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Airway responsiveness to various agonists and antagonists, experimental and human evidences

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Increased airway responsiveness to different stimuli is the main characteristic feature of asthma. However, airway hyper responsiveness is reported in COPD patients and smokers. In a series of studies airway responsiveness to various pharmacological agonists and antagonists were examined. In animal studies, increased tracheal responsiveness to histamine as histamine concentration caused 50% of maximum response (EC50) and hisataminie (H1) receptor blockade by chlorpheniramine as shift in concentration response to histamine (CR-1) in guinea pig model of COPD by their exposing to cigarette smoke as well as in sensitized animals was shown. Tracheal responsiveness to both isoprenaline and beta-adrenoreceptor blockade by propranolol in cigarette smoke exposed and sensitized guinea pigs and a close correlation in responsiveness to isoprenaline and propranolol between COPD and asthmatic animals were demonstrated. Increased tracheal responsiveness to methacoline and muscarinic receptor blockade by atropine in an animal model of COPD was also reported. Tracheal hyper responsiveness to methacholine in sulfur mustard exposed guinea pigs was also shown. In human studies, increased airway responsiveness to methacholine and salbutamol and the relationship between the two was demonstrated in smokers. Airway hyper responsiveness to salbutamol in COPD patients was also shown. Airway hyper responsiveness to methacholine as well as to salbutamol in chemical war victims were also shown in two studies. Increased airway responsiveness to different pharmacological agonists and antagonists in exposed animal to cigarette smoke and sulfur mustard, smokers, COPD patients and chemical war victims were documented.

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Therapeutic potential for COPD treatment, evidence for stem cell and natural product therapy

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In a series of studies various possible therapeutic potential of natural product and stem cell for treatment of COPD were examined. The effect of adipose derived stromal cells (ASCs) on tracheal responsiveness, interleukin-8 (IL-8), total and differential white blood cells (WBC) counts in animal model of COPD was shown. The effect of ASCs on lung histopathologic changes and serum level of malondialdehyde (MDA) in COPD animals was also demonstrated in another study. The effect of *Zataria multiflora* and its constituent, carvacrol on systemic inflammation including serum levels of IL-8 and MDA as well as total and differential white blood cell (WBC) in the blood of guinea pig COPD model was documented in two studies. The preventive effect of *Zataria multiflora* and carvacrol on thiol groups, IL-8, total and differential WBC broncho-alveolar lavage fluid (BALF), lung pathology and tracheal responsiveness, were also demonstrated. Tracheal responsiveness to both methacholine and ovalbumin reduced in COPD animal model due to *Nigella sativa* extract and vitamin C treatment. The preventive effect of vitamine E, dexamethazone and the extract of *Nigella sativa* on tracheal responsiveness and lung inflammation of sulfur mustard exposed animals was studied. Significant improvement in pulmonary function tests and respiratory symptoms in chemical war victims treated with the extract of *Nigella sativa* for two month was also observed. The results of these studies indicated a promising therapeutic potential for stem cell and natural product in the treatment of COPD which should be clinically evaluated in further studies.

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