

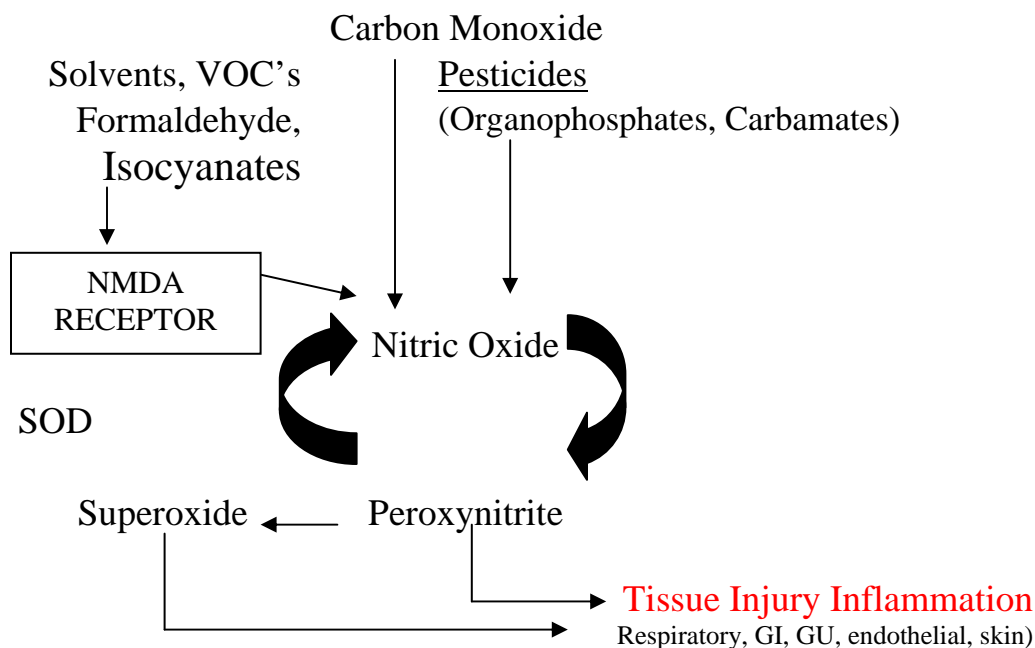
## ISOCYANATES

Exposure to isocyanates can cause sensitization of the respiratory tract, which causes greatly heightened future respiratory symptoms with lower level exposure.<sup>1</sup> Nonspecific long-standing reactive airway disease (with reactivity and symptoms induced by future low dose irritant exposure) is also induced by isocyanates.<sup>1 2 3</sup> Even brief exposures to isocyanates can cause these changes.<sup>1</sup> Asthma was induced in 30% of workers exposed to one third of a part of isocyanate to 1 trillion parts of air.<sup>4</sup> Further deterioration in symptoms can occur after cessation of exposure.<sup>5</sup>

Isocyanate chemicals stimulate the brain vanilloid receptor.<sup>6</sup> This receptor activates the NMDA receptor<sup>7</sup>, which then increases peroxynitrite and sets in motion neural sensitization. Vanilloid stimulation also increases release of immune substance P.<sup>8</sup> Increased substance P is involved in the mechanism of reactive airway disease.<sup>9</sup>

Isocyanates are used in polyurethane foams, coatings and adhesives.<sup>10</sup> Isocyanates can be released for weeks after coating and other isocyanate product application.<sup>10</sup> Heating, grinding, cutting and sanding such products can release isocyanates.<sup>10</sup>

Sensitization can occur from skin as well as breathing exposure.<sup>10</sup>



<sup>1</sup> AW Musk *etal.*, "Isocyanates and respiratory disease: current status", *Amer J Indust Med* 13:331-349.

<sup>2</sup> JCJ Luo *etal.*, "Persistent reactive airway dysfunction syndrome after exposure to toluene diisocyanate", *Brit J Ind Med* 47:239-241, 1990.

<sup>3</sup> DR Moller *etal.*, "Chronic asthma due to toluene diisocyanate", *Chest* 90:494-499, 1986.

<sup>4</sup> WG White *etal.*, "Isocyanate-induced asthma in a car factory", *Lancet* :756-760, 1980.

<sup>5</sup> G Pisati *etal.*, "Toluene diisocyanate induced asthma: outcome according to persistence or cessation of exposure", *Brit J Indust Med* 50:60-64,1993.

<sup>6</sup> CE Mapp *etal.*, "Evidence that toluene-di-isocyanate activates the efferent function of capsaicin-sensitive primary afferents", *Env J Pharmccol* 180: 113-118, 1990.

<sup>7</sup> E Palazzo *etal.*, "Interaction between vanilloid and glutamate receptors in the central modulation of nociception", *Env J Pharmacol* 439: 69-75, 2002.

<sup>8</sup> H Kimata, *etal.*, "Effect of exposure to volatile organic compounds on plasma levels of neuropeptides, nerve growth factor and histamine in patients with chemical sensitivity", *Int J Hyg Environmental Health* 207: 159-163, 2004.

<sup>9</sup> WJ Meggs, "The toxic induction of asthma and rhinitis", *Clinical Toxicol* 32: 487-501, 1994.

<sup>10</sup> D Bello, *etal.*, "Skin exposure to isocyanates: Reasons for concern", *Env Health Persp*, 115: 328-335, 2007.