

# Rolling Stones



## The Evaluation, Prevention, and Medical Management of Nephrolithiasis

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### KEYWORDS

- Nephrolithiasis • Kidney stones • Hypercalciuria • Hyperoxaluria • Hyperuricosuria
- Medical expulsive therapy

### KEY POINTS

- Nephrolithiasis, an increasingly prevalent and costly ailment, is a heterogeneous phenotype influenced by both genetics and multiple environmental factors.
- Nearly 80% of kidney stones are composed of calcium and are due to idiopathic hypercalciuria; uric acid and struvite (infection) stones are the next most common.
- A focused history and physical examination along with laboratory and imaging studies are necessary to identify risk factors that can be addressed with directed therapy.
- All patients should consume enough fluids to generate more than 2 L of urine daily. For calcium stones, normal calcium intake with reduced sodium and animal protein is preventative for stone formation.
- Drug therapies include thiazide diuretics, potassium citrate and allopurinol. The effectiveness of medical expulsive therapy to facilitate passage of stones under 10 mm is uncertain.

### INTRODUCTION

Kidney stones have plagued mankind since the beginnings of recorded history. Stones were found in an Egyptian mummy dating back nearly 7000 years. The word lithotomy comes from ancient Greek and stones are mentioned in the Hippocratic Oath.<sup>1,2</sup> Fortunately, through the centuries great advances have been made in our understanding of this affliction. The intent of this review is to present current information on the epidemiology, risk factors, evaluation, medical management, and prevention of the most common causes of nephrolithiasis in adults. Information on rare genetic causes

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Disclosures: None.

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of nephrolithiasis and surgical management can be found in Edvardsson and colleagues<sup>3</sup> and Bird and associates.<sup>4</sup>

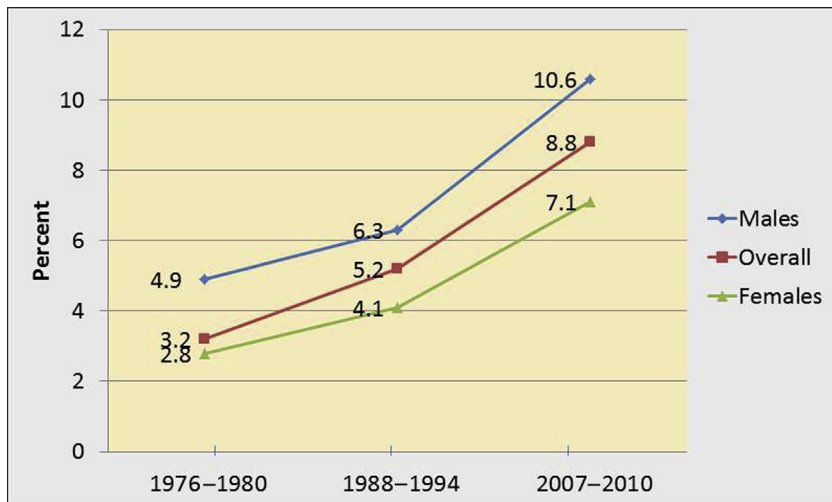
## EPIDEMIOLOGY

### *Incidence and Prevalence Rates in the United States*

Nephrolithiasis is a common affliction that can strike at any age, including childhood. Among adults, the incidence of a first symptomatic stone begins to increase after age 20, peaks between ages 30 and 50, and then declines but never disappears.<sup>5</sup> The lifetime risk of developing at least 1 kidney stone is 19% in men and 9% in women.<sup>6</sup> Once a person has had a kidney stone, the chance of future stones progressively increases with each episode.<sup>7</sup>

The prevalence of kidney stones has been increasing over the past several decades<sup>6</sup> (Fig. 1). According to data from the National Health and Nutrition Examination Survey (NHANES), the prevalence has increased dramatically from 3.2% between 1976 and 1980 to 8.8% between 2007 and 2010.<sup>6</sup> These numbers tell only part of the story; the prevalence rates vary by sex, age, and race. Although males have always had a higher prevalence of stones than females, the ratio of males to females has narrowed over this time frame. Moreover, women now comprise a majority of hospital admissions for management of nephrolithiasis.<sup>8</sup> Along with the overall increase in stone prevalence, there has been a trend of increasing prevalence with age, both in the United States and in several other countries worldwide.<sup>9</sup> NHANES data also reveal significant differences in stone prevalence by race, with non-Hispanic blacks showing the lowest rates, Caucasians the highest rates, and Hispanics and other racial groups falling in the middle<sup>6</sup> (Fig. 2).

The cost of nephrolithiasis has also escalated in recent decades and is now more than \$5 billion per year, including the costs of hospitalization, surgery, and time lost from work.<sup>10</sup> Contributing to the increasing costs of health care since the 1990s is the near doubling of emergency department visits for kidney stones and the tripling



**Fig. 1.** Prevalence rates of kidney stones according to data from the National Health and Nutrition Examination Surveys. (Data from Scales CD, Smith AC, Hanley JM, et al. Prevalence of kidney stones in the United States. *Europ Urol* 2012;62:160-5.)

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