

TOXINS AND THEIR MEASUREMENTS

The concept of the urine test and specific reaction of the urine in various diseases according to Enrico Cauchi – member of the medical council of Malta (1933)



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Abstract

The Study of urine from the outset has always aroused the interest of scientists and physicians all over the world, from ancient Greeks and Romans to Hindus, Hulcos in Mexico, Australian native etc.

The urine in such case was considered not only as a waste product but also as a therapeutic product.

In the late XIX century scientific knowledge had already identified the function of substances that favor the increase of urinary output, and physicians over the centuries have always tried to analyze urine in various ways.

In Cauchi's work in 1933 all chemistry and pathophysiological knowledge of the time was condensed. Cauchi signed the preface as Member of the medical council of Malta.

He was a medical doctor of the early 20th century, He wrote about the physiopathology of urine ranging from chemical and physical behavior, to the analysis of sediments and the special reactions of the urine in various pathologies. In particular Cauchi emphasizes the main diseases of the time combines the behavior of the reaction of urine as a diagnostic and prognostic instrument, stressing the importance of the urine test and describing the method used for analysis at the time.

The analyses of the text in the issue seems to belong to archaic medicine, and it is difficult to think today, that what was presented as very "up-to-date- science" at that time, took place only 80 years ago.

Reading the full original text with today experience we are led to consider the increasing importance that scientific community gave in the past, and still gives to urine test.

Key words: Cauchi Enrico, Down Brothers's test, Urinacidimeter, Urine Test

Introduction

The Study of urine from the outset has always aroused the interest of scientists and physicians all over the world, from ancient Greeks and Romans to Hindus, Hulcos in Mexico, Australian native etc.

The urine in such cases were not also to be considered only as a waste product but also as a therapeutic product [1].

Late in XIX century, scientific knowledge had already identified the function of substances that favor the increase of urinary function [2], and the physicians over the centuries always tried to analyzed the urine in various ways.

Enrico Cauchi, member of Medical Council of Malta, was a Physician of the early XXth century who wrote two books entitled: "Physiology and pathology of urine" and "Pathology of the urine" belonged to the "Opera medica" edited by A.Wassermann & c. (October 1933), and consisted of three tomes (Figure 1).

In general Cauchi describes the Urine test as a vital aid to gain information about the state of the kidneys, of the bladder, of replacement of materials(excretion of metabolites), heart strenght and diseases of the other organs, through the presence of

internal heterogeneous substances in urine. He also describes and in many case designed laboratory instruments in use at that time.

In the second part of the first book we found a chapter, the fifth, entitled: "Special reactions of the

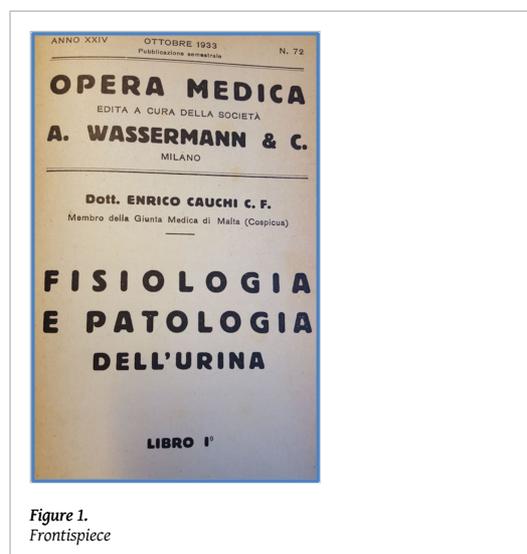


Figure 1.
Frontispiece

Urine” where Cauchi dwelt at length discoursing chemical reaction that could have at the same time, diagnostic and prognostic value.

The author consider some variants that at the time the scientific world was testing, trying to have higher and better sensitivity and specificity, describing different types of reactions according to the major diseases of the time.

The urine test

The author skillfully dissects mini paragraphs the text, describing and synthesizing the content of what at the time represented the core concepts of the meaning of examination of urine, analyzing the “urine” in its physiological state where there is no albumin. He also attempts an analysis with the means of the time an several diseases, including patients with “typhoid fever”, “Carcinomatosis”, and generally speaking about various pathological states in wich cylinders and Kidney epithelia begin to appear.

The author, indeed, defines the urine as: “a liquid where urea and uric acid are always present, and in addition the presence of creatinine can assure that it is a urine”.

For this reasons Cauchi describes some methods to identify Urea, Uric acid and Creatinine, matching the supposed liquid with nitric acid for urea, with hydrochloric acid plus nitric acid plus sodium hypochlorite for uric acide, and very important the re-

action for creatinine matching the presumable urine with sodium nitroprusside plus acetic acid, and heating finally the mixture to find the the torquoise precipitate of creatinine.

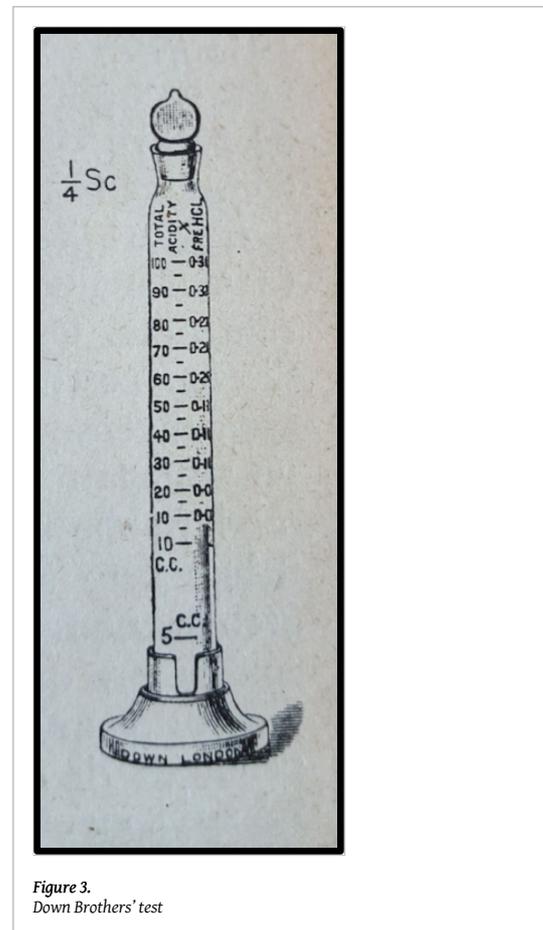
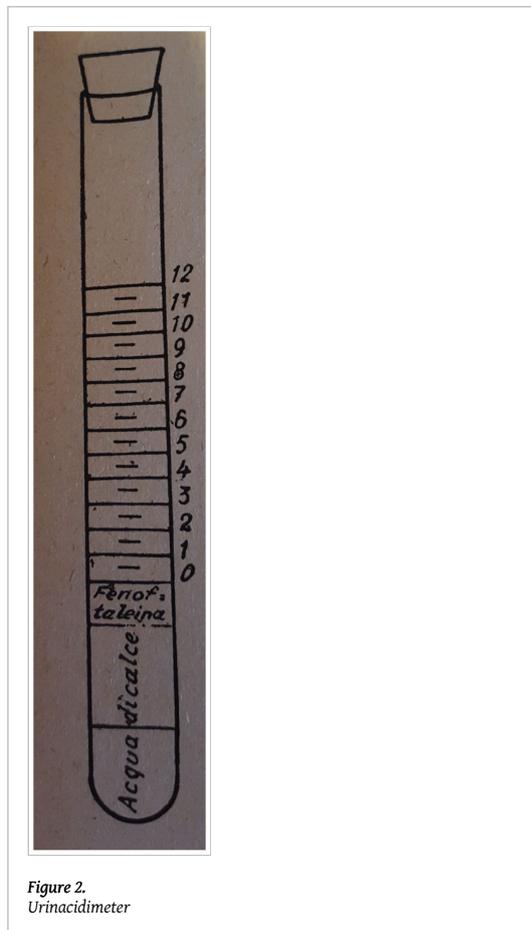
In the scientific technological evolution of the time the author furthermore describes two instruments to evaluate the acidity of urine: the Urinacidimeter and the Down Brothers’ test.

The Urinacidimeter (Figure 2) consists of a tube 30 cm long and 1 cm wide,closed at one end and opened at the other, divided in three sections; in the first was placed a solution of water lime, in the second solution of phenolphthalein and in the third pure urine.

Through the use of special tables, defined at the time, it was possible to analyze the acidity of urine expressed in grams of oxalic acid per liter.

The second instrument provided by firm Down Brothers London, consisted of a vertical tube 30 cm long and 1 cm wide (Figure 3),closed at the bottom and opened at the upper end with a glasscap, divided into two parts, one to contain 10cc of urine, the other with a double graduation for a decinormal solution of sodium hydroxide in the left side, and for the corresponding percentage of hydrochloric acid in the right side. As reported by Cauchi although these instruments did not give perfect results, they were however useful for a clinical response.

In Cauchi’s book the presence of uric acid was not only important to identify the urine as such, but



also to investigate the quantitative excretion of uric acid describing various method more or less reliable and accurate and according to him as the best Ruhemann's Uricometer (Figure 4).

Before speaking of the uricometer, it is interesting to specify that the author dedicates a very long chapter of the book to uric acid (twelve pages), possibly for the importance that the gout had not only in the past [3] but also during his time.

In fact he deduced that the production of uric acid is strictly connected with the typology of the ingested food and that purinic basis together with uric acid constituted purinic bodies.

He also mentions other scientists of his time and doctors from his recent past like Kunke and Meyer that emphasized an increase of uric acid in leukocytosis or after ingestion of thyme cow.

Furthermore he mentions Moris and Herman who observed an overproduction of uric acid after a meal rich in meat and vegetables.

The Uricometer consists of a graduated test tube, opened in one end with three divisions closed in the other. At the closed one; the lower indicated with "S" the highest with "Y". The space between S and Y divided into two equal parts. The S extremity filled with carbon disulfide and on the top stratified there is a solution of iodine with potassium iodide. Over these, drops of urine are added and slightly shaken until the carbon disulfide takes a milky complexion.

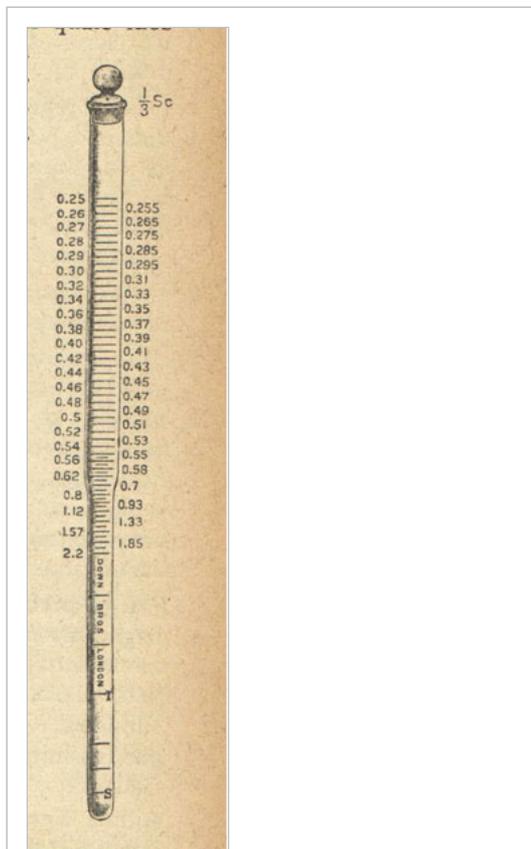


Figure 4.
Ruhemann's Uricometer

Following this procedure the level of liquid is read in value %.

Cauchi's interest was also directed in the possibility that through the urine test was possible to diagnose many pathologies like Tuberculosis, Typhus, Pancreatitis and eventually cancer of abdomen. Below there is a list of these.

Reaction of Moritz Weisz

The Moritz-Weisz's reaction, used for tuberculosis, matches the potassium permanganate on urine (gold yellow if positive). On the basis of its report this reaction has a high diagnostic and prognostic value for a series of reasons:

1. Simplicity and rapidity
2. High sensitivity
3. Lack of influence by drugs or by alkalinity of urine
4. The 60% of positivity in case followed by death (in the context of the preantibiotics era)

Reaction of camidge in the diseases of the pancreas

The author lists more reactions depending on various diseases that could have a diagnostic value, as is the case of the complex reaction of Reaction of Camidge for pancreas, with lead carbonate/acetate, in which the author asserts that it appears to be clear and obvious when the "entire pancreas" doesn't function, rather when only one part of the pancreas is concerned. Cauchi through the analysis of 1465 patients with pancreatic cysts, acute and subacute pancreatitis and other mixed forms affirmed that the reaction had a strong positivity in most cases.

Before starting with the test, however it was necessary to remove the albumin and eventually the sugar from the urine if contained.

Specific reaction on the urine of cancer patient

At the same time however Cauchi correctly specifies that other authors identify the limits of the reaction, declaring to have found positivity in other abdominal diseases of stomach, carcinomatosis and tuberculosis of the peritoneum, intestinal obstruction etc. Justifying the results, saying that "it was impossible to deny that what interests the abdomen in such way, would affect the pancreas".

Conclusion

In Cauchi's original textbook the importance of urine test is very stressed.

The Author considers the test not only for diagnosis but also for the prognosis for several local and general sicknesses.

Textually he says that: "The urine test enriches the physician of much practical and theoretical

knowledge and enables him to easily understand the chemistry of the organism in abnormal disease processes”; much more “if it is performed, like same physicians perform auscultation and percussion this test could gives important information about chemical disorder in the pathophysiologyof urine.”

At the end another concept appears in the text; the entire pathophysiology of the urinary tract is grouped under the Urology and the Urobacteriology chapter, in the book there isn't informations about the Nephrology branch of Medicine appeared some years later.

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