

**Table 2. Effects of Various Errors on Statistical Results, with Glucose Determination as an Example**

Type of error(s)			Statistical parameters						
Random mg/dl	Constant mg/dl	Proportional percent	<i>m</i>	<i>b</i> mg/dl	<i>S<sub>y</sub></i> mg/dl	Bias mg/dl	<i>SD<sub>d</sub></i> mg/dl	<i>t</i>	<i>r</i>
(a) ...	...	...	1.000	0.00	0.00	0.00	0.00	Undefined	1.000
(b) ±2	...	...	1.001	-0.02	2.00	0.05	2.00	0.16	0.999
5	...	...	1.001	-0.04	5.00	0.12	5.00	0.16	0.993
10	...	...	1.003	-0.08	10.00	0.24	10.00	0.16	0.986
(c) ...	2	...	1.000	2.00	0.00	2.00	0.00	∞	1.000
...	5	...	1.000	5.00	0.00	5.00	0.00	∞	1.000
...	10	...	1.000	10.00	0.00	10.00	0.00	∞	1.000
(d) ...	...	2	0.980	0.00	0.08	2.29	1.18	12.43	1.000
...	...	5	0.950	0.00	0.08	5.72	2.95	12.42	1.000
...	...	10	0.900	-0.04	0.14	11.45	5.88	12.47	1.000
(e) ±5	2	...	1.001	1.96	5.00	2.12	5.00	2.72	0.996
5	5	...	1.002	4.92	5.02	5.10	5.03	6.50	0.996
5	10	...	1.002	9.95	5.02	10.10	5.03	12.86	0.996
±10	2	...	1.003	1.92	10.00	2.24	10.00	1.44	0.986
10	5	...	1.003	4.92	10.00	5.24	10.00	3.36	0.986
10	10	...	1.003	9.92	10.00	10.24	10.00	6.56	0.986
(f) ±2	...	5	0.951	-0.02	2.00	5.67	3.53	10.27	0.999
5	...	5	0.951	-0.04	5.00	5.59	5.76	6.27	0.996
10	...	5	0.953	-0.08	10.00	5.47	10.38	3.38	0.985
±5	...	10	0.900	0.23	5.01	11.28	7.85	9.09	0.996
5	...	25	0.751	-0.02	5.00	28.45	15.68	11.62	0.994
5	...	50	0.501	-0.04	5.00	57.02	30.17	12.10	0.986
5	...	75	0.251	-0.04	5.00	85.60	44.94	12.20	0.948
(g) ...	2	5	0.950	2.00	0.08	3.72	2.95	8.07	1.000
...	5	5	0.950	5.00	0.08	0.72	2.95	1.55	1.000
...	10	5	0.950	10.00	0.08	4.28	2.95	9.31	1.000
(h) ±2	5	10	0.905	4.99	2.03	6.37	6.28	6.50	0.999
10	2	5	0.953	1.89	10.01	3.48	10.51	2.12	0.984
5	10	2	0.981	9.96	4.99	7.84	5.18	9.69	0.996

Statistical data are shown for errors of ±2, ±5, and ±10 mg/dl (Table 2, line b). There are no changes in *m*, *b*, and bias, but *S<sub>y</sub>* and *SD<sub>d</sub>* reflect the magnitude of the random error. The correlation coefficient decreases as random error increases, but the changes in *r* are small.

**Constant error.** The effect of constant error is shown in Figure 2, where the line does not go through the origin. In this case, 10 mg/dl has been added to each value to form the test set of data. Statistical results are shown for errors of 2, 5, and 10 mg/dl (Table 2, line c). From the Table, we see that *m*, *S<sub>y</sub>*, *SD<sub>d</sub>*, and *r* are *not sensitive* to constant error, but that *b* and bias reflect it exactly.

**Proportional error.** The effect of proportional error is shown in Figure 3, in which the glucose test results are 2%, 5%, and 10% lower than the reference results. Proportional error changes the steepness of the line and the exact magnitude of the error is quantitated by the changes in *m* (Table 2, line d). Proportional error does not affect *b*, *S<sub>y</sub>*, and *r*, but both bias and *SD<sub>d</sub>* increase.

Combinations of errors were also studied and statistical results are included in Table 2 (lines e-h). The sensitivities of the individual statistical param-

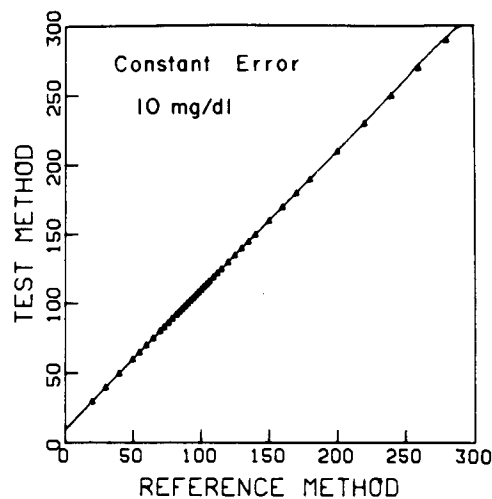


Fig. 2. Effect of simulated 10 mg/dl constant error

eters are the same as when single errors are introduced, and are summarized in Table 3.

**Specific Estimates of Errors**

The error-simulation study shows that different statistical parameters are sensitive to different types of errors, and in some cases to more than one error.