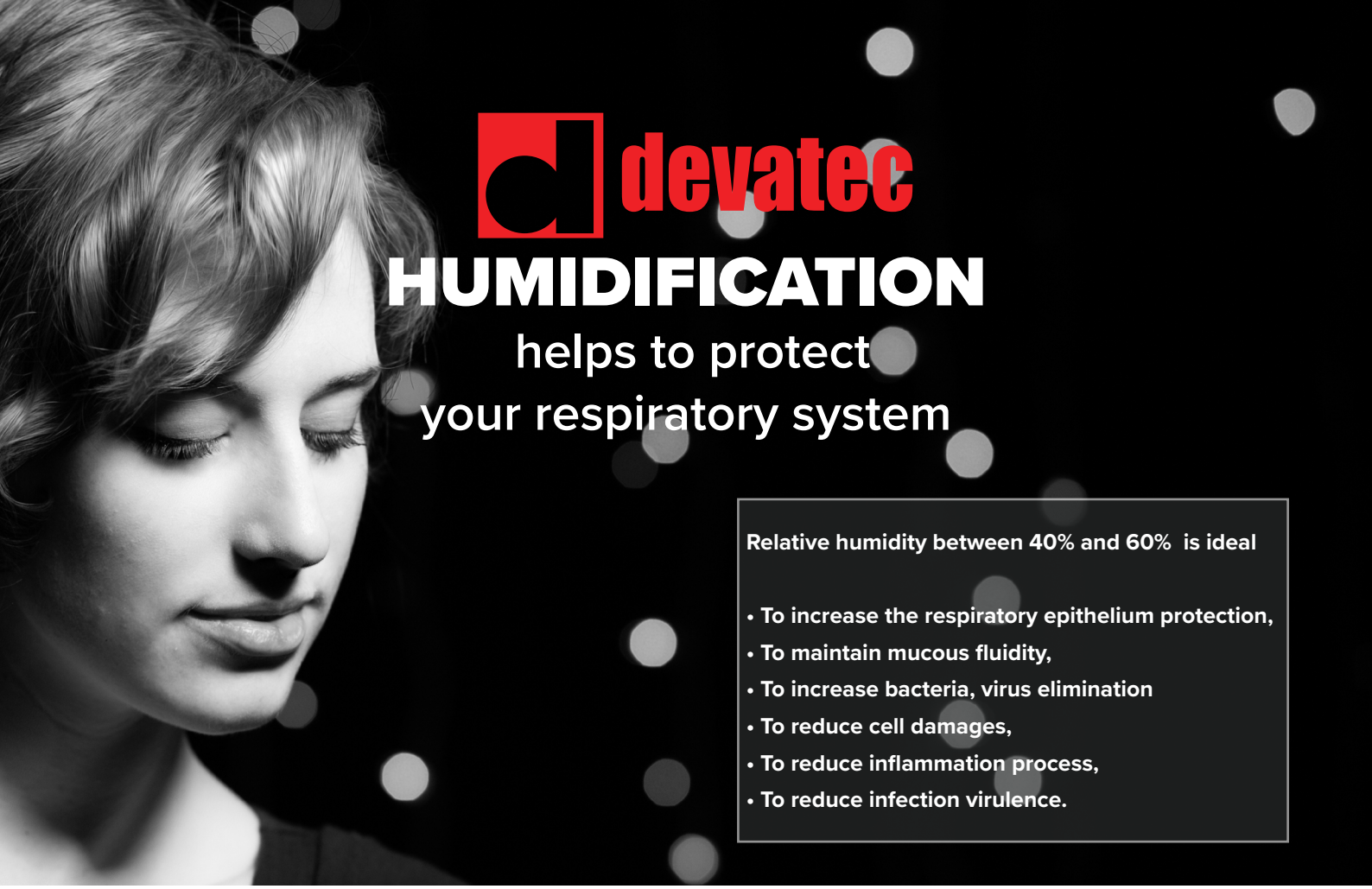


HUMIDIFICATION

helps to protect your respiratory system

Relative humidity between 40% and 60% is ideal

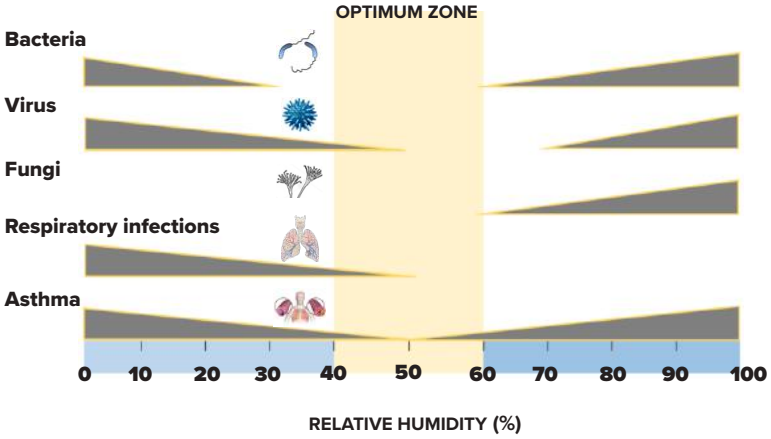
- **To increase the respiratory epithelium protection,**
- **To maintain mucous fluidity,**
- **To increase bacteria, virus elimination**
- **To reduce cell damages,**
- **To reduce inflammation process,**
- **To reduce infection virulence.**

ACUTE RESPIRATORY INFECTIONS (A.R.I.)



Nasal obstruction, sore throat, tonsillitis, pharyngitis, laryngitis, sinusitis, otitis media, common cold and pneumonia are commonly acute respiratory infections. These infections usually have a viral origin. Winter season is mainly the infection period, because it is the dryest season, with a low outdoor humidity ratio (around 1 - 2 g/kg) and low indoor relative humidity (< 35%) [7].

When indoor humidity ratio is around 7 - 10 g/kg (relative humidity 40%-60%) [1], the respiratory infection effects decrease.

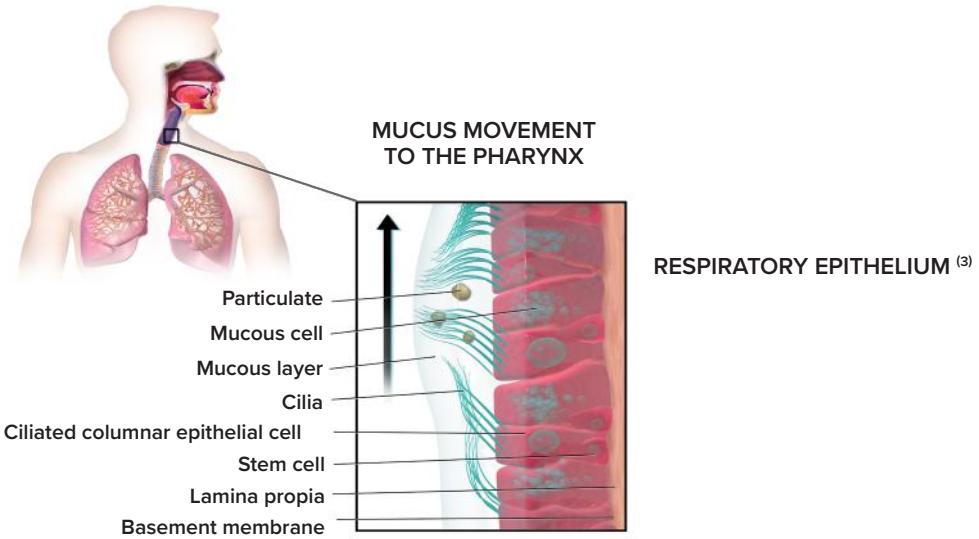




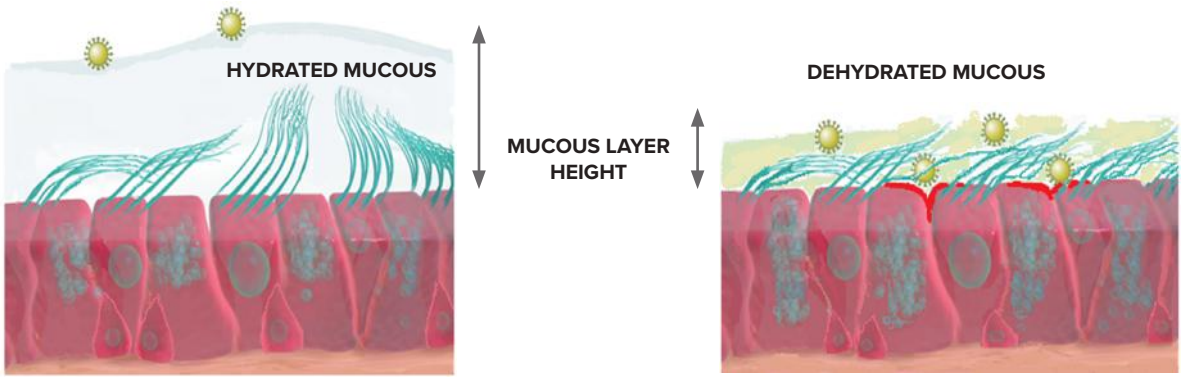
From Scofiel - Sterling diagram [1][2]

Correct relative humidity protects your respiratory tract

Respiratory epithelium (presents in nose, pharynx and tracheal system) humidifies, and warms inhaled air. Additionally it cleans the upper respiratory cavities producing mucous, which binds particulates that are transported to the pharynx by cilia on the epithelial cells. Each epithelial cell contains about 200 cilia [4]. This mucociliary clearance is the first defense line of lung. Loss of it is a significant cause of respiratory infections [8].



Indoor humidity ratio around 7 - 10 g/kg (relative humidity 40%-60%) ideal to protect the respiratory epithelium.



RIGHT INDOOR AIR HUMIDITY (OPTIMAL AT 50% R.H.[4])

- Maintain right mucous hydration
- Reduces mucous density,
- Increases mucous fluidity,
- Reduces mucous production,
- Increases mucous layer,
- Increases height ciliary layer
- Increases cilia motion,
- Increases mucociliary clearance,
- Increases particulate elimination,
- Reduces any inflammation risk
- Reduces any tissue damage
- Increases tissue defense,
- Increases tissue repair. [5][6]

DRY INDOOR AIR

- Causes mucous dehydration
- Increases mucous density,
- Reduces mucous fluidity,
- Increases mucous production,
- Reduces mucous layer,
- Reduces height of ciliary layer
- Immobilizes cilia,
- Reduces mucociliary clearance,
- Reduces particulate elimination,
- Increases inflammation risk
- Increases tissue damage
- Reduces tissue defense,
- Reduces tissue repair. [5][6]

Correct relative humidity protects your lungs

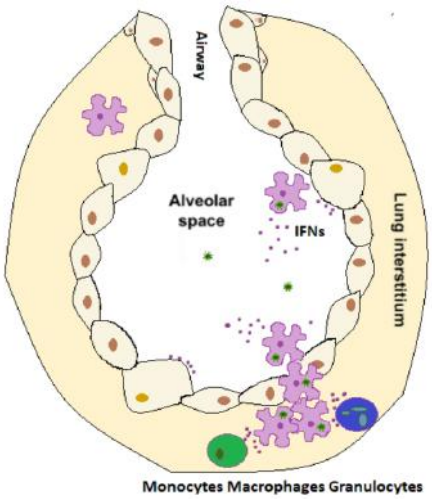
Particulates and microbes that evade the first line of defense, that is, epithelial mucus, reach the distal lung. From there, they must be cleared rapidly and efficiently by the second line of defense: phagocytes. Alveolar macrophages are the dominant phagocytic cells in the lungs [8].

Acute inflammation represents the immediate response to an aggressive agent, of short duration (a few days or weeks), often abrupt in onset and characterized by intense vasculo-exudative phenomena. Multiple biochemical mediators start inflammation. Among them, interferons (IFNs) activate macrophages and inhibit the replication of viruses.

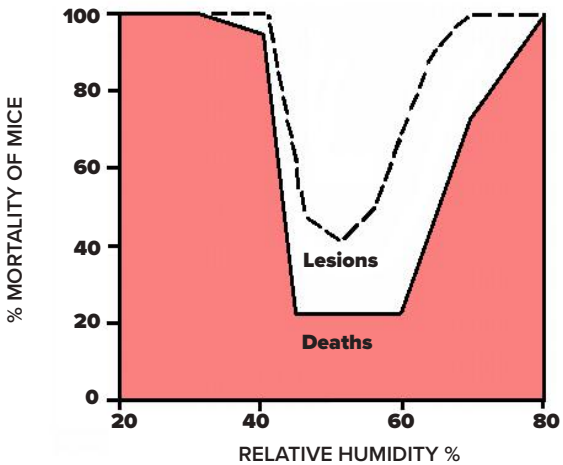
Indoor humidity ratio around 7 - 10 g/kg (relative humidity 40%-60%),
ideal to increase innate protective macrophage defense and to decrease A.R.I. virulence.

RIGHT INDOOR AIR HUMIDITY (OPTIMAL AT 50% R.H. [3])

- Reduces respiratory cell damage
- Decreases infection of airway epithelium
- Increases virus clearance by protective alveolar macrophages
- Increases inducible antiviral innate immunity.
- Increase type I IFN-mediated and IFN-independent antiviral defense mechanisms.
- Increases other innate defense mechanisms.
- Reduces sensitivity to inflammasome activation,
- Reduces Caspase activation,
- Decreases cytokine (interleukins 1β and 18) production. [5][6]



INNATE IFNS-MACROPHAGE PROTECTION



Deaths and lung lesions are minimized when humidity is held between 40 and 60% rh. [2,9]

Effect of relative humidity on the infectivity of air-borne influenza A virus [9]

Sources

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