

Summary of Two Key Institute of Medicine Reports Regarding Asthma, Indoor Air Quality, Damp Indoor Spaces, and Mold

Association Between Biological and Chemical Exposures in the Home and			
Development of Asthma in Sensitive Individuals		Exacerbation of Asthma in Sensitive Individuals	
Biological Agents	Chemical Agents	Biological Agents	Chemical Agents
Sufficient Evidence of a Causal Relationship			
<ul style="list-style-type: none"> House dust mite 	<i>No agents met this definition</i>	<ul style="list-style-type: none"> Cat Cockroach House dust mite 	<ul style="list-style-type: none"> ETS (in preschool-aged children)
Sufficient Evidence of an Association			
<i>No agents met this definition</i>	<ul style="list-style-type: none"> ETS (in preschool-aged children) 	<ul style="list-style-type: none"> Dog Fungi or molds Rhinovirus 	<ul style="list-style-type: none"> Nitrogen oxides (high-level exposures)¹
Limited or Suggestive Evidence of an Association			
<ul style="list-style-type: none"> Cockroach (in preschool-aged children) Respiratory Syncytial Virus 	<i>No agents met this definition</i>	<ul style="list-style-type: none"> Domestic birds <i>Chlamydia pneumoniae</i> <i>Mycoplasma pneumoniae</i> Respiratory Syncytial Virus 	<ul style="list-style-type: none"> ETS (in school aged and older children, & adults) Formaldehyde Fragrances
Inadequate or Insufficient Evidence to Determine Whether or Not an Association Exists			
<ul style="list-style-type: none"> Cat, Dog, Domestic Birds Rodents Cockroaches (except for preschool-aged children) Endotoxins Fungi or molds <i>Chlamydia pneumoniae</i> <i>Mycoplasma pneumoniae</i> <i>Chlamydia trachomatis</i> Houseplants Pollen 	<ul style="list-style-type: none"> Nitrogen oxides Pesticides Plasticizers Volatile organic compounds (VOCs) Formaldehyde Fragrances ETS (in older children and adults) 	<ul style="list-style-type: none"> Rodents (as pets or feral animals)² <i>Chlamydia trachomatis</i> Endotoxins Houseplants Pollen exposure in indoor environments Insects other than Cockroaches 	<ul style="list-style-type: none"> Pesticides Plasticizers Volatile organic compounds (VOCs)
Limited or Suggestive Evidence of No Association			
<ul style="list-style-type: none"> Rhinovirus (adults) 	<i>No agents met this definition</i>	<i>No agents met this definition</i>	<i>No agents met this definition</i>

Source: **National Academies Press, 2000.** *Clearing the Air: Asthma and Indoor Air Exposures. Executive Summary* Institute of Medicine. ISBN 0-309-06496-1 See www.nap.edu/books/0309064961/html/.

¹ At concentrations that may occur only when gas appliances are used in poorly ventilated kitchens.

- **Sufficient Evidence of a Causal Relationship:** Evidence fulfills association criteria and in addition satisfies criteria regarding the strength of association, biologic gradient (dose-response effect), consistency of association, biologic plausibility and coherence, and temporality used to assess causality.
- **Sufficient Evidence of an Association:** Association has been observed in studies in which chance, bias, and confounding factors can be ruled out with reasonable confidence (e.g. several small bias free studies showing an association that is consistent in magnitude and direction)
- **Limited or Suggestive Evidence of an Association:** Evidence is suggestive of an association but is limited because chance, bias, and confounding cannot be ruled out with confidence (e.g. one high quality study shows association, but results of other studies are inconsistent)
- **Inadequate or Insufficient Evidence to Determine Whether or Not an Association Exists:** Available studies are of insufficient quality, consistency, or statistical power to permit a conclusion; or no studies exist
- **Limited or Suggestive Evidence of No Association:** Several adequate studies are mutually consistent in not showing an association (but limited to the conditions, level of exposure, and length of observation covered in the study).

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Exposure to Damp Indoor Environments	Presence of Mold or Other Agents in Damp Indoor Environments
Sufficient Evidence of a Causal Relationship	
Sufficient Evidence of an Association	
<ul style="list-style-type: none"> • Upper respiratory (nasal and throat) tract symptoms • Cough • Wheeze • Asthma symptoms in sensitized persons 	<ul style="list-style-type: none"> • Upper respiratory (nasal and throat) tract symptoms • Cough • Hypersensitivity pneumonitis in susceptible persons • Wheeze • Asthma symptoms in sensitized persons
Limited or Suggestive Evidence of an Association	
<ul style="list-style-type: none"> • Dyspnea (shortness of breath) • Lower respiratory illness in otherwise healthy children • Asthma development 	<ul style="list-style-type: none"> • Lower respiratory illness in otherwise healthy children
Inadequate or Insufficient Evidence to Determine Whether or Not an Association Exists	
<ul style="list-style-type: none"> • Airflow obstruction (in otherwise healthy persons) • Skin symptoms • Mucous membrane irritation syndrome • Gastrointestinal tract problems • Chronic obstructive pulmonary disease • Fatigue • Inhalation fevers (nonoccupational exposures) • Neuropsychiatric symptoms • Lower respiratory illness in otherwise healthy adults • Cancer • Acute idiopathic pulmonary hemorrhage in infants • Reproductive effects • Rheumatologic and other immune diseases 	<ul style="list-style-type: none"> • Dyspnea (shortness of breath) • Skin symptoms • Asthma development • Gastrointestinal tract problems • Airflow obstruction (in otherwise healthy persons) • Fatigue • Mucous membrane irritation syndrome • Neuropsychiatric symptoms • Chronic obstructive pulmonary disease • Cancer • Inhalation fevers (nonoccupational exposures) • Reproductive effects • Lower respiratory illness in otherwise healthy adults • Rheumatologic and other immune diseases • Acute idiopathic pulmonary hemorrhage in infants

*Source: National Academies Press, 2004. Damp Indoor Spaces and Health. Tables ES-1 and ES-2
Institute of Medicine of the National Academies, ISBN 0-309-09246-9.
See www.nap.edu/books/0309091934/html/.*

- **Sufficient Evidence of a Causal Relationship:** Evidence is sufficient to conclude that a causal relationship exists between the agent and the outcome. That is, the evidence fulfills the criteria for “sufficient evidence of an association” and, in addition, satisfies the following criteria: strength of association, biologic gradient, consistency of association, biologic plausibility and coherence, and temporally correct association.
- **Sufficient Evidence of an Association:** Evidence is sufficient to conclude that there is an association. That is, an association between the agent and the outcome has been observed in studies in which chance, bias, and confounding can be ruled out with reasonable confidence.
- **Limited or Suggestive Evidence of an Association:** Evidence is suggestive of an association between the agent and the outcome but is limited because chance, bias, and confounding cannot be ruled out with confidence.
- **Inadequate or Insufficient Evidence to Determine Whether an Association Exists:** The available studies are of insufficient quality, consistency, or statistical power to permit a conclusion regarding the presence of an association. Alternatively, no studies exist that examine the relationship.