INTRODUCTION
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Anthropologic history provides evidence that urinary calculi existed as long as 7000 years ago and perhaps more. The recognition of different varieties of urinary calculi also resulted in more varieties of medical treatment. During the last decade however, many major advances have greatly improved our understanding of the causes of stone disease. Although not all calculi can be cured, patients who develop one of the five major types of urinary calculi now have at least a 50 percent chance of cure or control with medical therapy alone. Surgery continues to be important as one aspect of treatment of urinary calculi, but it is now only one step in total therapeutic or the mentorium for patients with urinary lithiasis.

Urinary lithiasis represents a realm of sharing between the urologist and his medical colleagues. In some instances, medical specialists with training in endocrinologic diseases perform nonsurgical evaluation and treatment of urinary calculus disease. In many instances, however, this is not possible or feasible. Decision about evaluation and treatment of patients with urinary lithiasis often rests with urologist. Urologist
must therefore understand all aspects of etiology, diagnosis and surgical & non surgical treatment of urinary lithiasis.

Ancient man was undoubtedly afflicted with calculi just as men is now. Riches (1968) refers to a stone that was found in pelvis (Presumably bladder) of an Egyptian mummy estimated to be over 7000 years old. Perhaps because of admission of Hippocrates, surgical treatment of bladder calculi was for centuries traditionally left to numbers of wandering lithotomists. By the 17th and 18th centuries many of these men had become famous lithotomists of that time.

As Europeans moved to America, they brought with them their predisposition to form bladder calculi. Mengensteen et al (1969) summarized several reviews of lithotomy practice in America during the years 1810 to 1853. Vogel (1970) noted that in America urinary calculi disease was isolated, predominantly to immigrant Europeans. For instance he reviews the statement that "Savages were unacquainted with a great many diseases that afflict the Europeans, such as gout, dropsy, gravel". Citing another reference, he notes that North Carolina Indians were "never troubled by scurvy, dropsy or stone". In 1954, an Inca reporter (cited by Vogel) stated that he thought that corn was the factor that prevented occurrence
of urinary calculi in native American Indians. Many Indian Herbal treatments were adopted to the treatment of urinary calculus or gravel by the Americans. Thus Vogel mentions the use of haw or hawthorn tree, persimmon, sarsaparilla, and decoctions of multiple other leaves and twigs as remedies for stones.

Some authors (notably Frein 1971, and Joly 1931) have used this observed capability of transference of European urinary stone disease to the new world to challenge the theory that geographic distribution of urinary calculi has any importance whatsoever.

Whether or not stone disease of early centuries was governed more by heredity or by environment, there is no doubt that bladder calculi were an endemic part of life prior to the 20th century (Ellis, 1969; Castergoard 1973). Kind (1971) and Frein (1971) noted the historical trend away from bladder calculi towards upper urinary tract calculi whenever a country becomes more industrialized and diet becomes more nutritious, when agrarian primitive pursuits remain the primary way of life for a population, the incidence of bladder stone disease continues to be high, as it is in Thailand (Lonsdale 1968b; Suwachittanont et al 1973).
By the early 1900's observers of urinary stone disease had already begun to notice an increased occurrence of renal and ureteral calculi in Europe, the British Isles and America. This change seemed to parallel increased industrialization.

By 1950, investigators began to report some significant physiologic observations that were associated with production of urinary calculi. These included the importance of diet, especially in association with uric acid bladder calculi (Gutman and Yu 1958). Hypercalciuria was clearly defined as one factor contributing to the formation of calcium calculi (Flocks, 1939), and hypercalciuria due to hyperparathyroidism was identified and separated from idiopathic hypercalciuria (Albright and Reifenstein 1948, Flocks 1940). The importance of nucleation of stones in kidney was studied intensively by Randall (1937), who described his famous "Randall Flakes". Urinary crystals and colloids were described, and the crystallloid and colloid composition of all stones was determined (Wesson 1935). The effect of infection on stone formation was noted to be different from the effects of excessive excretion of crystalloids in the absence of infection. Much ground work was laid for the world-wide resurgence of research into the etiology and prophylaxis of urolithiasis that followed world-war II.
The history of stone disease implies that many diverse factors might be involved in its causation: heridity, environment, age, sex, urinary infection, the presence of metabolic diseases and dietary excesses or deficiencies.

Anderson (1973) presents an interesting multifaceted theory of epidemiology of urinary calculi. He notes that the incidence of upper tract urinary calculi varies greatly with age, anatomic site and geographic distribution and that there are unexplained increases during different periods of history. He feels therefore that there are at least two separate epidemiological factors involved in the genesis of urinary calculi. The first of these may be considered intrinsic. Intrinsic factors are related to the inherited biochemical or anatomic makeup of individual. For example, African Bantu natives and the related North American Negroes tend to have very few urinary calculi (Modlin, 1967, Fentonowitz et al 1973). A subcategory of this racial or ethnic factor includes any familial tendency towards generation of calculi. Familial inheritance of calcium stone disease has been reported by Rosnick et al (1968) and McGown (1960) and reviewed by Pinlgson (1974). No true sex-linked inheritance of urinary lithiasis has been defined, but Transhol and Fredendel (1973) have
reported that male relatives of patients with hypercalciuric stone disease were more often afflicted than female relatives. Intrinsic factors of urolithiasis, then included ethnic, racial or familial background and any inherited physiological or anatomic predisposition to urinary calculi.

Superimposed upon these apparent intrinsic factors are those that Anderson terms extrinsic. Another term for these might be environmental factors. These include climate, water available for drinking, dietary patterns or populations and of household of people with urinary calculi, the presence or absence of trace elements in food stuffs and drinking water, differing age and sex distributions of types of calculi; and different occupations.

Geography - There is a noticeable increase in urinary calculi in mountainous or tropical areas. Fialllyson (1974) reviewed several recent world wide geographic surveys and states that the United States is relatively high in incidence of urinary calculus diseases for its population. Other high incidence areas are Mediterranean countries, northern India & Pakistan, northern Australia, central Europe, portions of Malayan peninsula & China.
In summary, geography has some influence on the incidence of urinary calculi and on the types of calculi that occur within a given area. Geography also has an effect in terms of temperature & humidity, which also seems to influence the incidence of human urinary calculi.

**Climatic and Seasonal factors** - It is difficult to find direct evidence for the influence of climate on the occurrence of urinary lithiasis but elevated environmental temperature seem to be definitely related to increased risk of stone disease in populations capable of forming stones.

**Water Intake** - Two factors involved in the relationship between water intake and urolithiasis are the volume of water ingested as opposed to that lost by perspiration, and the mineral or trace elements content of the water supply of the region. Increased water intake and increased urinary output decreases the incidence of urinary calculi in those patients who are predisposed to the disease. Lonsdale (1968b) pointed out that habitual low levels of water intake may have been related to the high incidence of uric acid stones of British adults in earlier times.

**Diet** - There can be little doubt that dietary intake of various foods and fluids that result in increased urinary
excretion of substances that produce stones has a significant effect on the incidence of urinary calculi. Ingestion of excessive amounts of purines (Uric acid) (Hodgkinson 1976), oxalate (Thomas 1975), calcium phosphate and other elements often result in excessive excretion of these components in urine.

Occupation - Lonsdale indicated (1956b) that urinary calculi are much more likely to be found in individuals who have sedentary occupation. The highest rates of incidence were found in cools and engine room personal and these were probably associated with work conditions that included a hot environment. Nette (1969) described an interesting method for prevention of stone disease based on his epidemiological study "a large consumption of beer and butter is associated with minimal stone disease".

In summary this review of the epidemiology of urinary lithiasis leads us to conclude that the following factors all appear to play some part in the genesis of urinary calculi, heredity, age, sex, geographic location, environmental temperature, water intake, diet & occupation of the individual.