44. Physical Characteristics of Urines With and Without Crystals

Source The data were obtained from the laboratory of James S. Elliot M.D. of the Urology Section, Veteran's Administration Medical Center, Palo Alto and the Division of Urology, Stanford University School of Medicine, Stanford.

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The 79 urine specimens, given in Table 44.1, were analyzed in an effort to determine if certain physical characteristics of the urine might be related to the formation of calcium oxalate crystals.

The six physical characteristics of the urine are: (1) *specific gravity,* the density of the urine relative to water; (2) *pH,* the negative logarithm of the hydrogen ion; (3) *osmolarity* (mOsm), a unit used in biology and medicine but not in physical chemistry. Osmolarity is proportional to the concentration of molecules in solution; (4) *conductivity* (mMho milliMho). One Mho is one reciprocal Ohm. Conductivity is proportional to the concentration of charged ions in solution; (5) *urea concentration* in millimoles per litre; and (6) *calcium concentration* (CALC) in millimoles/litre. It may be anticipated that some of these characteristics are highly correlated. Another point worth noting is that the units of measurement vary by several orders of magnitude among the six characteristics.

D. F. Andrews et al., *Data*

Table 44.1
Physical Characteristics of Urines With and Without Crystals *

Patient number	Crystals**	Specific gravity	pH	mOsm	mMho	Urea	Calcium
1	1	1.021	4.91	725	-	443	2.45
2	1	1.017	5.74	577	20.0	296	4.49
3	1	1.008	7.20	321	14.9	101	2.36
4	1	1.011	5.51	408	12.6	224	2.15
5	1	1.005	6.52	187	7.5	91	1.16
6	1	1.020	5.27	668	25.3	252	3.34
7	1	1.012	5.62	461	17.4	195	1.40
8	1	1.029	5.67	1107	35.9	550	8.48
9	1	1.015	5.41	543	21.9	170	1.16
10	1	1.021	6.13	779	25.7	382	2.21
11	1	1.011	6.19	345	11.5	152	1.93
12	1	1.025	5.53	907	28.4	448	1.27
13	1	1.006	7.12	242	11.3	64	1.03
14	1	1.007	5.35	283	9.9	147	1.47
15	1	1.011	5.21	450	17.9	161	1.53
16	1	1.018	4.90	684	26.1	284	5.09
17	1	1.007	6.63	253	8.4	133	1.05
18	1	1.025	6.81	947	32.6	395	2.03
19	1	1.008	6.88	395	26.1	95	7.68
20	1	1.014	6.14	565	23.6	214	1.45
21	1	1.024	6.30	874	29.9	380	5.16
22	1	1.019	5.47	760	33.8	199	0.81
23	1	1.014	7.38	577	30.1	87	1.32
24	1	1.020	5.96	631	11.2	422	1.55
25	1	1.023	5.68	749	29.0	239	1.52
26	1	1.017	6.76	455	8.8	270	0.77
27	1	1.017	7.61	527	25.8	75	2.17
28	1	1.010	6.61	225	9.8	72	0.17
29	1	1.008	5.87	241	5.1	159	0.83
30	1	1.020	5.44	781	29.0	349	3.04
31	1	1.017	7.92	680	25.3	282	1.06
32	1	1.019	5.98	579	15.5	297	3.93
33	1	1.017	6.56	559	15.8	317	5.38
34	1	1.008	5.94	256	8.1	130	3.53
35	1	1.023	5.85	970	38.0	362	4.54
36	1	1.020	5.66	702	23.6	330	3.98
37	1	1.008	6.40	341	14.6	125	1.02
38	1	1.020	6.35	704	24.5	260	3.46
39	1	1.009	6.37	325	12.2	97	1.19
40	1	1.018	6.18	694	23.3	311	5.64