

Supporting Information for Digital PCR on a SlipChip

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Derivation of Equation 1 to estimate template concentration:

The Poisson equation (Equation S1),

$$p = (\lambda^k \cdot e^{-\lambda}) / k! \quad (\text{S1})$$

simplifies to $\mathbf{p} = e^{-\lambda}$ when $\mathbf{k} = \mathbf{0}$, where \mathbf{p} is the probability of having \mathbf{k} particles in a well given λ , the average concentration of particles per well. The average concentration is different at each dilution factor, but λ can be found using the expression $\lambda = \mathbf{c} \cdot \mathbf{x}$, where \mathbf{x} is the dilution factor of the original concentration, \mathbf{c} . Using \mathbf{s}/\mathbf{n} as an estimator of \mathbf{p} , where \mathbf{s} is the number of negative wells, \mathbf{f} is the number of positive wells, and \mathbf{n} is the total number of wells (so $\mathbf{s} = \mathbf{n} - \mathbf{f}$), then Equation S2 is generated:

$$\frac{(n - f)}{n} = e^{-c \cdot x} \quad (\text{S2})$$

This equation can be linearized by taking the natural logarithm (ln) of both sides to give Equation S1 (also Equation 1 in the main text)

$$Y = \ln(n - f) = -c \cdot x + \ln n \quad (\text{S3, 1})$$

The y-intercept then gives the number of wells, so can be used to test the suitability of the equation, or used to constrain the fit based on the known \mathbf{n} . The slope then gives the negative concentration in terms of particles/well.

Table S1. Number of positive wells in each quadrant of the SlipChip for various concentrations of genomic DNA and agreement with the 95% CI.

	Number of positive wells in quadrant				Average # per quadrant	Score based 95% CI range		Rounded 95% CI	
	Upper Left	Upper Right	Lower Left	Lower Right		Lower limit	Upper limit	Lower limit	Upper limit
1 fg/μL									
Trial 1	0	1	1	1	0.75	0.11	5.17	0	5
Trial 2	0	2	0	0	0.50	0.05	4.73	0	5
Trial 3	0	0	1	0	0.25	0.01	4.28	0	4
Trial 4	0	0	1	1	0.50	0.05	4.73	0	5
10 fg/μL									
Trial 1	3	5	5	4	4.25	1.70	10.49	2	10
Trial 2	5	4	3	0*	3.00	1.02	8.70	1	9
Trial 3	5	3	3	0*	2.75	0.90	8.33	1	8
100 fg/μL									
Trial 1	24	21	22	16	20.75	13.66	31.14	14	31
Trial 2	18	22	19	26	21.25	14.06	31.73	14	32
Trial 3	19	13	15	24	17.75	11.28	27.59	11	28
1 pg/μL									
Trial 1	154	159	159	151	155.75	138.38	173.22	138	173
Trial 2	151	145	135	140	142.75	125.63	160.28	126	160
Trial 3	131	140	152	148	142.75	125.63	160.28	126	160

*These values fell outside the CI.