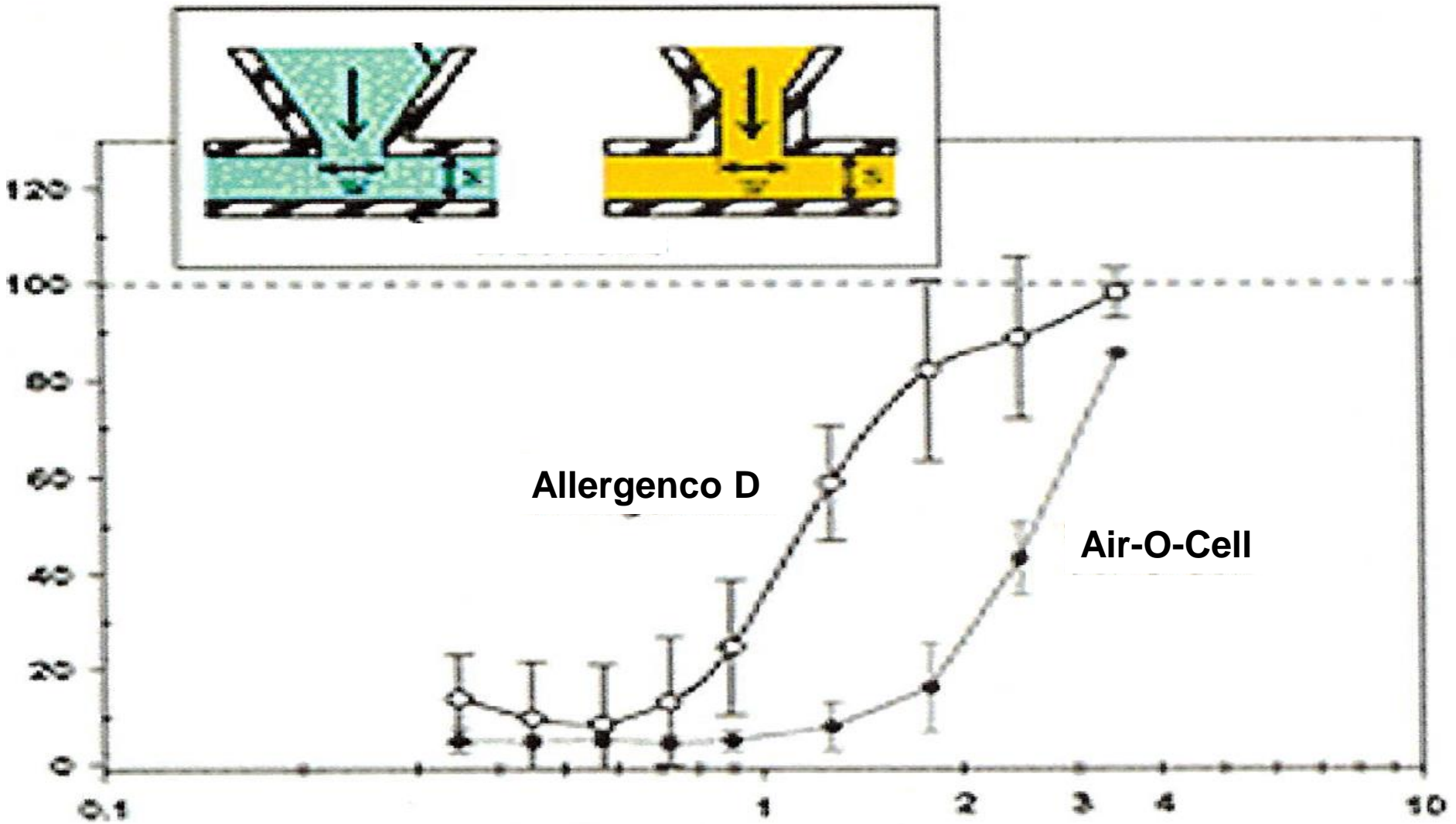
Indoor Air Samples



Limitations of Spore Traps for Particulate Analysis

- Cost of Analysis
- The cost of sampling every room to determine the variability.
- Difference in trace configuration, uniformity and analysts' skills.
- Inability to compare the results from one lab to another.
- Differences between gathering characteristics of different spore traps.
- Inability of spore traps to capture ultrafine particulate.
- Inability to determine the makeup of the particulate.

Overall Collection Efficiency %



Allergenco D

Air-O-Cell

Particle Diameter in micro grams

FALSE COUNT RATE						
Sample Time (Minutes)	Volume Sampled (Liters)	Concentration (Count/M ³)	Measured Counts (#)	95% UCL (Count/M ³)	Allowable Range	Pass/Fail
60	168.6	0.0	0	27.7	≤ 110.7	PASS

SIZE RESOLUTION			
Size (µm)	Actual	Limit	Pass/Fail
2.5	13.4%	≤ 15%	PASS

COUNTING EFFICIENCY			
Measurements	Allowable Range	Actual	Pass/Fail
0.3 µm	50% ± 20	45.2%	PASS
0.5 µm	100% ± 10	105.1%	PASS

FLOW RATE (L/MIN)			
Nominal	Actual	Actual %	Pass/Fail
2.83	2.81	-0.7%	PASS

Calibration Date:	July 31, 2018
Calibration Due Date:	July 30, 2019

Objectives

1. What is the Average, Median, and Standard Deviation for 0.3, 0.5, 1.0, 2.5, 5.0 and 10 micron particles in a residence?
2. How well do particle counts using spore traps correlate with particle counts from the particle counter?
3. How does the particle count vary within a home?
4. How well do particulate counts correlate to otherwise identified microbial issues?
5. How do particle counts correlate with health concerns expressed at the time the inspection is scheduled?

Average, Median, & Standard Deviation of 160 Indoor Samples With Particle Counter

Indoor	.3 micron	.5 micron	1.0 micron	2.5 micron	5.0 micron	10 micron
Average	38,495,693	3,565,052	457,355	199,472	73,295	32,262
Median	21,290,329	1,119,298	178,868	83,872	26,839	13,949
Std Dev	59,517,699	8,412,209	1,099,886	441,518	169,168	66,539

38 outdoor samples W/PC at same locations

Outdoor	.3 micron	.5 micron	1.0 micron	2.5 micron	5 micron	10 micron
Average	47,450,559	3,078,406	390,697	188,091	35,830	10,440
Median	27,355,800	1,550,313	241,552	150,440	27,898	4,944
Std Dev	53,840,852	4,173,941	496,561	183,726	35,751	18,244

Average, Median, & Standard Deviation of 71 Indoor Samples With Spore Traps

Indoor	Backgrd	Spore	bk+ ST	.5X2.5 +	differ	% dif	CntsCumM3
Average	94,521	15,722	110,243	136,037	25,795	23%	37,114,014
Median	69,716	5,677	77,715	80,517	-1,307	-2%	21,279,556
Stand dev	104,318	25,711	112,823	193,274	194,495	172%	67,971,039

38 Outdoor Samples with Spore Traps

Outdoor	Backgrd	Spores	Bk + ST	.5X2.5 +	Differ	%diff	CntsCumM3
Average	34,108	25,262	59,369	140,316	80,946	136%	51,154,024
Median	20,240	16,606	55,603	118,126	62,523	112%	28,838,658
Std dev	33,470	21,370	36,529	135,480	98,951	271%	58,127,381

NAAQS PM_{2.5} Standard is not to exceed 35 ug/M³ for 24-hours

1 Outdoor sample exceeded 65ug/M³

9 Indoor samples exceeded 65ug/M³

NAAQS Standard for PM₁₀ is not to exceed 150 ug/M³ for 24-hours

3 Outdoor samples exceeded 150 ug/M³

19 Indoor samples exceeded 150 ug/M³

- 80% of the properties had filters inadequate for capturing respirable particulate.
- Particulate counts are consistent between rooms in some homes but can vary significantly in other homes.
- Spore Trap particulate correlates better with larger particle meter readings but are not an adequate predictor of finer particulate.
- Particle counters do not always identify microbial damage
- Clients who reported health concerns had higher 5 & 10 micron counts

What to Recommend

Good Housekeeping to minimize dust and microbial growth

Eliminate obvious sources: fireplaces, candles, powders, aerosols, smoking

Encourage Vent Hoods vented to outside over cooking surfaces

Add filtered Make-up air to HVAC systems to avoid air entry from unconditioned spaces

Encourage filtration to remove particulate as small as .3 micron

- ▶ Drug Companies sell Pharmaceuticals
- ▶ Allergists treat allergies
- ▶ Environmentalists focus on outdoor air
- ▶ Pharmacists dispense drugs
- ▶ Pulmonologists repair the lungs
- ▶ Emergency room doctors stabilize the patient
- ▶ Landlords minimize expenses
- ▶ Insurance Companies, Medicaid, and Medicare pay for healthcare
- ▶ Health Departments focus on Treatment
- ▶ Politicians are influenced by Stakeholders
- ▶ None focus on unhealthy indoor environments

Questions?

Richard Johnson
rjohnson@airallergen.com

Thomas Grillo
thomas.grillo@particlesplus.com

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