



## The Effect of Omega-3 Fatty Acids on Airway Inflammation, Hyperpnea-Induced Bronchoconstriction, and Airway Smooth Muscle Contractility in Asthma

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[Head, Sally K.](#)



Name: Sally\_K\_Head\_Diss ...  
Size: 22.68Mb  
Format: PDF

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Permanent Link: <http://hdl.handle.net/1805/2752>  
Date: 2012-03-16  
Committee Chair: [Mickleborough, Timothy D.](#)  
Committee: Gunst, Susan J.  
Members: Harrington, Maureen A.  
Sturek, Michael Stephen  
Tepper, Robert S.  
Tune, Johnathan D.  
Degree: Ph.D.  
Degree Year: 2011  
Department: Department of Cellular & Integrative Physiology  
Grantor: Indiana University  
Keywords: [Asthma](#); [Bronchoconstriction](#); [Fish Oil](#)  
LC Subjects: [Asthma -- Treatment -- Research](#); [Fish oils -- Therapeutic use](#);  
[Smooth muscle -- Contraction](#)

### Abstract:

Asthma, a chronic inflammatory disease of the airways, affects nearly 25 million Americans. The vast majority of these patients suffer from exercise-induced bronchoconstriction (EIB), a complication of asthma. Although traditionally treated pharmacologically, nutritional strategies provide a promising alternative for managing EIB as the prevalence of asthma may

be due in part to changes in diet. Our objective was to determine the effects of novel nutritional strategies on hyperpnea-induced bronchoconstriction (HIB) in asthmatic individuals. HIB uses rapid breathing to identify EIB in a research or clinical setting. Fish oil, a combination of the omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), has been shown to be effective in suppressing EIB. However, its use in combination with other nutritional supplements, the optimal fish oil formula, and its effect on smooth muscle contractility have not been fully explored. An in vivo study (study 1) was conducted in individuals with both asthma and HIB to determine whether a combination of fish oil and vitamin C was more effective than either one alone in alleviating HIB. Pulmonary function was significantly improved with both fish oil and the combination treatment but not with vitamin C alone. In study 2, individuals with both asthma and HIB were supplemented with DHA alone since the optimal formula for fish oil has yet to be ascertained; previous in vitro studies have suggested DHA may be the more potent omega-3 fatty acid in fish oil. However, no significant changes in pulmonary function or airway inflammation were seen with DHA supplementation. For study 3, canine airway smooth muscle tissue was treated with fish oil to determine the in vitro effect of fish oil on smooth muscle contractility. Acute treatment with fish oil relaxed smooth muscle strips that had been contracted with 5-hydroxytryptamine. These minor relaxations in smooth muscle tension with fish oil may represent significant changes at the level of the smaller airways. These studies have confirmed that fish oil represents a viable treatment modality for asthmatic individuals with EIB and suggest that fish oil may influence airway smooth muscle contractility.

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