

Table 1

Year	Scientist/Lifespan/Country	Discovery
After 168AC	Galen (129-c.130-c.200/c.216 AC) Pergamon and Rome.	<i>Excessive food intake causes cold and moist diseases.</i>
1591	Prospero Alpini (1563-1616), Republic of Venice.	<i>First description of Mediterranean diet.</i>
1614	Santorio Santorio (1561-1636), Republic of Venice.	<i>Balance between food and drink intake and excreta (urine, feces, and perspiration).</i>
1664	Jan Baptist van Helmont (1580-1644), Belgium.	<i>Urea a natural salt of the urine.</i>
1732	Herman Boerhaave (1668-1738), Holland.	<i>A native salt of urine that tastes different from sea salt. Resembles "sal ammoniac".</i>
1773	Hilaire Rouelle (1718-1779), France.	<i>Saponaceous extract of urine; high in nitrogen content, crystallizes into octahedral rather than cubic crystals of sea salt.</i>
1785	Claude-Louis Berthollet (1748-1822), France.	<i>Urea source of ammonia in urine.</i>
1798	William Cruickshank (d. 1810), UK.	<i>Urea crystallizes by addition of nitric acid; isolated the crystals in diabetic urine.</i>
1799-1908	Antoine Fourcroy (1755-1809), France.	<i>Urea crystallized, nitrogen content determined.</i>
1813	John Bostock (1773-1846), UK.	<i>First to realize the relationship between the diminution of urea in urine and its raising in blood.</i>
1814	William Prout (1785-1850), UK.	<i>Analyzed isolated pure urea crystals. Confirmed Bostock's findings.</i>
1821	Jean Louis Prévost (1790-1850), France.	<i>Extra-renal origin of urea. Elevated blood urea after bilateral removal of the kidneys.</i>
1828	Friedrich Wöhler (1800-1882), Germany.	<i>First to synthesize urea, an organic substance, from silver cyanate and ammonium chloride.</i>
1829	Robert Christison (1797-1882), UK.	<i>Urea increased in blood and reduced in Urine of patients with Bright's disease.</i>
1836	Richard Bright (1789-1858), UK.	<i>1st description of dropsy and proteinuria in end-stage kidney disease.</i>
1833	George Owen Rees (1813-1889), UK.	<i>Elevated blood urea in diabetic patients.</i>
1850	Thomas Graham (1805-1869), UK.	<i>Dialysis of urea across semi-permeable membranes.</i>
1850	Mariano Semmola (1831-1895), Kingdom of Naples.	<i>Effects of various protein intakes on albuminuria, urinary uremia and specific gravity in Bright's disease.</i>
1851	Friedrich T. Von Frerichs (1819- 1885), Germany.	<i>Identified stages of Bright disease through urea concentration.</i>
1856	Antoine Béchamp (1816-1908), France.	<i>Urea product of protein oxidation.</i>
1856	Joseph Picard (1834-1896), France.	<i>Differential urea levels between renal artery and vein.</i>
1869	Lionel Smith Beale (1876-1906), USA.	<i>Low protein diet in renal disease would lower urea generation.</i>
1868	Adolph Fick (1829-1901), Germany.	<i>Calculated filtration rate from urea excretion.</i>
1883	Johan Kjeldhal (1849-1900), Denmark.	<i>Introduced an exact method for nitrogen measurement.</i>
1902	Hermann Strauss (1868-1944), Germany.	<i>Blood urea introduced in clinical medicine.</i>
1904	Fernand Widal (1862-1929).	<i>Relation of protein intake to blood urea in Bright's disease.</i>
1904	Nestor Gréhant (1838-1910), France.	<i>First simultaneous determination of urea in blood and urine.</i>
1910	Léon Ambard (1883-1962), France.	<i>Introduced the urea coefficient (blood to urine urea concentration ratio).</i>
1918	Franz Volhard (1872-1950), Germany.	<i>A vegetarian low protein diet may ameliorate uremic symptoms.</i>

1927	MacKay EM and MacKay LL, (USA).	<i>Gaussian distribution of blood urea concentration.</i>
1931	Newburgh LH, Johnston MW, USA.	<i>High nitrogen diets and renal injury. The dependence of the injury upon the nature of the nitrogenous substance.</i>
1932	Hans Krebs (1900-1981), UK.	<i>Urea (ornithine) cycle.</i>
1944	Walter Kempner (1903-1997), USA.	<i>Treatment of kidney disease and hypertensive vascular disease with a diet of 250-350 g of rice a day.</i>
1948	Thomas Addis (1881-1949), UK-USA.	<i>Protein restriction may be beneficial in uremia.</i>
1954	Theodore N Pullman, USA.	<i>Early studies the effects of various protein intakes on GFR.</i>
1955	John P Merrill (1917-1984), USA.	<i>Experience with AKI let him suggest for CKD a diet of 0.5-0.6 g/Kg of protein a day.</i>

Building a critical mass of data on urea excretion by the kidneys before Giordano. Modified from reference n. 10