# Respiratory Diseases and the Fire Service

U.S. Fire Administration | FEMA

# Chapter 2-4
# Asthma

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Asthma is a chronic inflammatory disease of the airways.[1] This inflammation can lead to airway hyperreactivity when exposed to triggers (such as irritants, allergens, temperature/humidity change, stress and exertion) and acute airflow limitation producing symptoms, such as cough, wheeze, chest tightness and shortness of breath. These symptoms are at least partially reversible with bronchodilator medications. Airway inflammation is present even in mild disease.

## EPIDEMIOLOGY

An estimated 23.4 million Americans have asthma and the prevalence has been steadily increasing.[2,3] The incidence of asthma is greater in childhood compared to adulthood. Each year, there are nearly 500,000 hospitalizations and close to two million visits to the Emergency Department. Nearly one quarter of adults with asthma missed work during the prior year due to asthma and over one third of parents of asthmatics missed work in the prior year. The annual direct and indirect health cost is estimated at over 16 billion dollars. Fortunately the overall mortality of asthma in the United States appears to be decreasing. Of concern, the mortality rate appears to be higher among African Americans and Puerto Rican Americans, perhaps due to factors such as health care access, environmental factors, and/or genetic influences.

## RISK FACTORS

Both genetic and environmental risk factors have been sited for the development of asthma. Some studies have shown a more than 25% chance of having a child with asthma if one of the parents has asthma. Numerous studies have also linked asthma to allergic diseases which occur in families with a genetic predisposition towards the development of a hypersensitivity reaction to environmental allergens. There have been many reports describing the identification of potential asthma-susceptibility genes, and such research and genetic findings will lead to better disease classification and treatment.

Environmental risk factors include exposure to maternal smoking during pregnancy, chemical sensitizers, air pollutants, allergens and infections of the respiratory tract. Studies have shown a two-fold risk of a child developing asthma if the mother smokes while pregnant. Environmental tobacco smoke may also be linked to adverse asthma-related outcomes.[4,5] Vigorous outdoor exercise in regions with high levels of ozone also has been shown to predispose to the development of asthma, and particulate air pollution from motor vehicles has been suspected of contributing to the increased prevalence.[5] The indoor environment is just as important, perhaps more-so, where exposure

# Chapter 4-1
# Pulmonary Function Tests for Diagnostic and Disability Evaluations

**By Dr. Andrew Berman, MD and Dr. Naricha Chirakalwasan, MD**

## INTRODUCTION

Pulmonary function tests (PFTs) are a group of studies designed to evaluate how the lung functions in health and in disease. They are usually performed in a lab or in a doctor's office and can be used to diagnose, assess severity and progression, and guide treatment of pulmonary diseases. PFTs can uncover clinically undetected dysfunction.

Most pulmonary function measurements are routinely expressed as a percent predicted of normal so that the patient can see how they are doing compared to the population. Since pulmonary function measurements are known to be lower in shorter, older or female subjects, the percent predicted normal value automatically adjusts for age, height and gender. While obesity also has a direct effect in lowering pulmonary function measurements by placing a greater stress on the lungs, heart and skeletal muscles, the impact of obesity is not adjusted for automatically in the percent predicted equations. Therefore, if your values are low and you have central obesity (chest and/or abdomen) your values would likely be higher if you lost weight.

For PFTs to be accurate and to provide the correct diagnosis it is important that the patient, physician and technician performing the test remember the following points:

- Most PFTs are effort dependent and the patient must be coached to breathe in as deep as possible and to blow out as hard as possible.
- Reproducibility is required and multiple efforts may be needed. As with the Olympics, the best effort counts and not the number of efforts required to produce that best effort.
- Tobacco smoke should be avoided as it can negatively influence both your health and these measurements.

Unless otherwise advised by your physician, bronchodilator medications (ex. albuterol, ventolin, proventil, ipratropium bromide or Atrovent, Combivent, Seravent, Foradil, Advair, Symbicort and Spiriva) and caffeine should not be taken the morning of the test. However, if you have a history of taking these medications you should bring them with you, tell the technician administering the test about them and be prepared to use them, if necessary, after the test.

This chapter will review some of the many ways lung function can be evaluated.

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# Toxins and Hemostasis

## From Bench to Bedside

Springer

# Chapter 39
# Snakebite-Induced Coagulopathy and Bleeding Disorders

**Ponlapat Rojnuckarin**

**Abstract** Snake venoms target mainly neuromuscular and/or hemostatic systems. Each of them is a combination of several toxins. Therefore, coagulopathy is only a part of multi-systemic involvement from envenomation including muscular weakness, rhabdomyolysis, renal failure and hypotension. Kinetics studies reveal that viper venoms comprise long half-life components resulting in a delay onset and prolonged duration of bleeding in a subset of patients. On the other hand, elapid venoms are more rapidly cleared from the circulation showing faster recovery. Remarkably, snake venoms affect almost every component of hemostasis including vascular wall, platelets, coagulation factors, natural anticoagulants and fibrinolysis. They can be stimulatory or inhibitory through enzymatic or binding mechanisms. These effects can contribute to hemorrhagic, as well as thrombotic, manifestations of snakebites. The most prominent clinical syndrome is consumptive coagulopathy from the thrombin-like enzymes and/or coagulation factor activators in the venoms. In addition, anticoagulation syndrome, thromboembolism and thrombotic microangiopathy have been reported in victims of particular snake species. The key treatment of snakebites is antivenom that can promptly reverse coagulopathy in most situations.

## Introduction

Venomous snakes concoct their poisons to inflict several physiological systems of their preys. The two main targets are neuromuscular damage causing immobilization and blood clotting activation resulting in circulatory obstruction and rapid death. However, the latter effect displays a different consequence in larger animals, which are not the natural preys. In human, due to greatly larger blood volume, the fibrinolytic system activation causes coagulation factor as well as platelet

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CHAPTER 14

c0014

# Neuroimaging in Rabies

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Abstract

Rabies remains a virtually incurable disease once symptoms develop. Neuroimaging studies demonstrate lesions in the different parts of the neuroaxis, even before brain symptoms are evident. These abnormalities have been detailed in both rabies virus-infected humans and dogs with magnetic resonance imaging (MRI). MRI disturbances were similar in both forms (furious or paralytic) in human rabies; however, they were more pronounced in paralytic than in furious rabies virus-infected dogs in which examination was done early in the disease course. Abnormalities were not confined only to neuronal structures of hippocampus, hypothalamus, basal ganglia, and brain stem but also extended to

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CHAPTER 15

c0015

# Rabies Virus Infection and MicroRNAs

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Contents



Abstract

Endogenous RNA-silencing mechanisms have been shown to play a role in regulating viral and host processes during the course of infection. Such interactive processes may involve host cellular and/or viral-encoded microRNAs (miRNAs). Rabies is unique not only in terms of its invariably fatal course once disease signs develop, but it also has a variable incubation period (eclipse phase). It has been recently shown that cells or tissues of different

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