

Supplementary Table 1. Summary of accumulated experiments

Author identifier	Cancer type	sample type	No. of replicates	Total no. of mice	Source
Hansson et. al.	Neuroblastoma	PDX	2	11	https://doi.org/10.1126/scitranslmed.aba4434
Radke et. al.	Neuroblastoma	PDX	1	7	https://doi.org/10.1016/j.tranon.2021.101149
Mohlin et. al.	Neuroblastoma	cell lines	5	32	https://doi.org/10.1158/0008-5472.CAN-15-0708 ; (some unpublished)
Manas et. al.	Neuroblastoma	PDX	6	30	https://doi.org/10.1101/2022.04.01.486670
Murphy et. al.	Wilms tumor	PDX	6	48	https://doi.org/10.1038/s41467-019-13646-9
n.a.	Breast cancer	cell lines	2	18	Unpublished data
n.a.	Lung cancer	cell lines	5	34	Unpublished data

Supplementary Table 2. Neuroblastoma PDXs (Hansson et. al.)

Replicate 1.

Control	Growth rate	%log	%chaos
A1	2.9	75%	67%
A2	6.9		
A3	7.1		
A4	n.a		

Replicate 2.

Control	Growth rate	%log	%chaos
A1	4.1	43%	100%
A2	n.a		
A3	n.a		
A4	4.4		
A5	n.a		
B1	4.9		
B2	n.a		

%log: Percentage of mice that followed a logistic growth

%chaos: Percentage of mice following logistic growth that observed growth rate over 3.0

Supplementary Table 3. Neuroblastoma PDXs (Radke et. al.)

Control	Growth rate	%log	%chaos
A1	n.a	43%	67%
A2	2.5		
A3	n.a		
A4	9.8		
A5	n.a		
A6	n.a		
A7	8.8		

%log: Percentage of mice that followed a logistic growth

%chaos: Percentage of mice following logistic growth that observed growth rate over 3.0

Supplementary Table 4. Neuroblastoma SK-N-BE2(C) cell line (Mohlin et. al.)

Replicate 1.

Control	Growth rate	%log	%chaos
A31	4.8	50%	80%
A41	6.2		
B11	n.a		
B21	n.a		
B31	5.8		
A32	1.7		
A42	11		
B12	n.a		
B22	n.a		
B32	n.a		

Replicate 2.

Control	Growth rate	%log	%chaos
A1	1.4	60%	67%
A2	3.7		
A3	4		
A4	n.a		
A5	n.a		

Replicate 3.

Control	Growth rate	%log	%chaos
m1	n.a	60%	100%
m2	6.5		
m3	20		
m4	n.a		
m5	15		

Replicate 4.

Control	Growth rate	%log	%chaos
m1	5	44%	75%
m2	n.a		
m3	n.a		
m4	n.a		
m5	n.a		
m6	n.a		
m7	1.5		
m8	5.6		
m9	3.7		

Replicate 5.

Control	Growth rate	%log	%chaos
m1	3.9	67%	100%
m2	n.a		
m4	4.1		

%log: Percentage of mice that followed a logistic growth

%chaos: Percentage of mice following logistic growth that observed growth rate over 3.0

Supplementary Table 5. Neuroblastoma PDXs (Manas et. al.)

Model: PDX1 (nude mice)

Control	Growth rate	%log	%chaos
c1	4.5	75%	100%
c2	3.1		
c3	n.a		
c4	11		

Model: PDX1 (NSG mice)

Control	Growth rate	%log	%chaos
c1	25	60%	100%
c2	29		
c3	n.a		
c4	n.a		
c5	6		

Model: PDX2 (NSG mice)

Control	Growth rate	%log	%chaos
c1	4.4	71%	100%
c2	13		
c3	11		
c4	n.a		
c5	16		
c6	12		
c7	n.a		

Model: PDX3 (nude mice), replicate 1

Control	Growth rate	%log	%chaos
C1	1.8	50%	50%
C2	6.4		
C3	n.a		
C4	n.a		

Model: PDX3 (nude mice), replicate 2

Control	Growth rate	%log	%chaos
c1	n.a	40%	100%
c2	9.4		
c3	n.a		
c4	9.8		
c5	n.a		

Model: PDX3 (nude mice), replicate 3

Control	Growth rate	%log	%chaos
c1	17	80%	100%
c2	18		
c3	n.a		
c4	16		
c5	16		

%log: Percentage of mice that followed a logistic growth

%chaos: Percentage of mice following logistic growth that observed growth rate over 3.0

Supplementary Table 6. Wilms tumor PDXs (Murphy et. al.)

Model: KT47

Control	Growth rate	%log	%chaos
m1	n.a	75%	100%
m2	30		
m3	18		
m4	34		
m5	32		
m6	40		
m7	n.a		
m8	27		

Model: KT53

Control	Growth rate	%log	%chaos
m1	31	100%	100%
m2	35		
m3	37		
m4	34		
m5	32		
m6	32		
m7	27		
m8	32		

Model: KT51

Control	Growth rate	%log	%chaos
m1	21	88%	100%
m2	6.8		
m3	15		
m4	15		
m5	40		
m6	n.a		
m7	39		
m8	15		

Model: KT45

Control	Growth rate	%log	%chaos
m1	n.a	63%	100%
m2	n.a		
m3	5.8		
m4	20		
m5	12		
m6	4.3		
m7	7.3		
m8	n.a		

%log: Percentage of mice that followed a logistic growth

%chaos: Percentage of mice following logistic growth that observed growth rate over 3.0

Model: KT75

Control	Growth rate	%log	%chaos
m1	n.a	38%	100%
m2	n.a		
m3	8.2		
m4	4.8		
m5	n.a		
m6	n.a		
m7	n.a		
m8	7.6		

Model: KT43

Control	Growth rate	%log	%chaos
m1	n.a	13%	100%
m2	n.a		
m3	4.4		
m4	n.a		
m5	n.a		
m6	n.a		
m7	n.a		
m8	n.a		

%log: Percentage of mice that followed a logistic growth

%chaos: Percentage of mice following logistic growth that observed growth rate over 3.0

Supplementary Table 7. Breast cancer cell line models

Cell line: MCF7

Control	Growth rate	%log	%chaos
m1	0.9	89%	0%
m2	0.23		
m3	0.98		
m4	0.63		
m6	n.a		
m7	0.97		
m8	0.99		
m9	0.98		
m10	0.87		

Cell line: MDA-MB-231

Control	Growth rate	%log	%chaos
m1	1.5	100%	11%
m2	2.9		
m3	3.6		
m5	0.52		
m6	2.80		
m7	1.20		
m8	1.30		
m9	2.50		
m10	1.30		

%log: Percentage of mice that followed a logistic growth

%chaos: Percentage of mice following logistic growth that observed growth rate over 3.0

Supplementary Table 8. Lung cancer cell line models

Cell line: A549 (replicate 1)

Control	Growth rate	%log	%chaos
m1	0.7	88%	0%
m2	0.35		
m3	0.9		
m4	0.032		
m5	0.66		
m6	0.99		
m7	0.74		
m8	n.a		

Cell line: A549 (replicate 2)

Control	Growth rate	%log	%chaos
m1	0.37	100%	0%
m2	0.6		
m3	0.93		
m4	0.62		
m5	0.33		
m6	0.25		
m7	0.64		
m8	0.49		

Cell line: H520 (replicate 1)

Control	Growth rate	%log	%chaos
m1	n.a	60%	0%
m2	1.1		
m3	2		
m4	n.a		
m5	1.6		

Cell line: H520 (replicate 2)

Control	Growth rate	%log	%chaos
m1	n.a	40%	0%
m2	1.60		
m3	1.70		
m4	n.a		
m5	n.a		

Cell line: H441

Control	Growth rate	%log	%chaos
m1	0.65	75%	0%
m2	0.29		
m3	n.a		
m4	1.7		
m5	2.1		
m6	1.6		
m7	0.33		
m8	n.a		

%log: Percentage of mice that followed a logistic growth

%chaos: Percentage of mice following logistic growth that observed growth rate over 3.0

Supplementary Table 9. Summary of growth rates across experiments. The growth rates are accumulated for all mice that adhered to logistic pattern. All growth rates more than 3 are color coded in orange to reflect possible mechanisms of chaos in those mice and all less than 3 are shown in green as these are unlikely to exhibit chaotic fluctuations. This heatmap provides an overview for possible inclination of cancer types under consideration to observe chaotic growth.

Source	Cancer type	Growth rates								scale
Hansson et.al.	Neuroblastoma	4.1	4.4	4.9						
	Neuroblastoma	2.9	6.9	7.1						<1
Radke et.al.	Neuroblastoma	2.5	9.8	8.8						3
Mohlin et.al.	Neuroblastoma	4.8	6.2	5.8	1.7	11				>4
	Neuroblastoma	1.4	3.7	4						
	Neuroblastoma	5	1.5	5.6	3.7					
	Neuroblastoma	6.5	20	15						
Manas et. al.	Neuroblastoma	3.9	4.1							
	Neuroblastoma	4.5	3.1	11						
	Neuroblastoma	25	29	6						
	Neuroblastoma	4.4	13	11	16	12				
	Neuroblastoma	1.8	6.4							
Murphy et.al.	Neuroblastoma	9.4	9.8							
	Neuroblastoma	17	18	16	16					
	Wilms tumor	30	18	34	32	40	27			
	Wilms tumor	31	35	37	34	32	32	27	32	
	Wilms tumor	21	6.8	15	15	40	39	15		
	Wilms tumor	5.8	20	12	4.3	7.3				
n.a.	Wilms tumor	8.2	4.8	7.6						
	Wilms tumor	4.4								
	Breast cancer	0.9	0.23	0.98	0.63	0.97	0.99	0.98	0.87	
	Breast cancer	1.5	2.9	3.6	0.52	2.80	1.20	1.30	2.50	1.30
	Lung cancer	0.7	0.35	0.9	0.032	0.66	0.99	0.74		
	Lung cancer	0.37	0.6	0.93	0.62	0.33	0.25	0.64	0.49	
	Lung cancer	1.1	2	1.6						
Lung cancer	1.60	1.70								
Lung cancer	0.65	0.29	1.7	2.1	1.6	0.33				

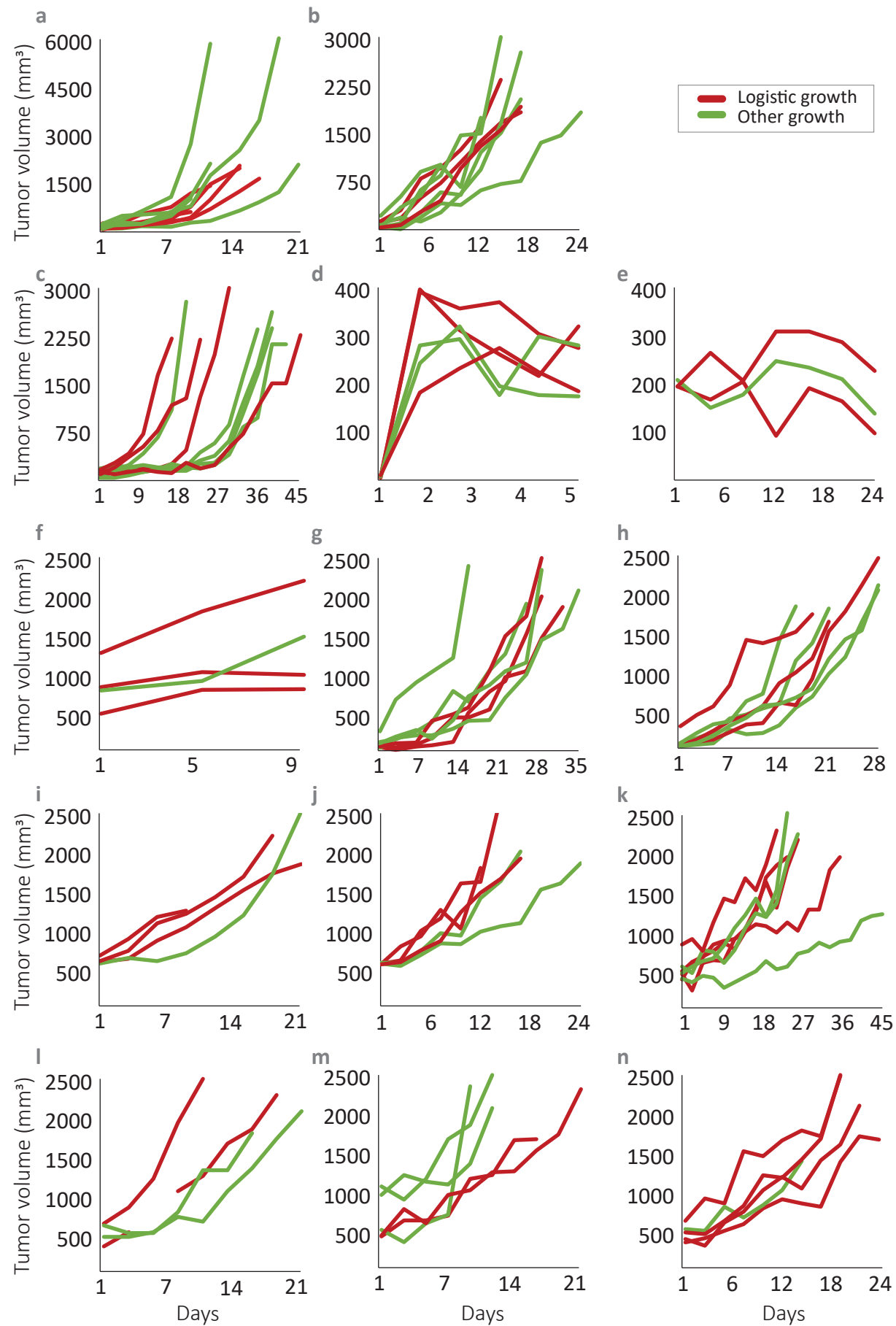
Supplementary figure legends

Supplementary figure 1-4.

Prediction of growth trend (red if logistic, green if not) are shown for each growth curve, experiment wise. For neuroblastoma, **a-e** are from Mohlin et. al., **f-g** are from Hansson et. al., **h** is from Radke et. al. and, **i-n** are from Manas et. al. The Wilms tumor, breast and lung cancer samples are taken from sources as discussed in supplementary table 1. All samples are ordered as they appear in supplementary tables 2-8.

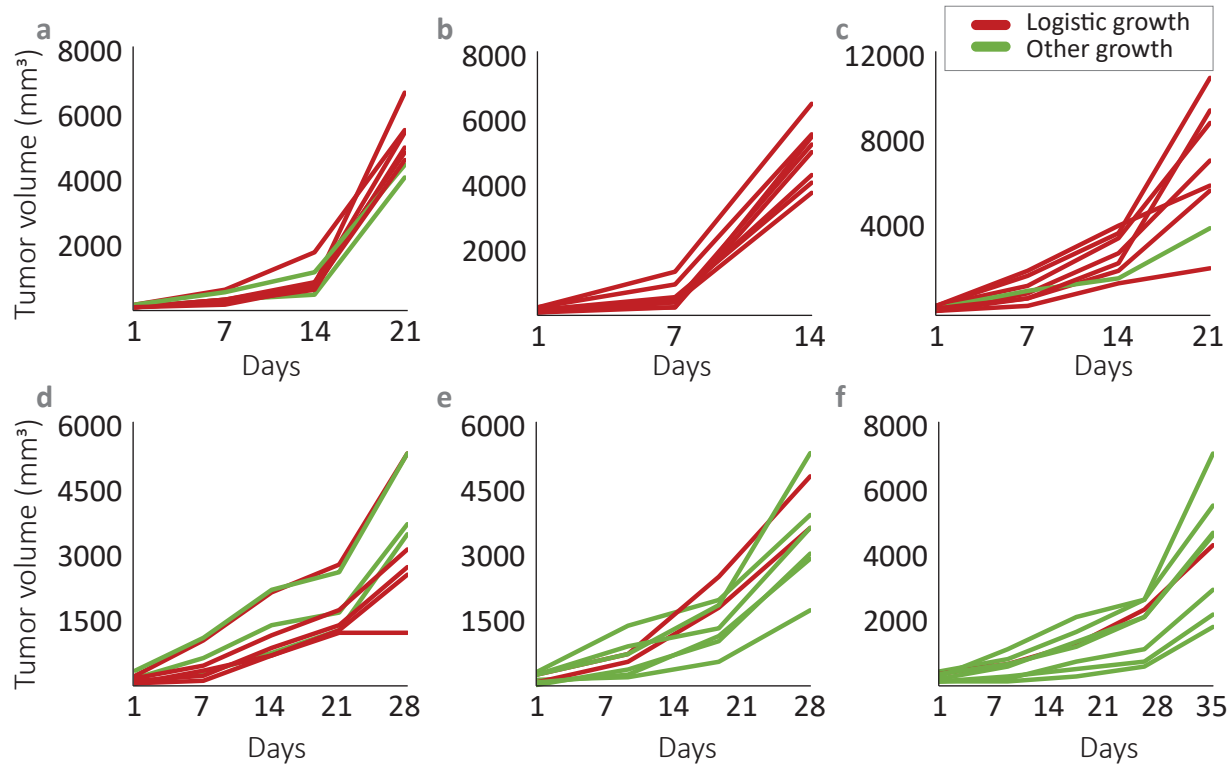
Supplementary figures 5-30.

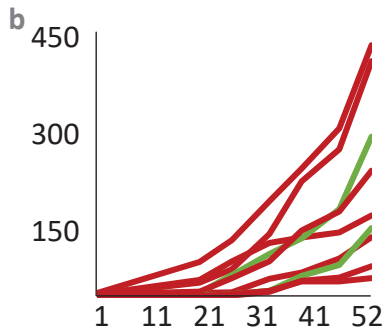
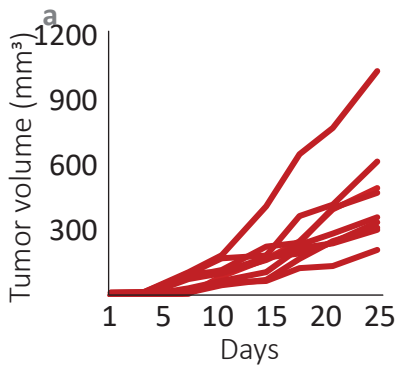
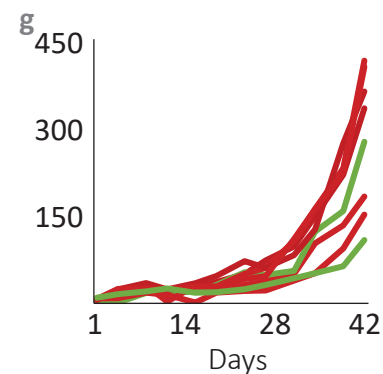
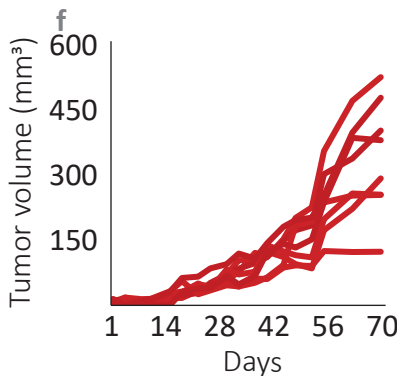
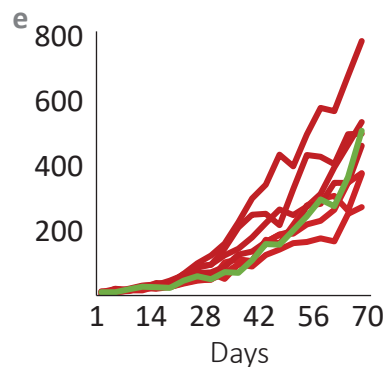
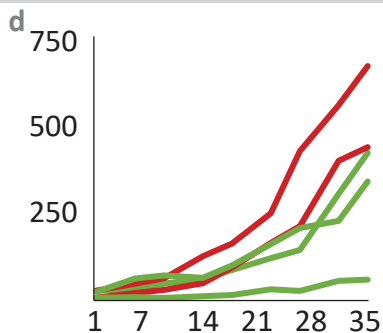
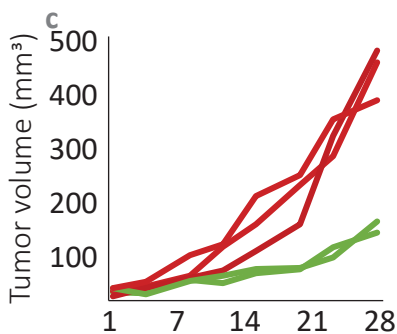
Goodness of logistic fit is shown with fitted curve and overlaid tumor volume measures. Each plot refers to a single control mouse belonging to a set of experiments whose growth adhered to a logistic growth. For example, mice from replicate 1 of Hansson et. al. are shown in supplementary figure 5. Supplementary table 2 for the replicate 1 shows three mice (A1, A2, A3) followed a logistic growth. In supplementary figure 5, goodness of fit are shown for these three mice. All plots accompany the mouse identifier that correspond to supplementary tables 2-8 for respective experiment.



Supplementary figure 2.

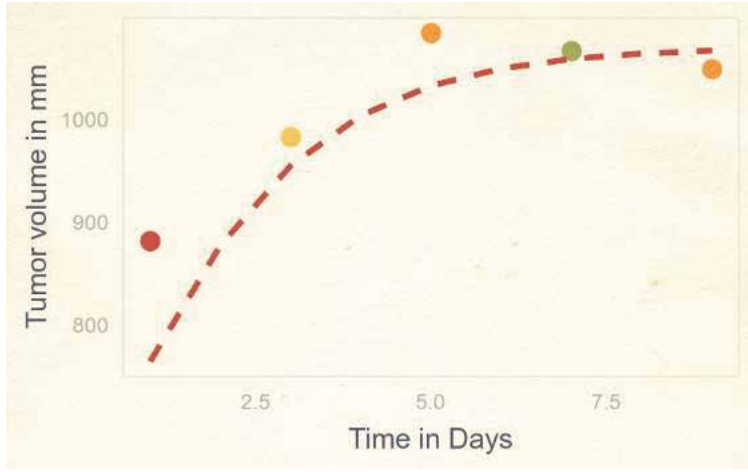
Wilms tumor



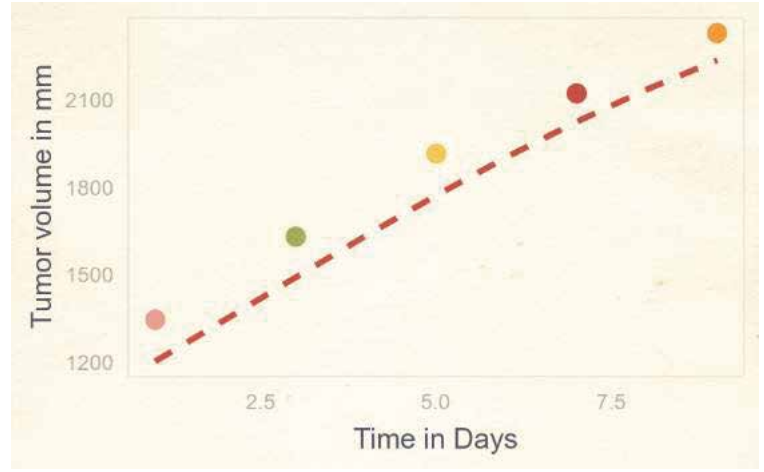
Supplementary figure 3.**Breast cancer****Supplementary figure 4.****Lung cancer**

Supplementary figure 5. Neuroblastoma PDX (Hansson et. al., replicate 1)

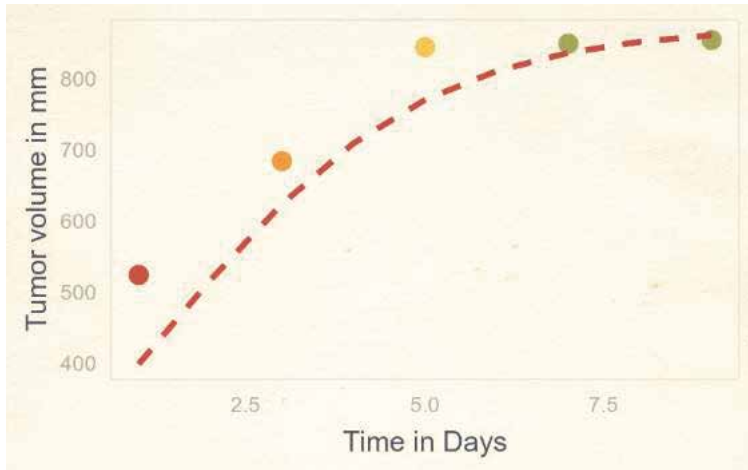
mouse A1



mouse A2

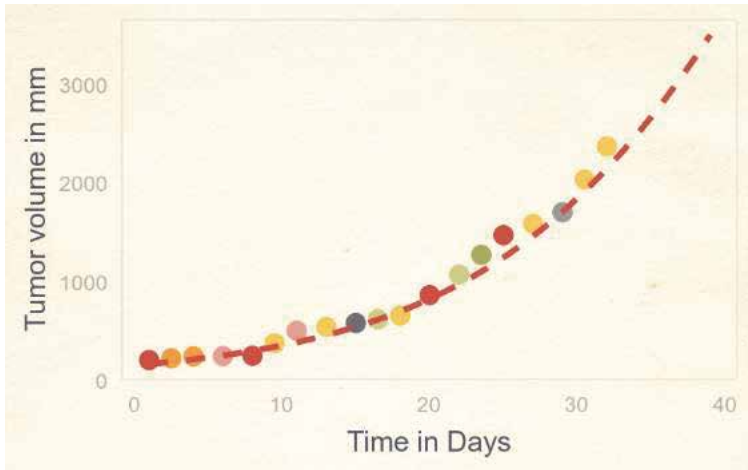


mouse A3

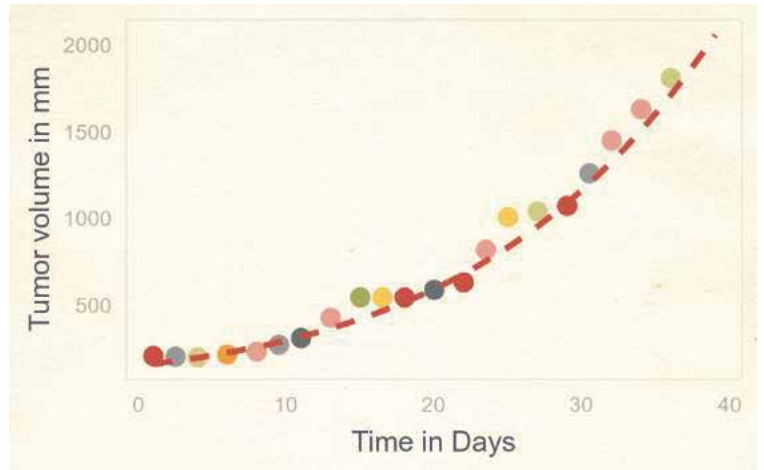


Supplementary figure 6. Neuroblastoma PDX (Hansson et. al., replicate 2)

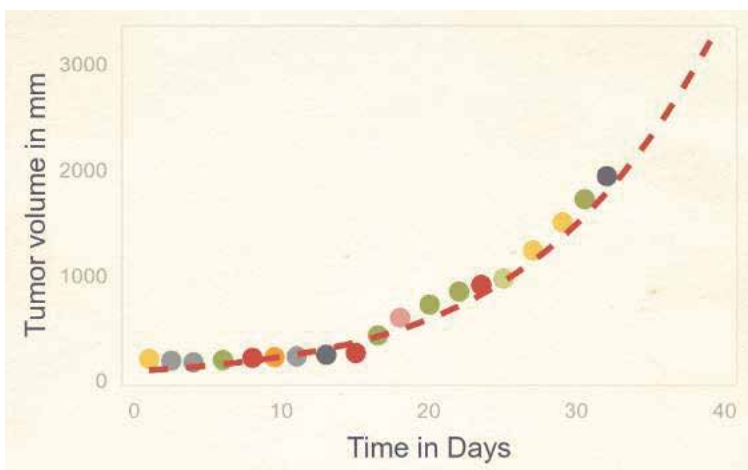
mouse A1



mouse A4

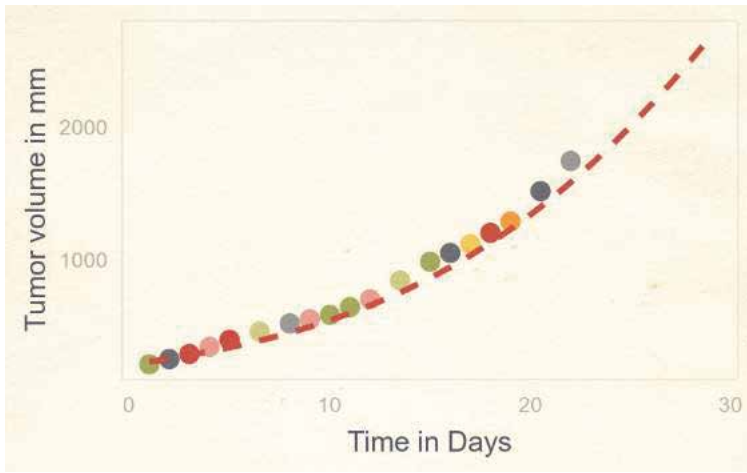


mouse B1



Supplementary figure 7. Neuroblastoma PDX (Radke et. al.)

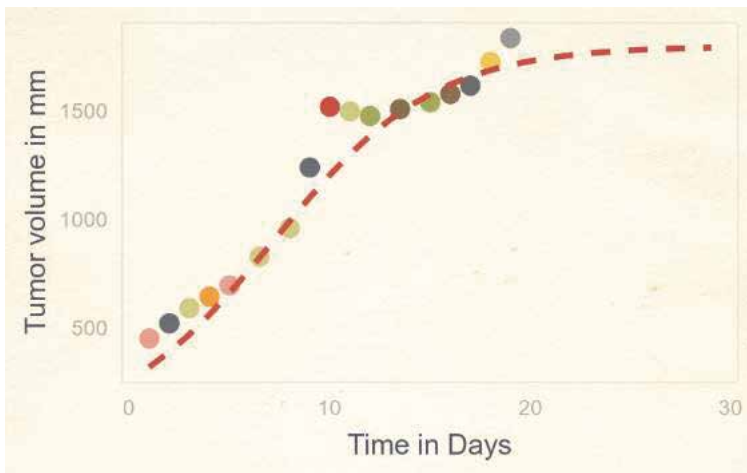
mouse A2



mouse A4

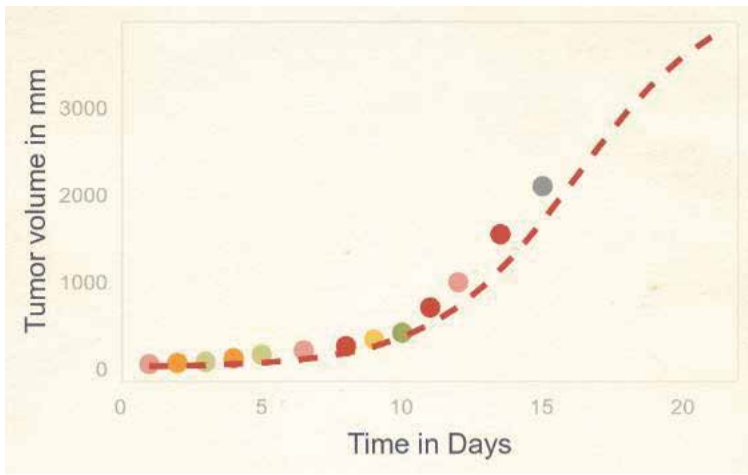


mouse A7

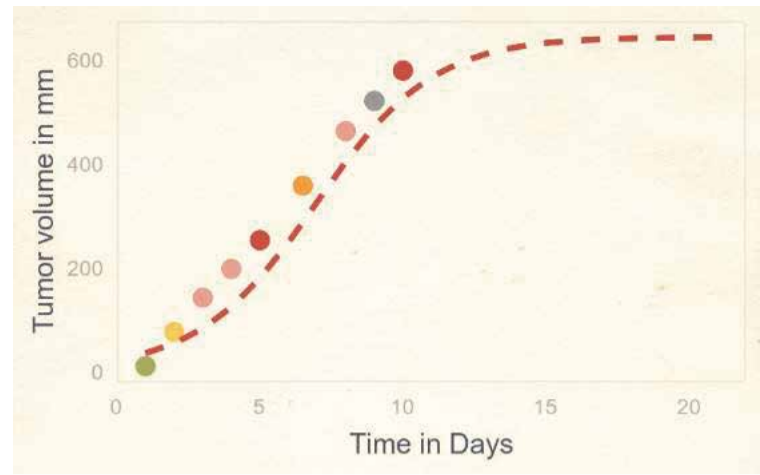


Supplementary figure 8. Neuroblastoma PDX (Mohlin et. al., replicate 1)

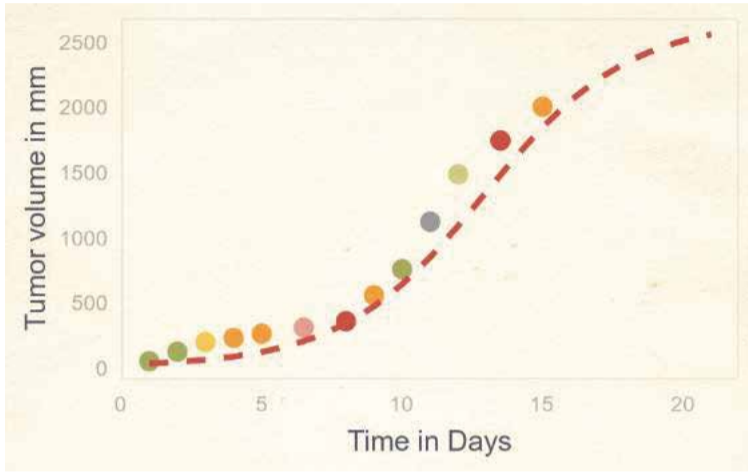
mouse A31



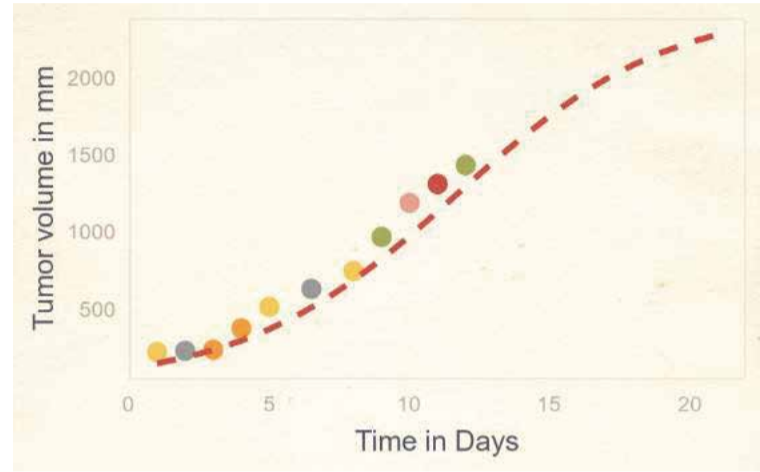
mouse A41



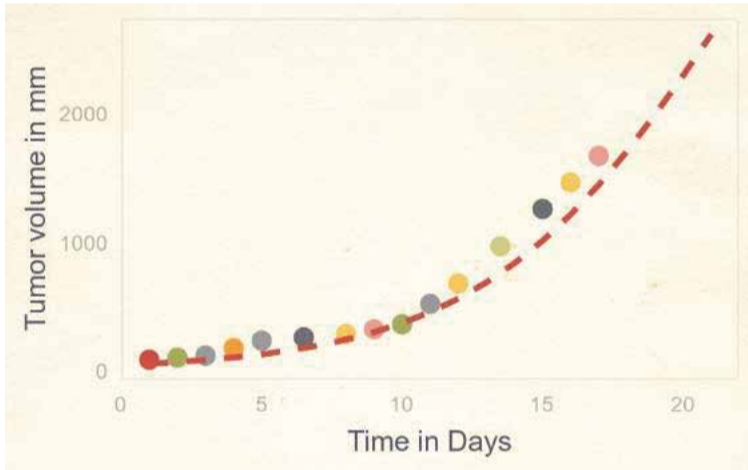
mouse B31



mouse A32

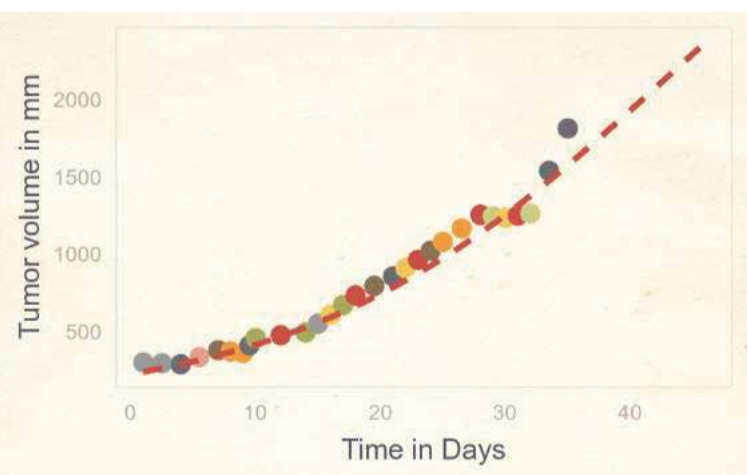


mouse A42

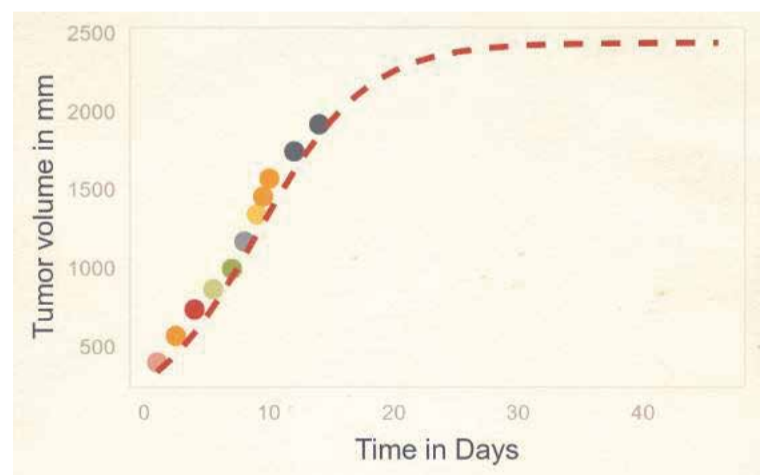


Supplementary figure 9. Neuroblastoma PDX (Mohlin et. al., replicate 2)

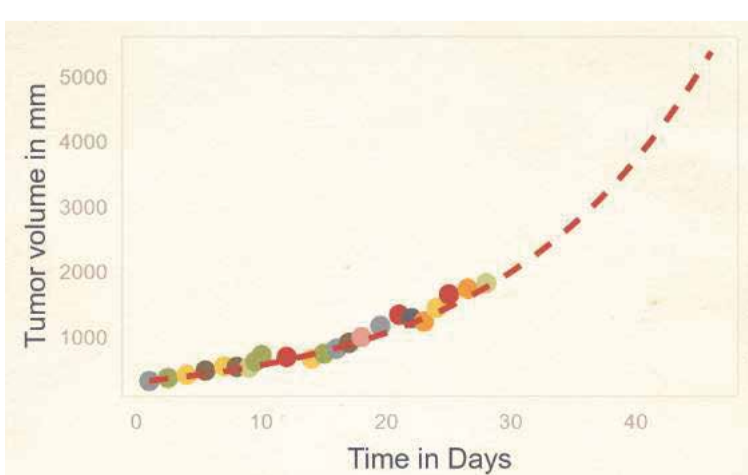
mouse A1



mouse A2

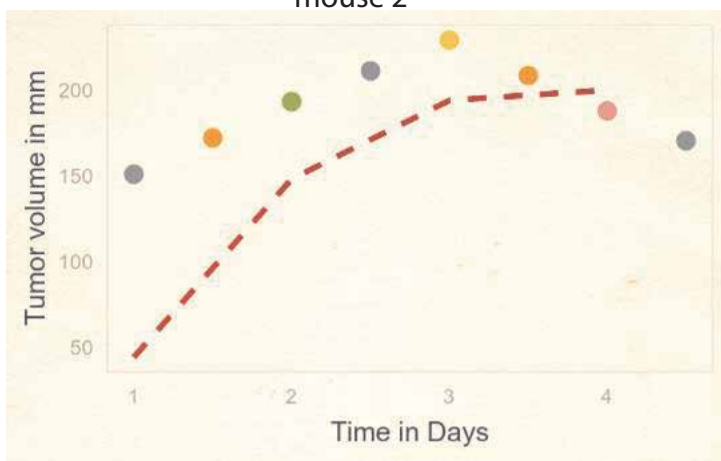


mouse A3

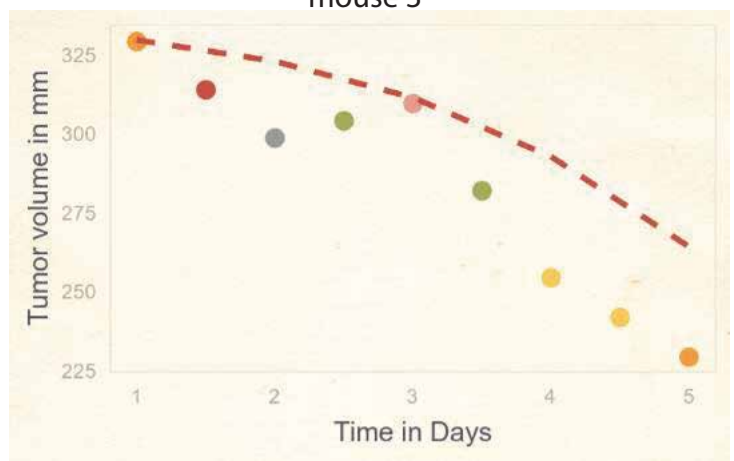


Supplementary figure 10. Neuroblastoma PDX (Mohlin et. al., replicate 3)

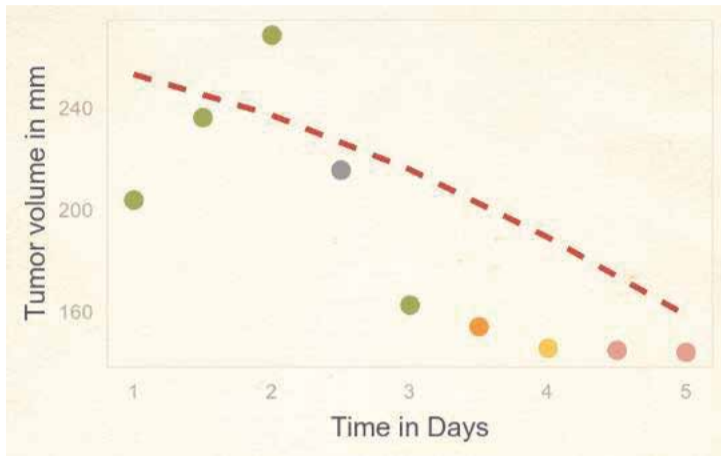
mouse 2



mouse 3

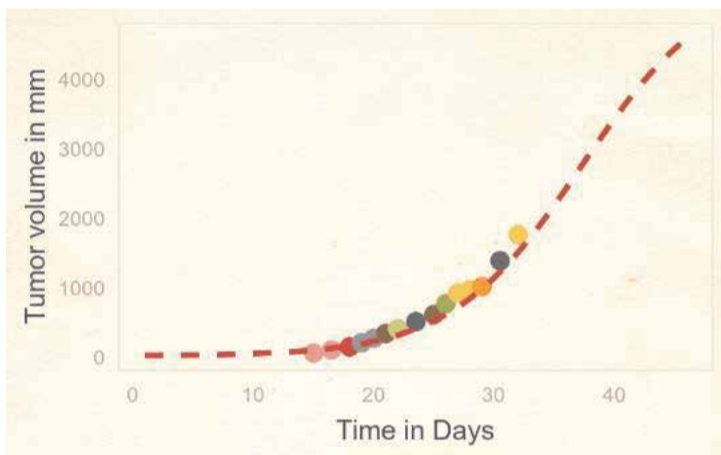


mouse 5

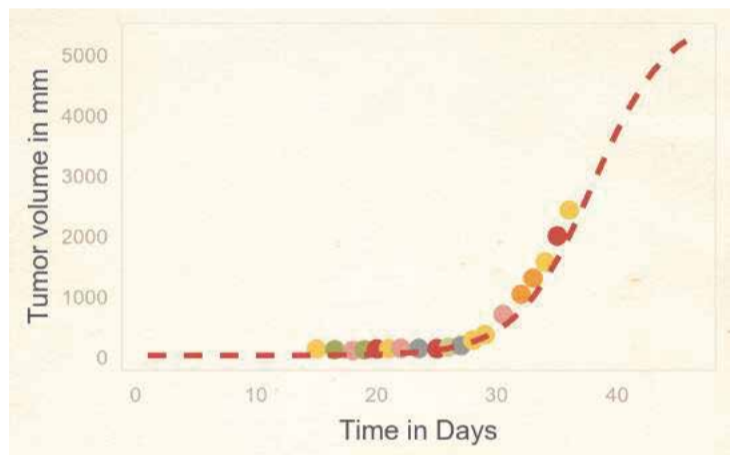


Supplementary figure 11. Neuroblastoma PDX (Mohlin et. al., replicate 4)

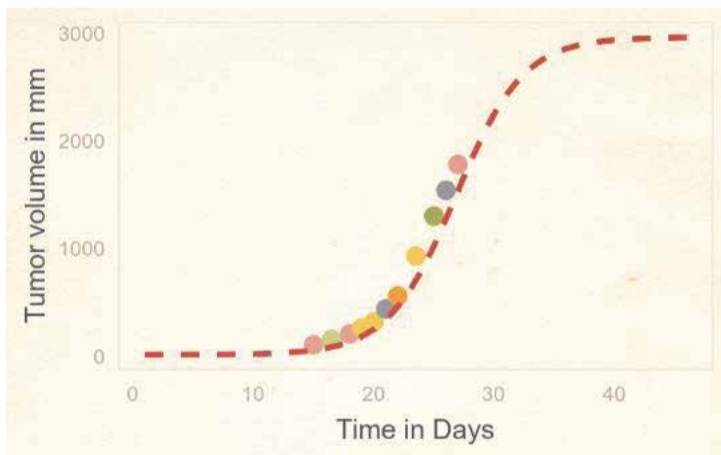
mouse 1



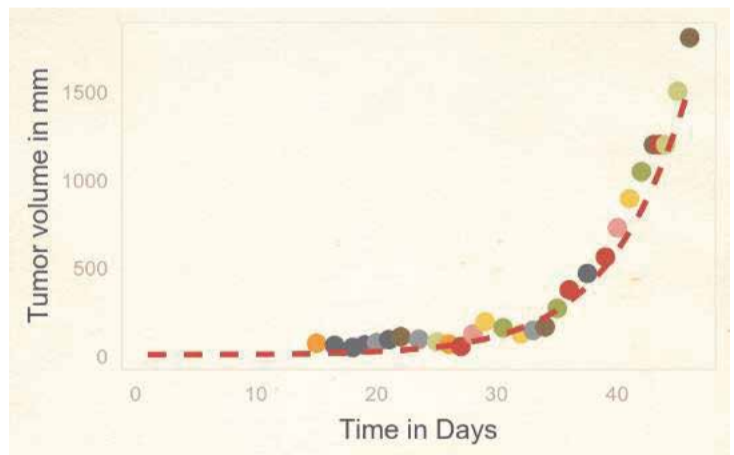
mouse 7



mouse 8

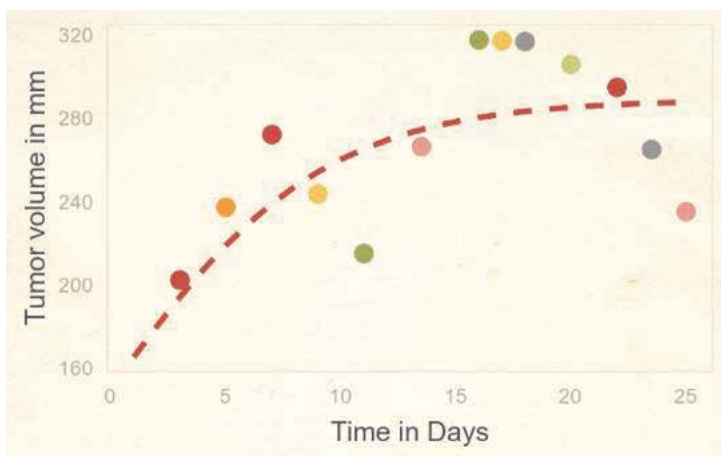


mouse 9

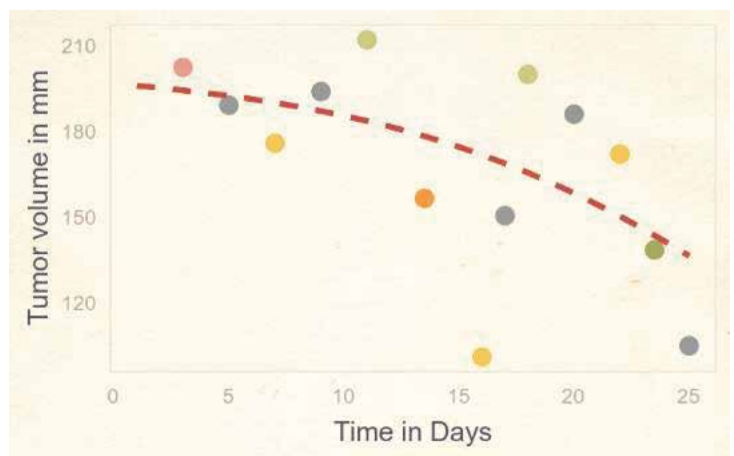


Supplementary figure 12. Neuroblastoma tumor initiating cells (Mohlin et. al.)

mouse 1

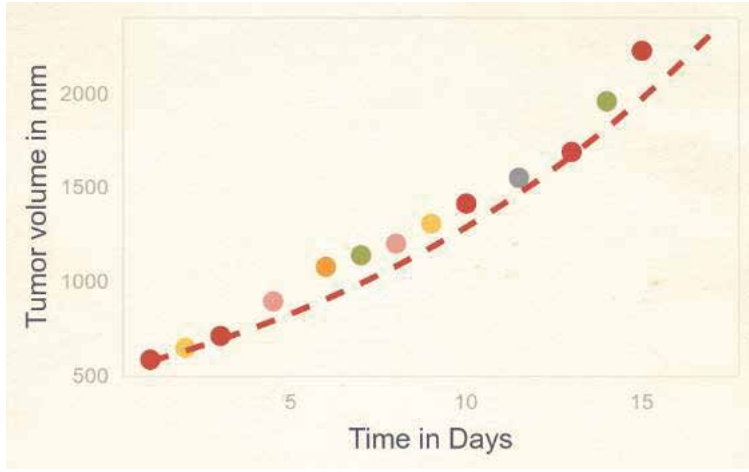


mouse 4

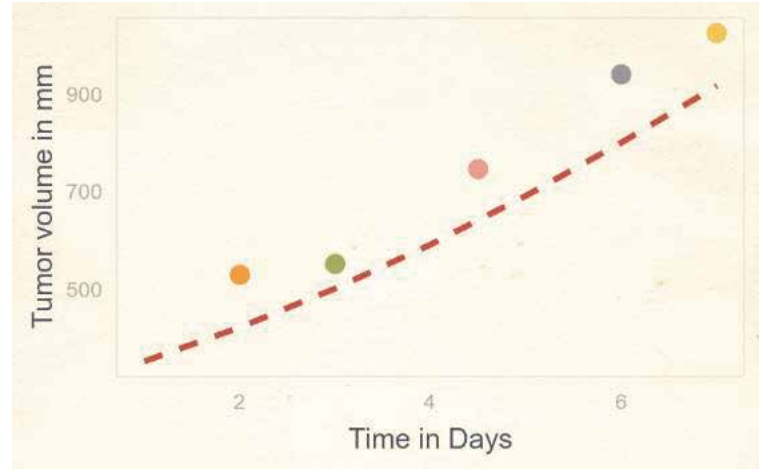


Supplementary figure 13. Neuroblastoma PDX (Manas et. al., *PDX1*, replicate 1)

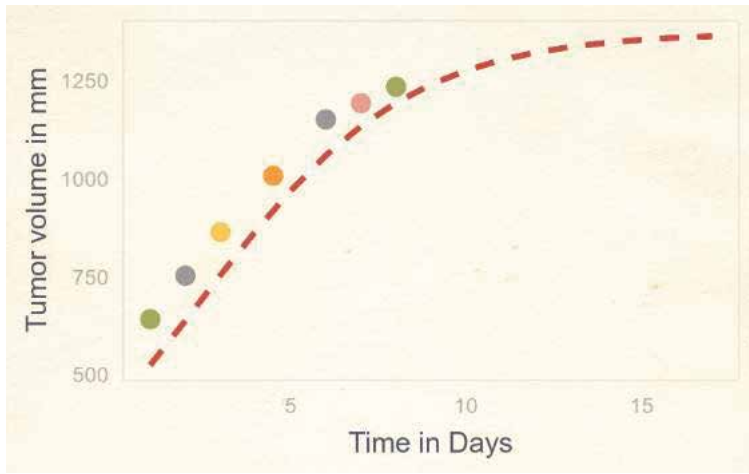
mouse C1



mouse C2

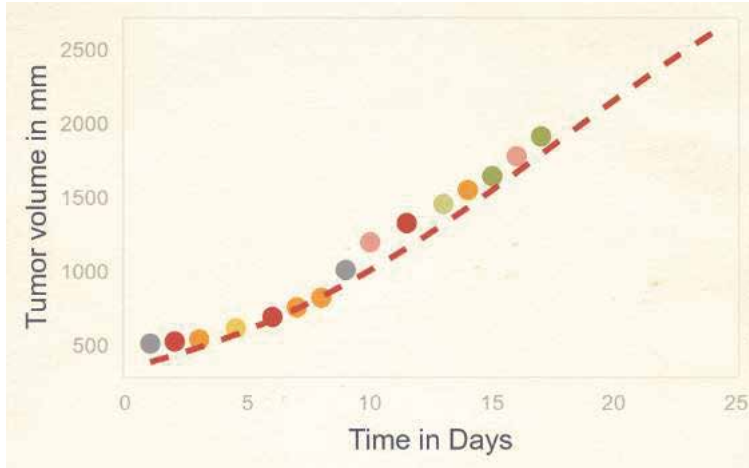


mouse C4

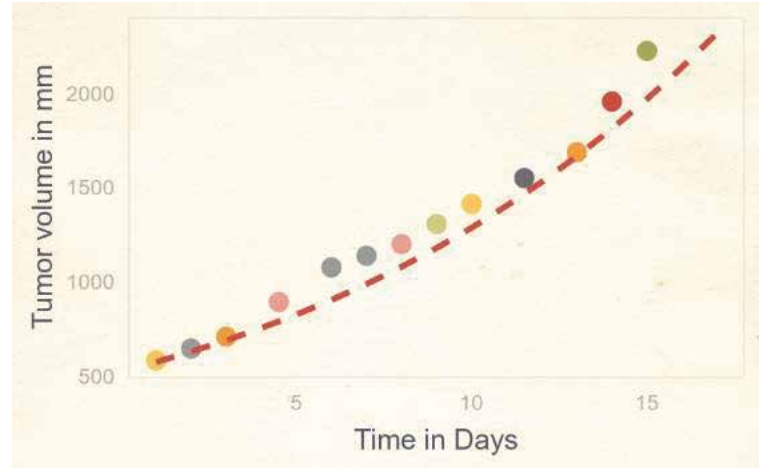


Supplementary figure 14. Neuroblastoma PDX (Manas et. al., *PDX1*, replicate 2)

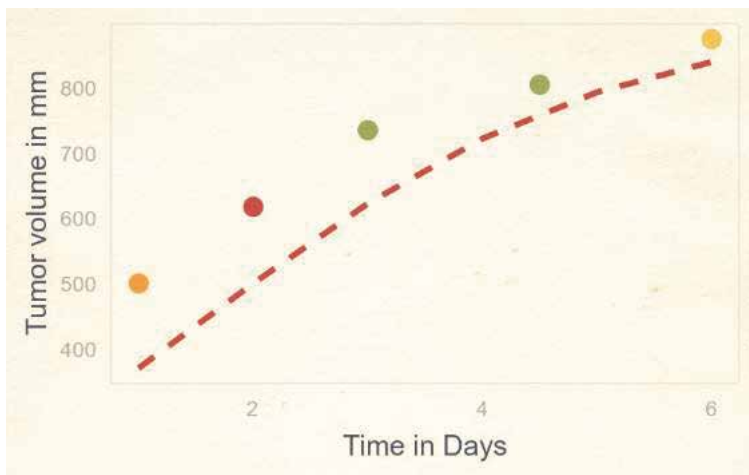
mouse C1



mouse C2

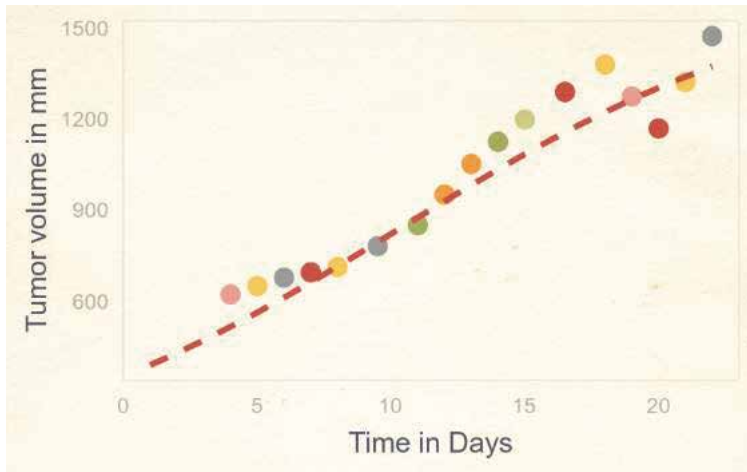


mouse C5

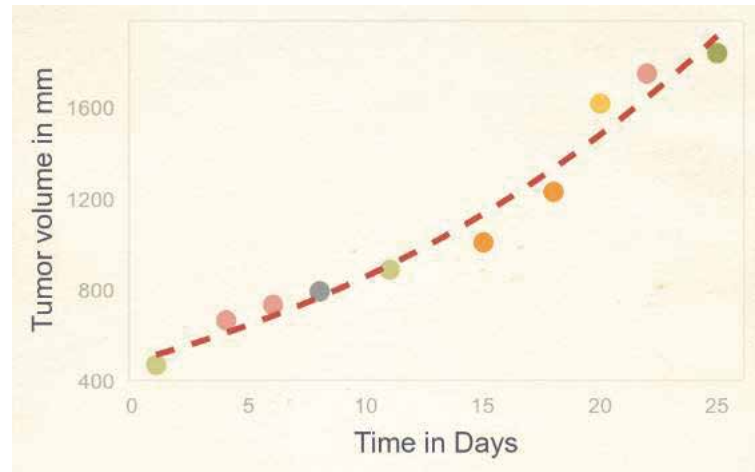


Supplementary figure 15. Neuroblastoma PDX (Manas et. al., *PDX2*)

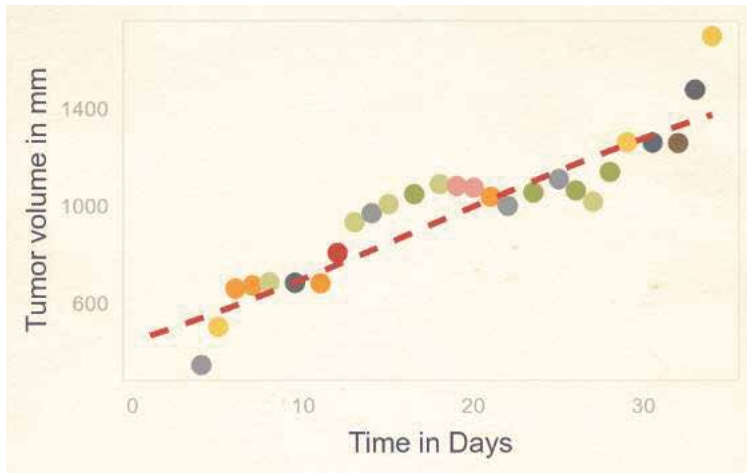
mouse C1



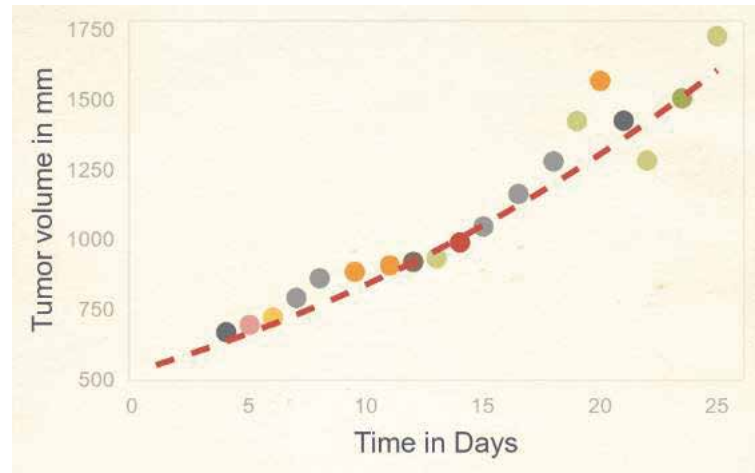
mouse C2



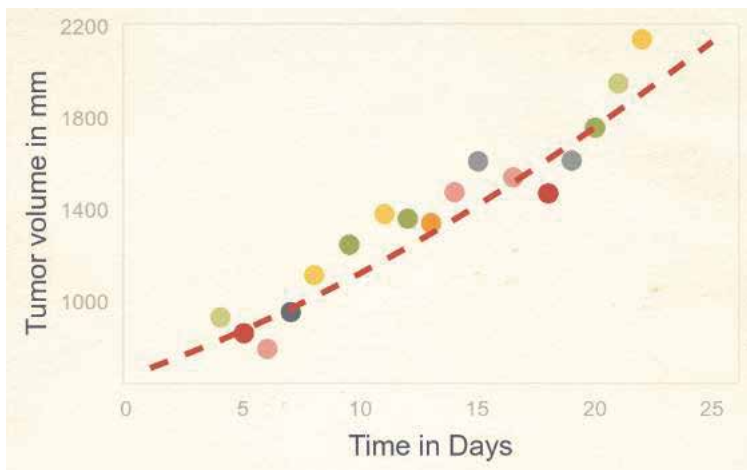
mouse C3



mouse C5

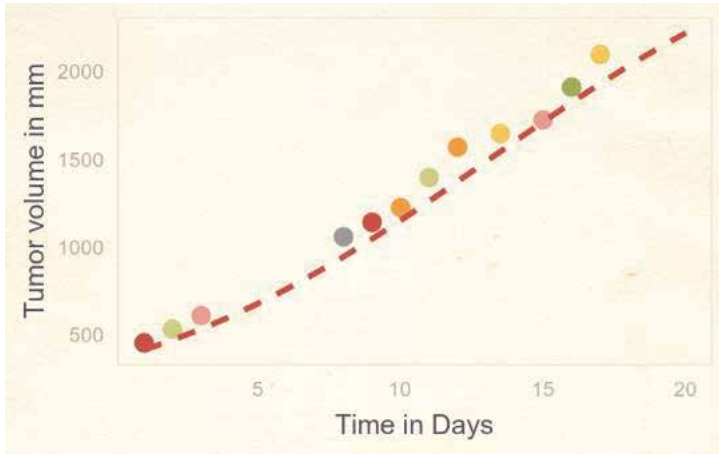


mouse C6

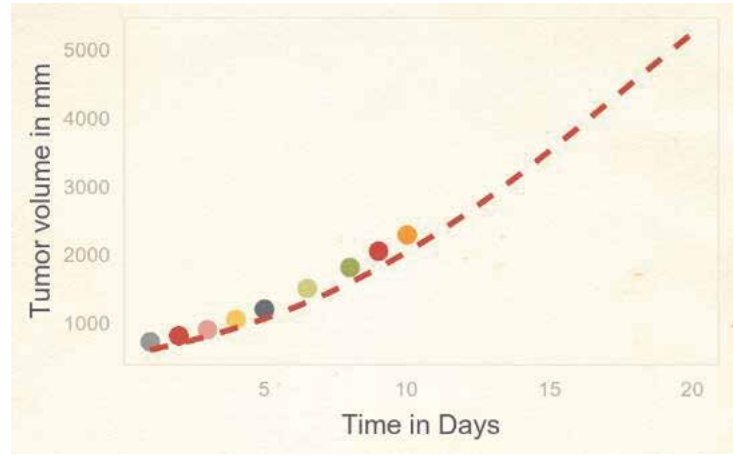


Supplementary figure 16. Neuroblastoma PDX (Manas et. al., *PDX3*, replicate 1)

mouse C1

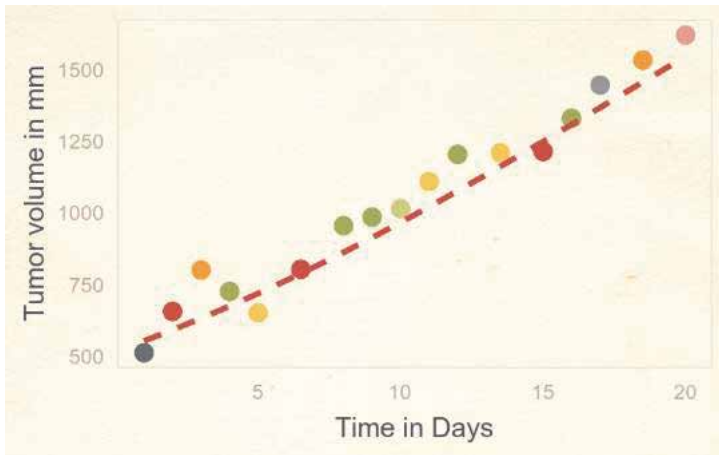


mouse C2

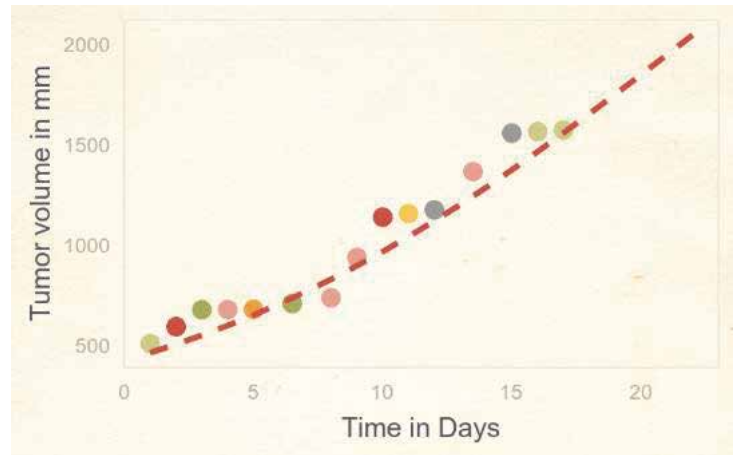


Supplementary figure 17. Neuroblastoma PDX (Manas et. al., *PDX3*, replicate 2)

mouse C2

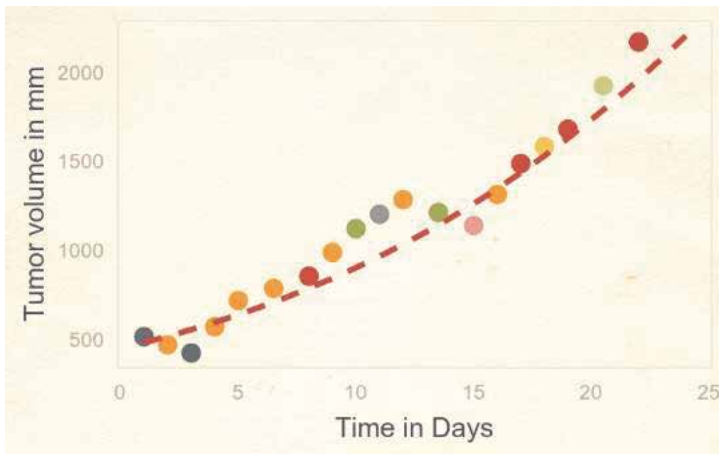


mouse C4

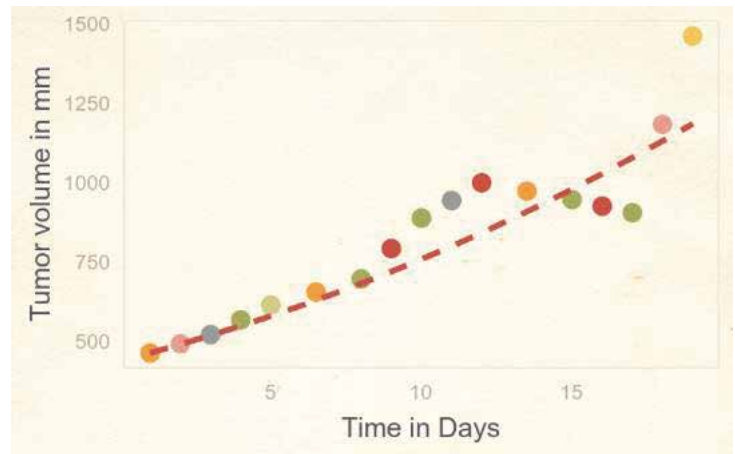


Supplementary figure 18. Neuroblastoma PDX (Manas et. al., *PDX3*, replicate 3)

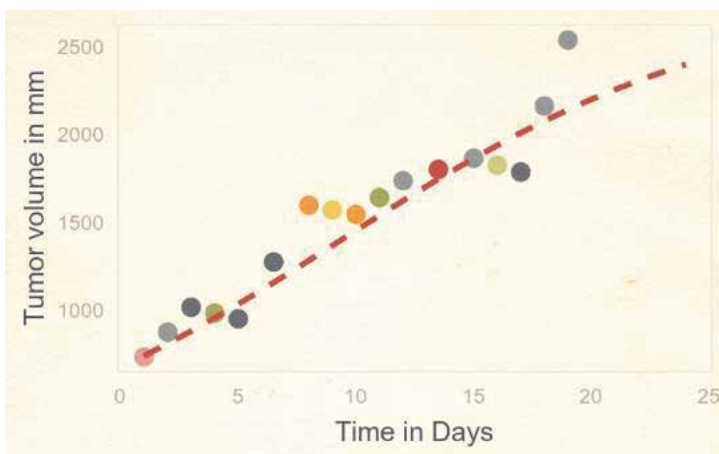
mouse C1



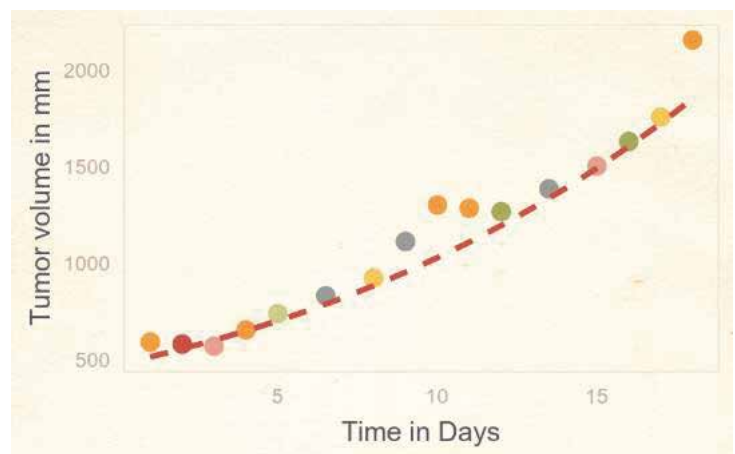
mouse C2



mouse C4

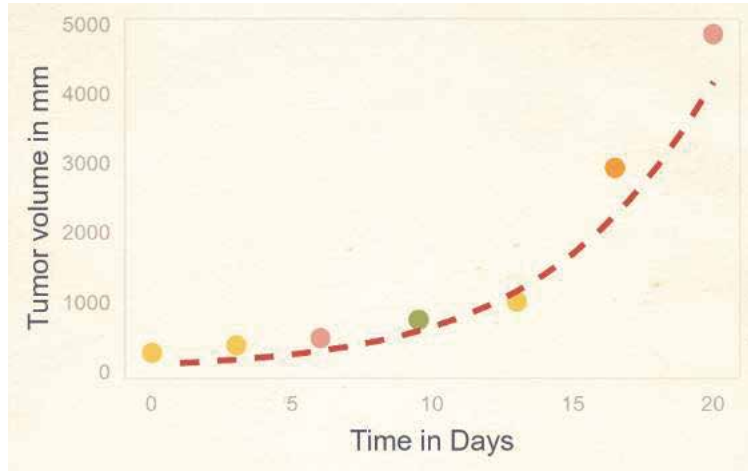


mouse C5

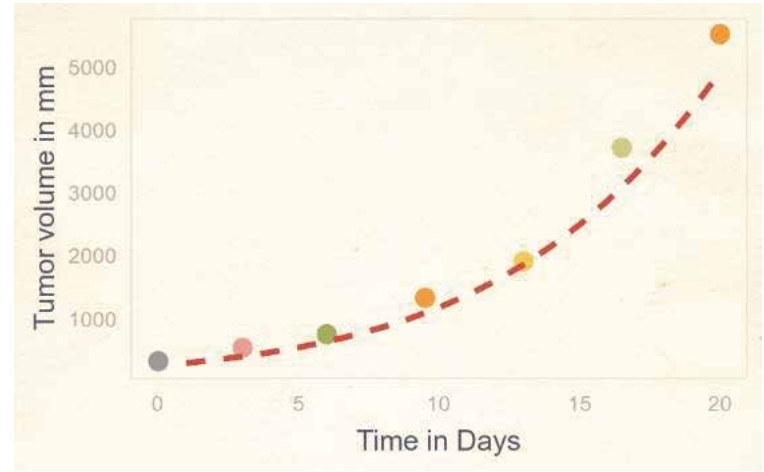


Supplementary figure 19. Wilms tumor PDX KT47

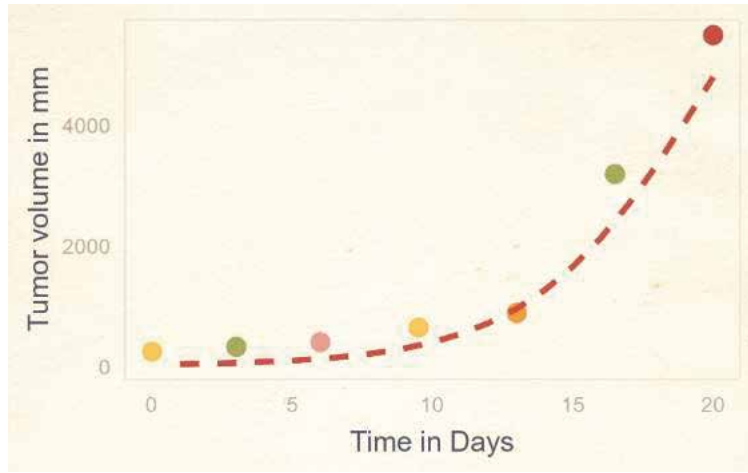
mouse 2



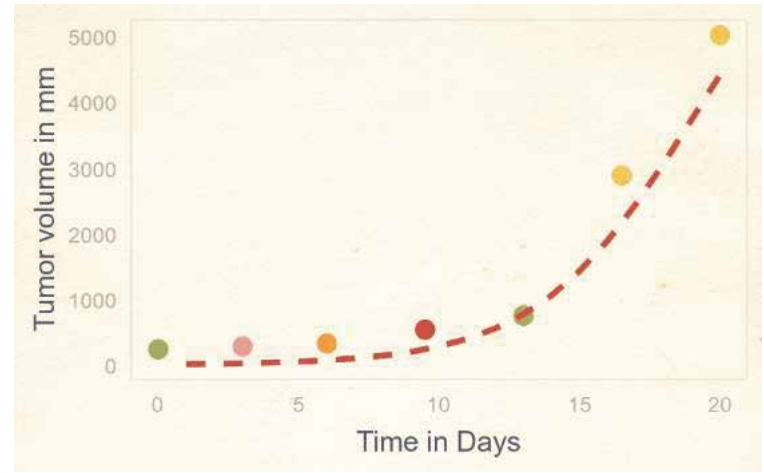
mouse 3



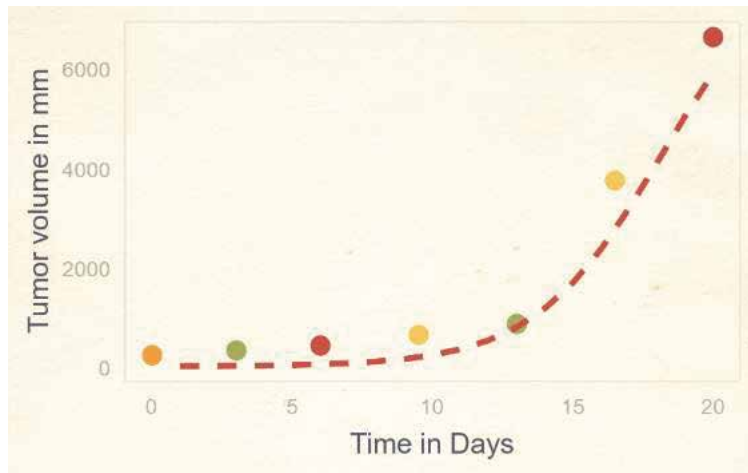
mouse 4



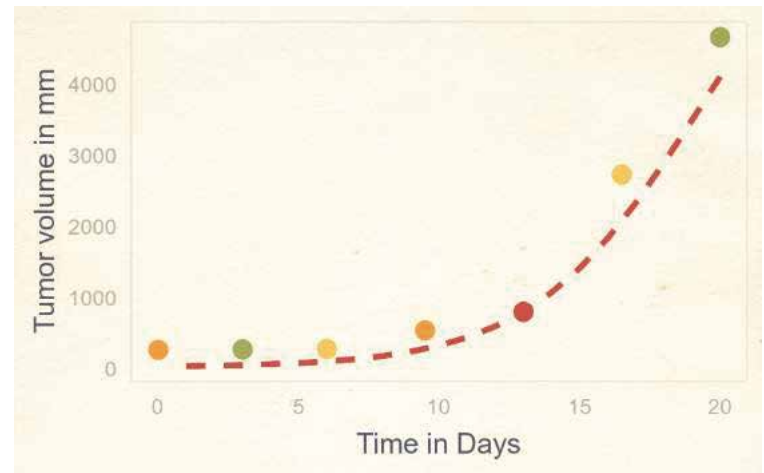
mouse 5



mouse 6

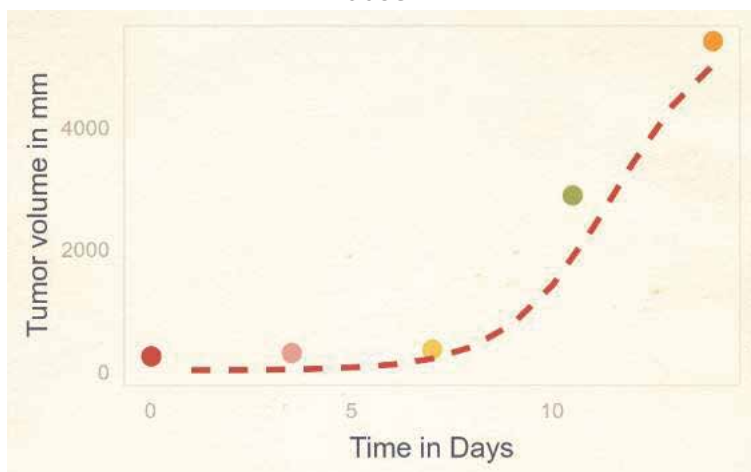


mouse 8

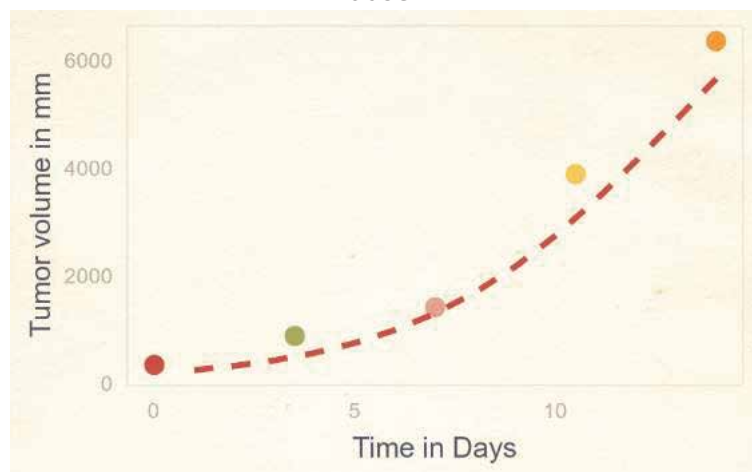


Supplementary figure 20. Wilms tumor PDX KT53

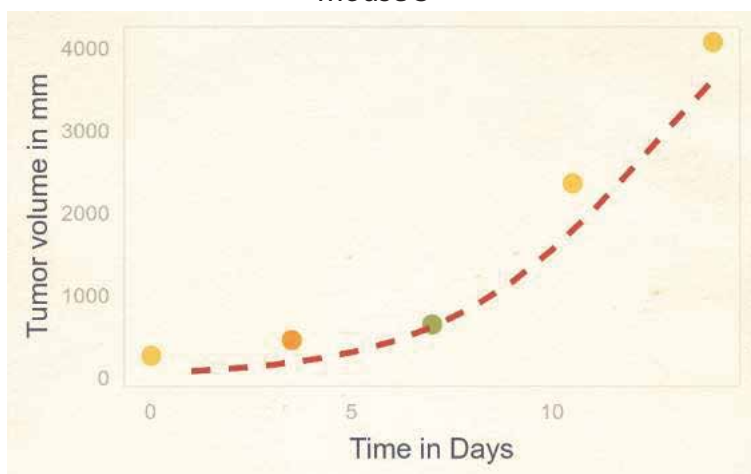
mouse 1



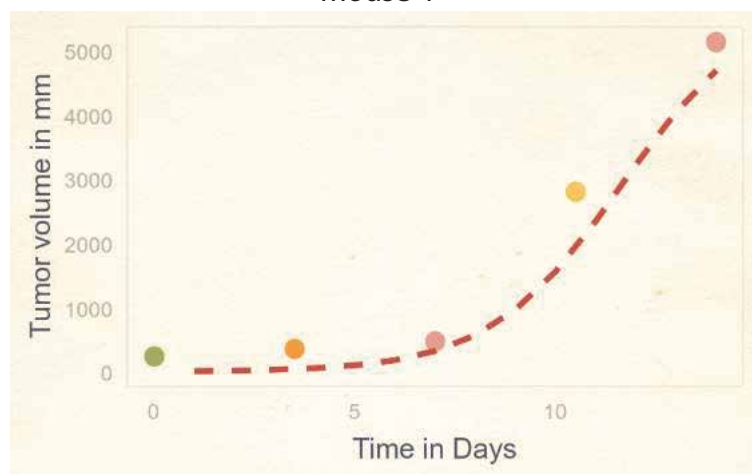
mouse 2



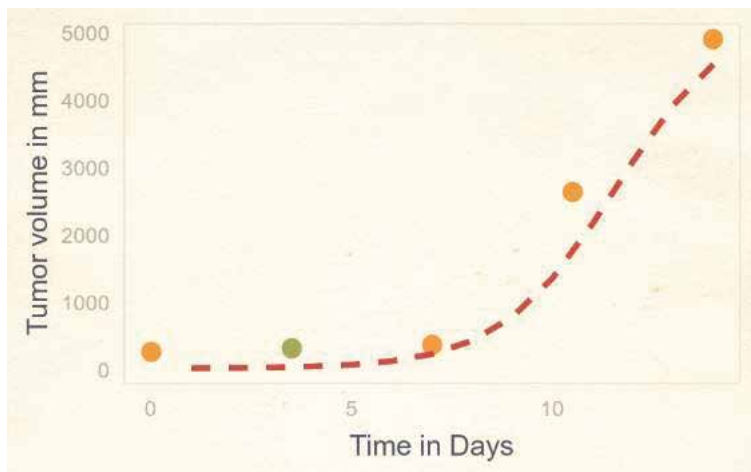
mouse 3



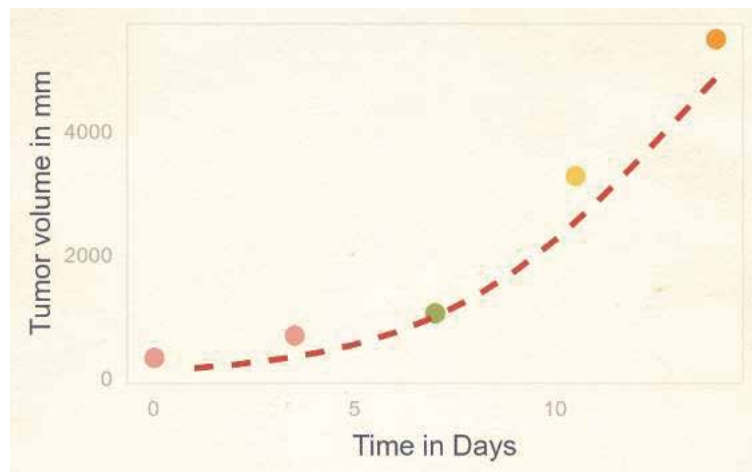
mouse 4



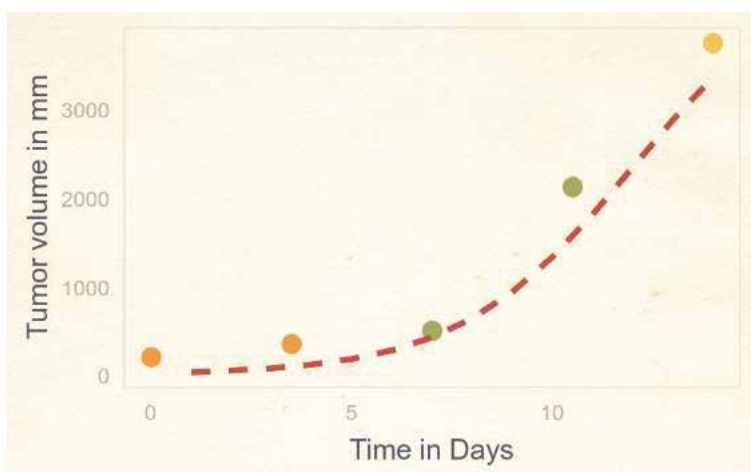
mouse 5



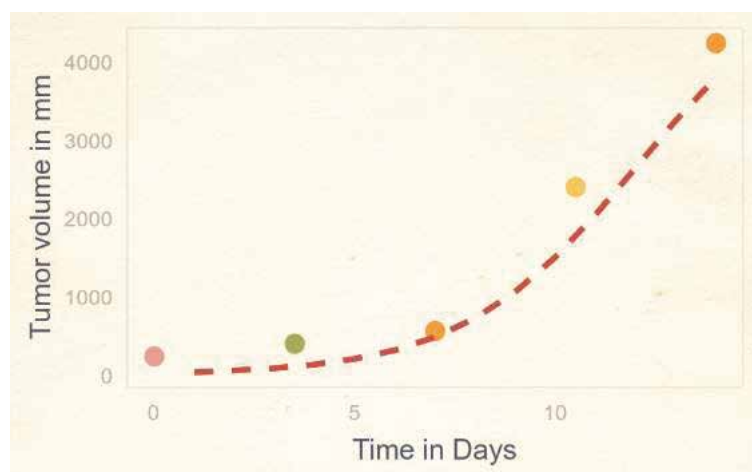
mouse 6



mouse 7

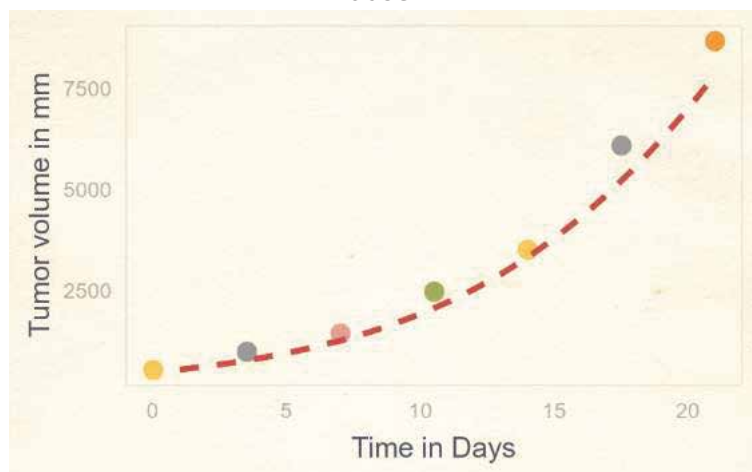


mouse 8

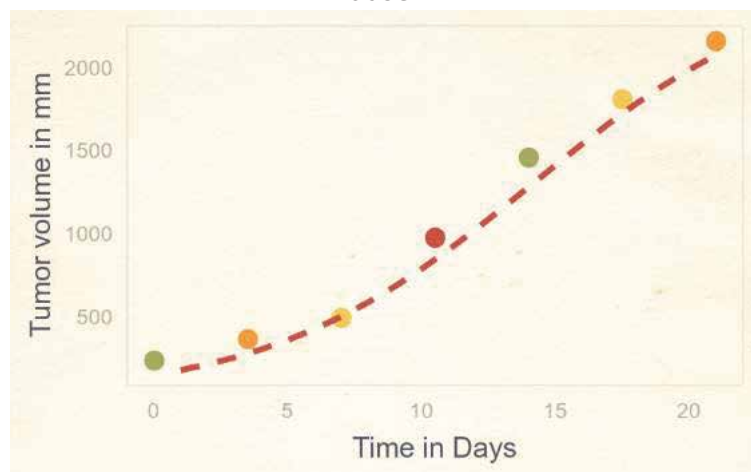


Supplementary figure 21. Wilms tumor PDX KT51

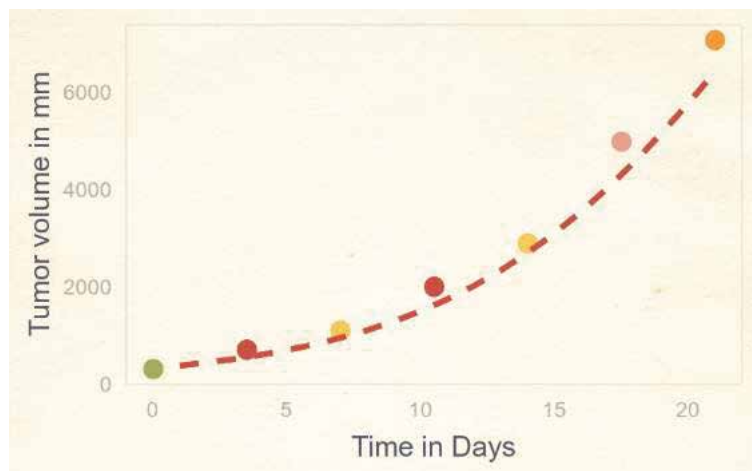
mouse 1



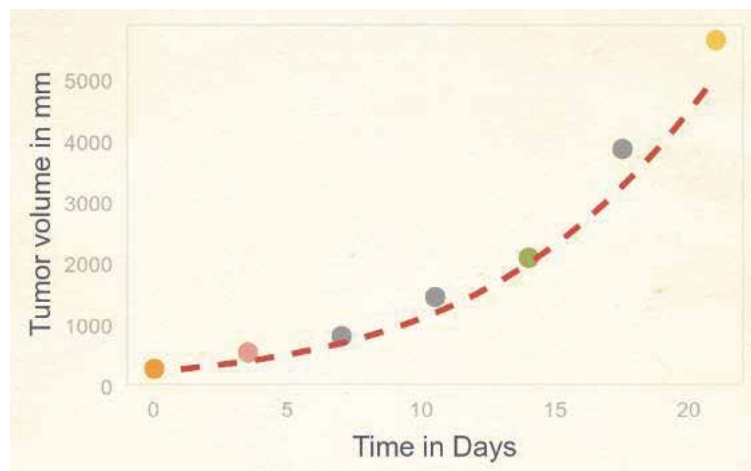
mouse 2



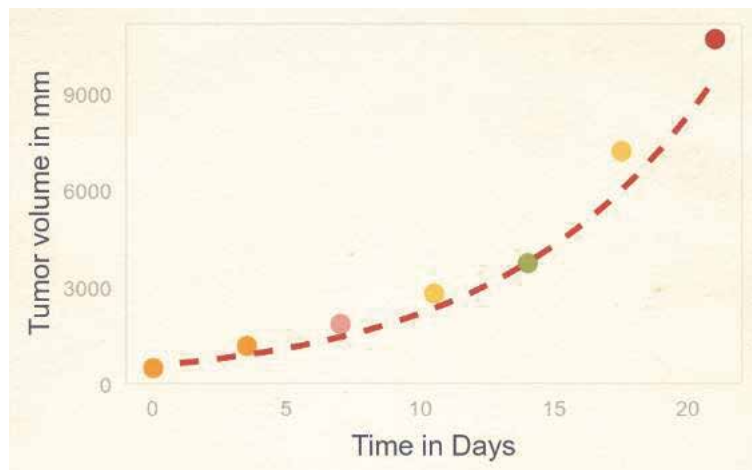
mouse 3



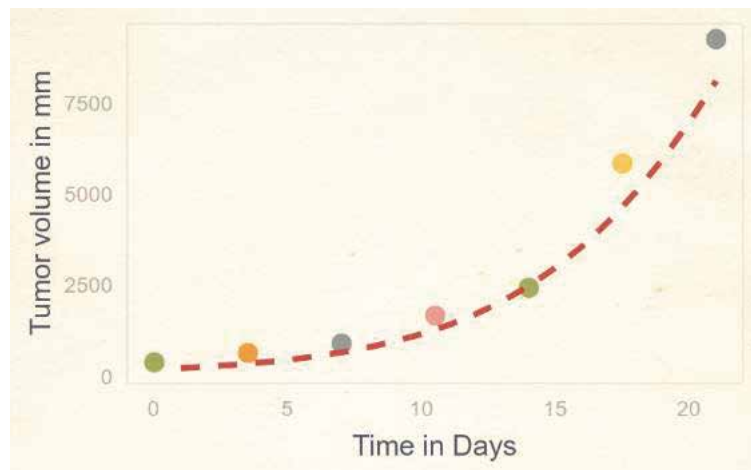
mouse 4



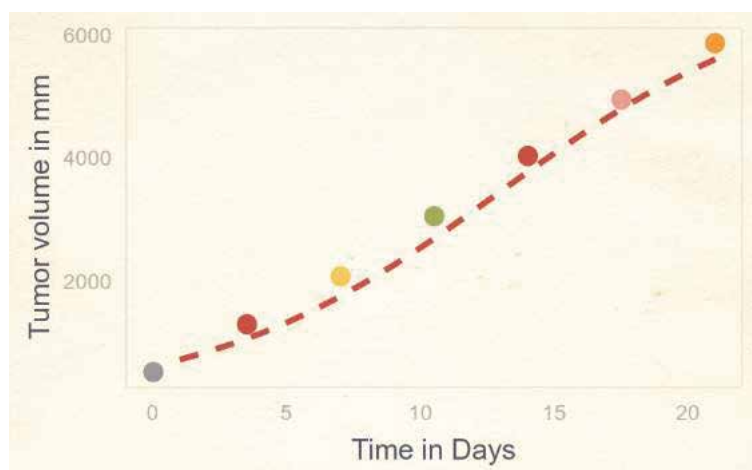
mouse 5



mouse 7

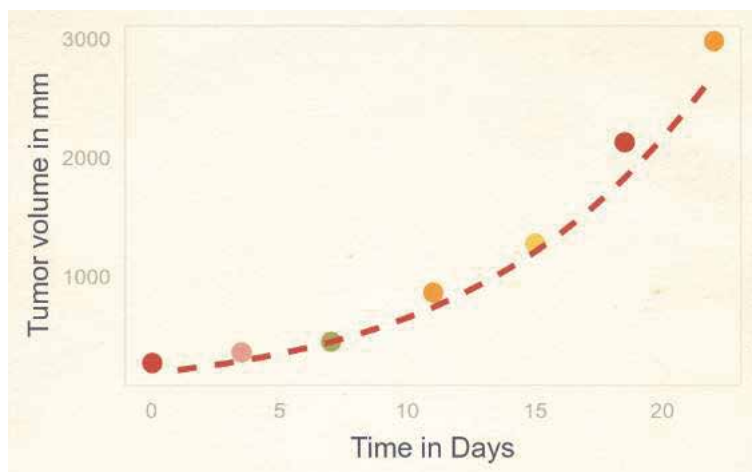


mouse 8

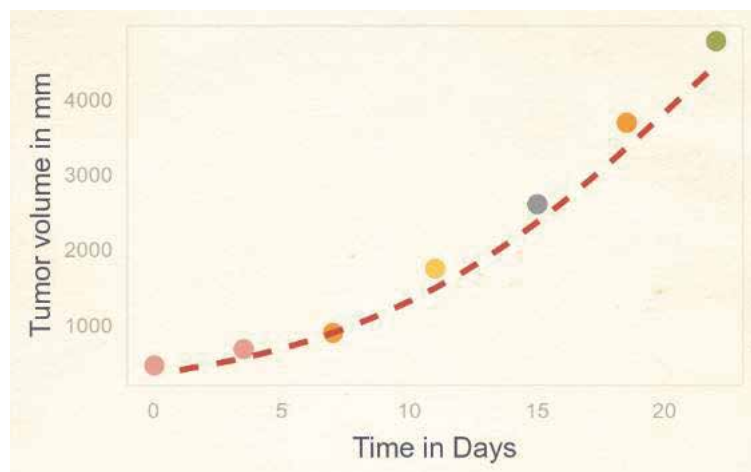


Supplementary figure 22. Wilms tumor PDX KT75

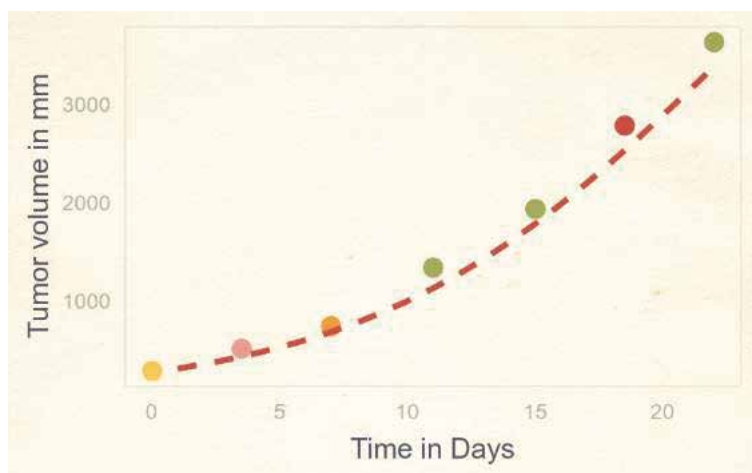
mouse 3



mouse 4

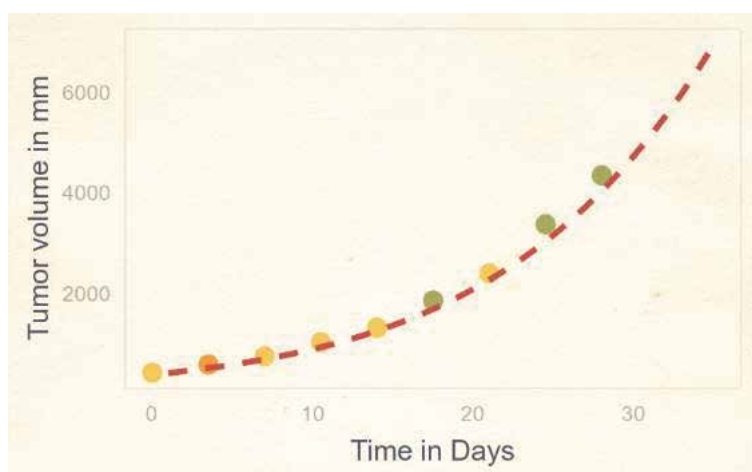


mouse 8



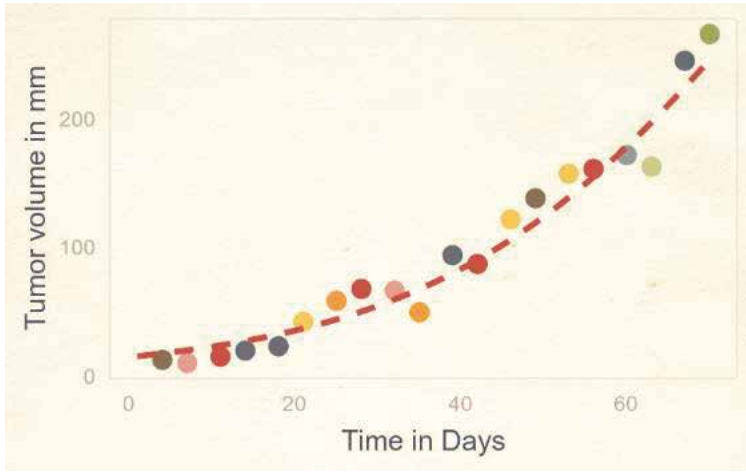
Supplementary figure 23. Wilms tumor PDX KT43

mouse 3

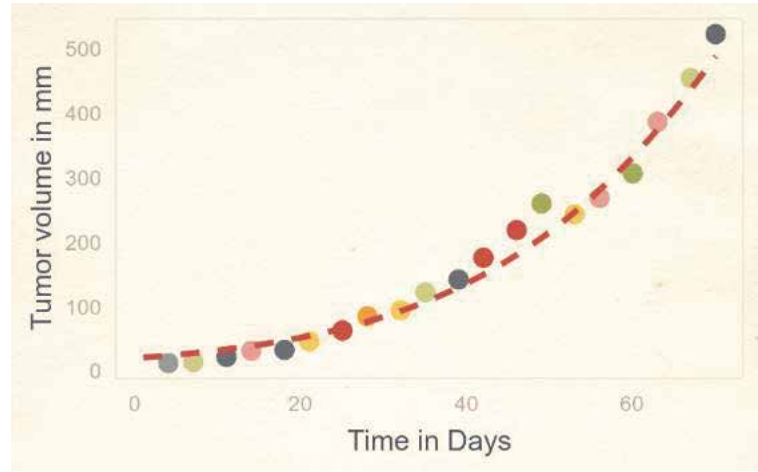


Supplementary figure 24. A549 lung cancer cell line (replicate 1)

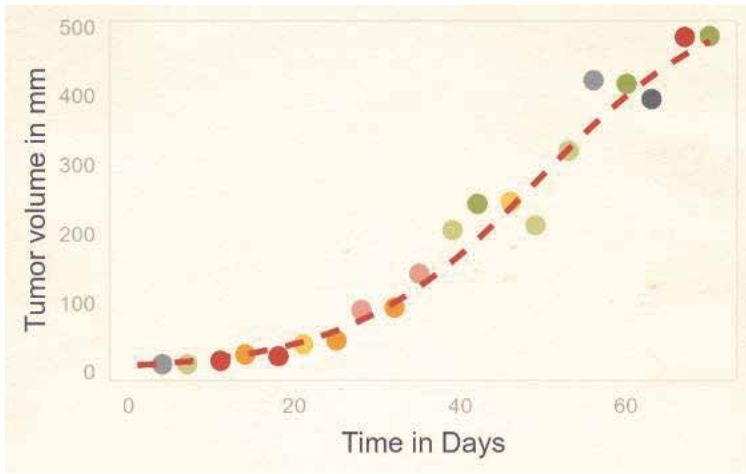
mouse 1



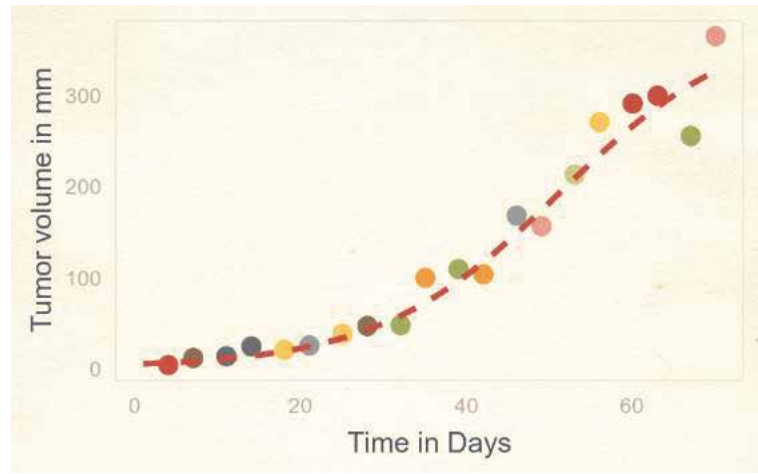
mouse 2



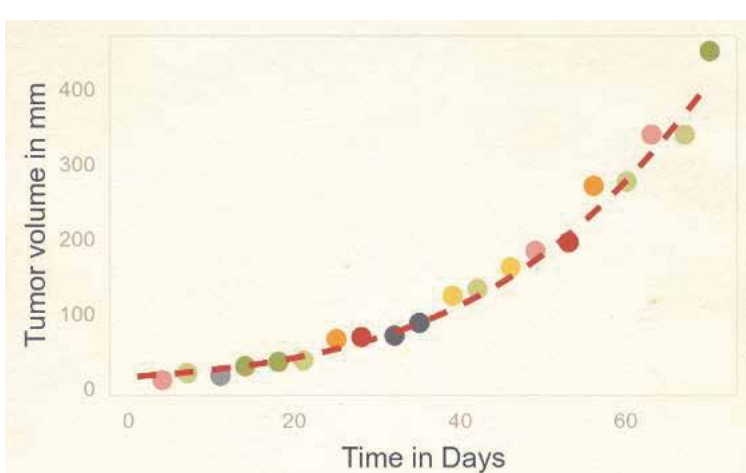
mouse 4



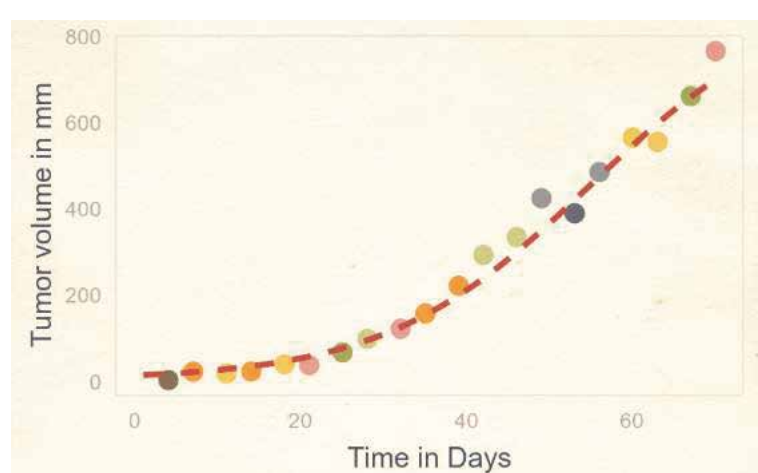
mouse 5



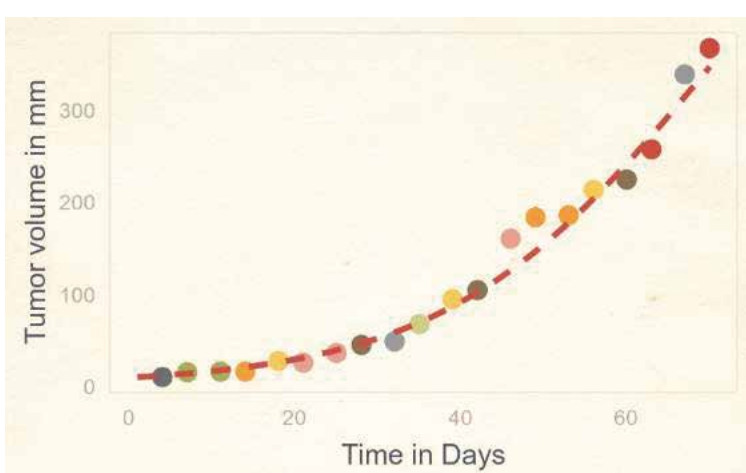
mouse 6



mouse 7

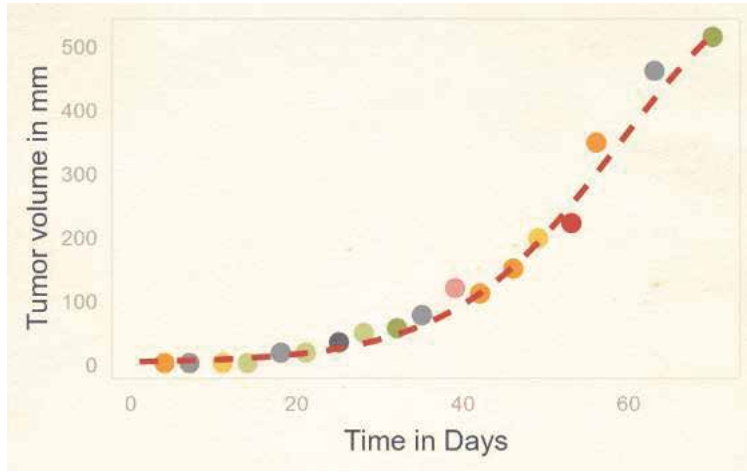


mouse 7

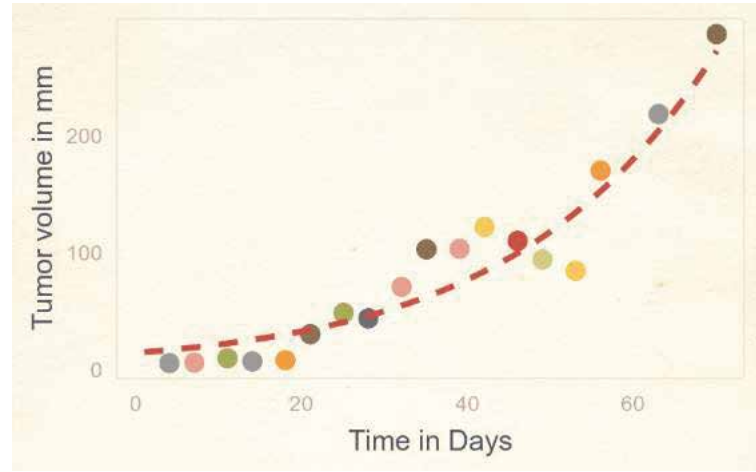


Supplementary figure 25. A549 lung cancer cell line (replicate 2)

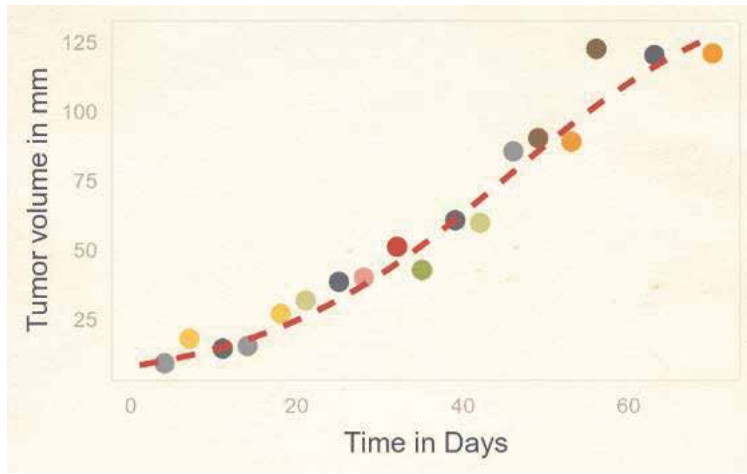
mouse 1



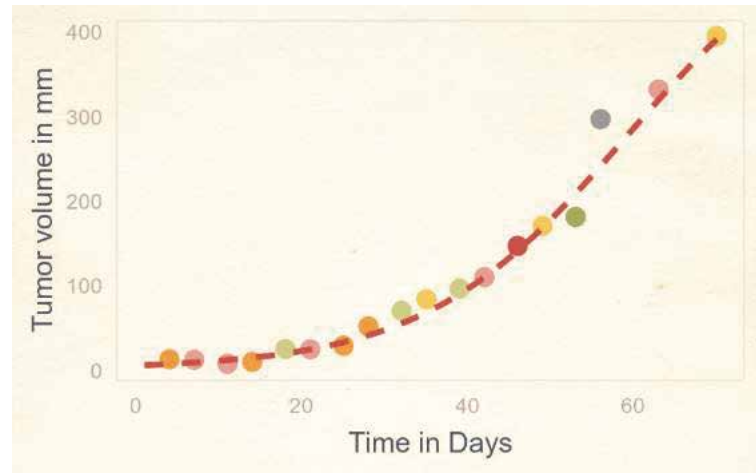
mouse 2



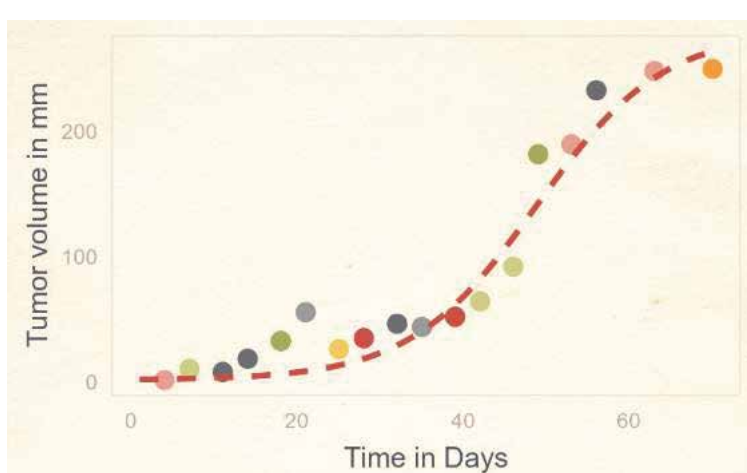
mouse 3



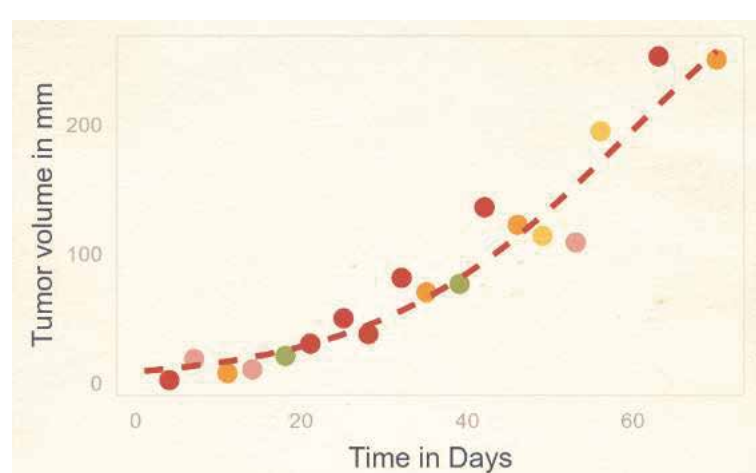
mouse 4



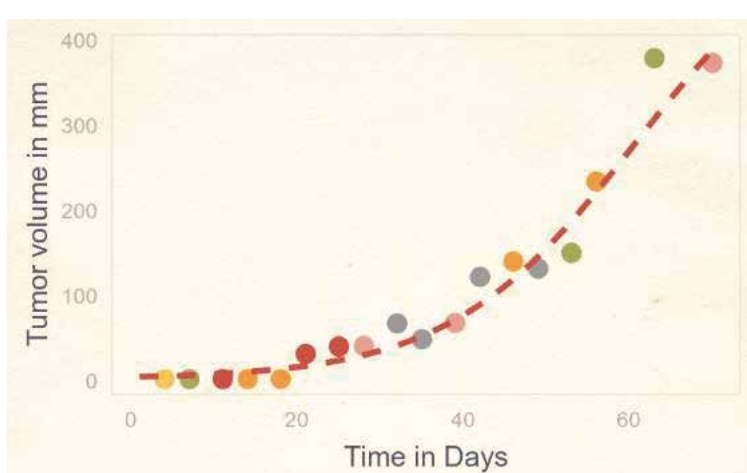
mouse 5



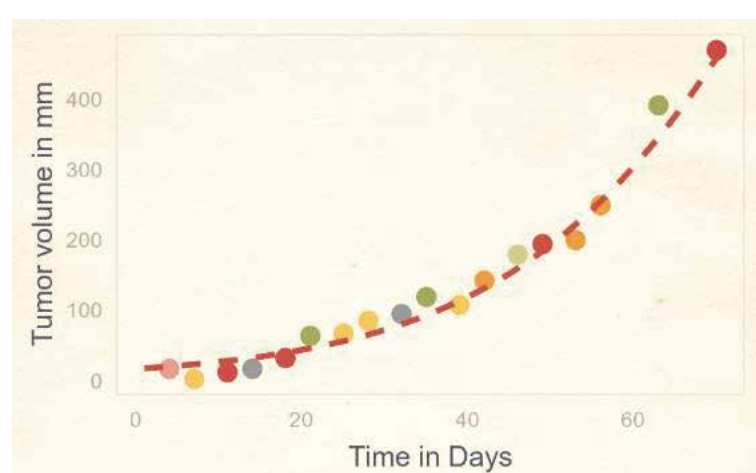
mouse 6



mouse 7

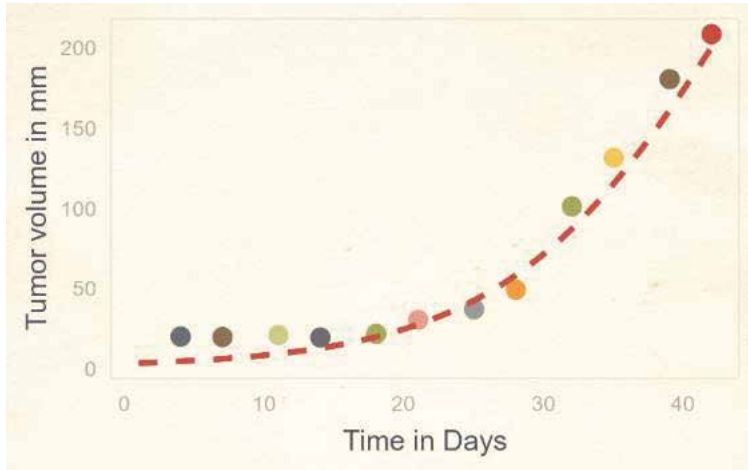


mouse 8

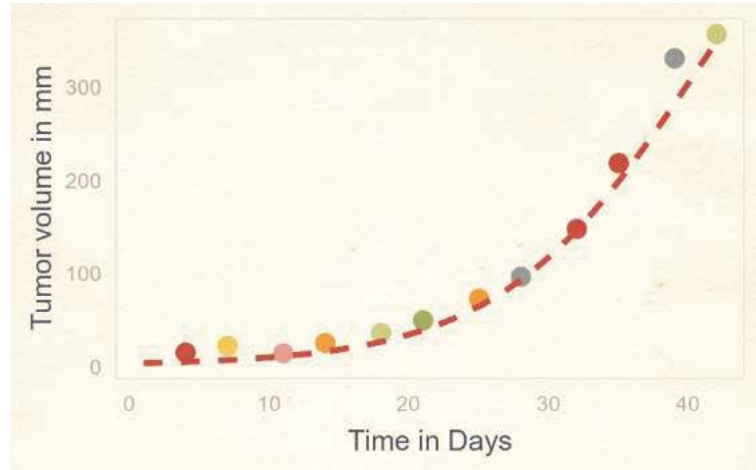


Supplementary figure 26. H441 lung cancer cell line

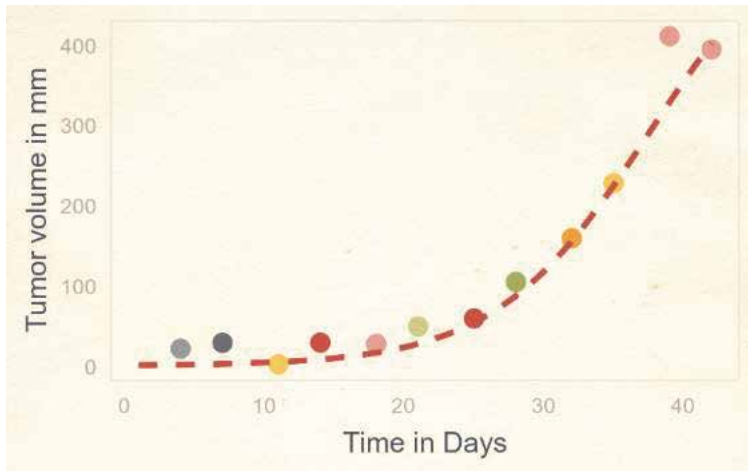
mouse 1



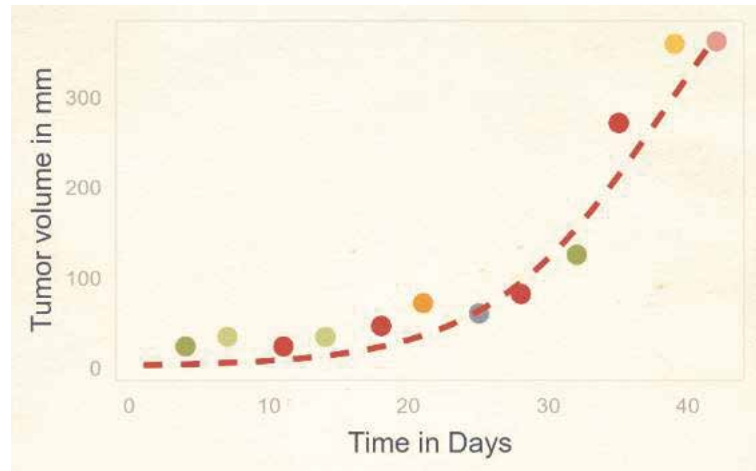
mouse 2



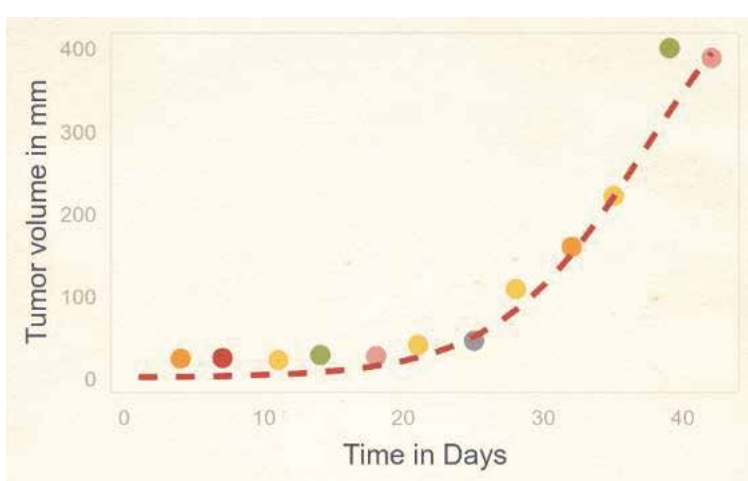
mouse 4



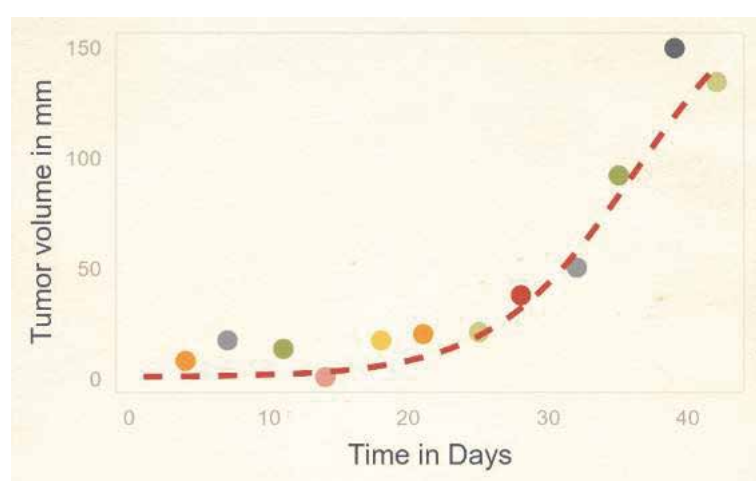
mouse 5



mouse 6

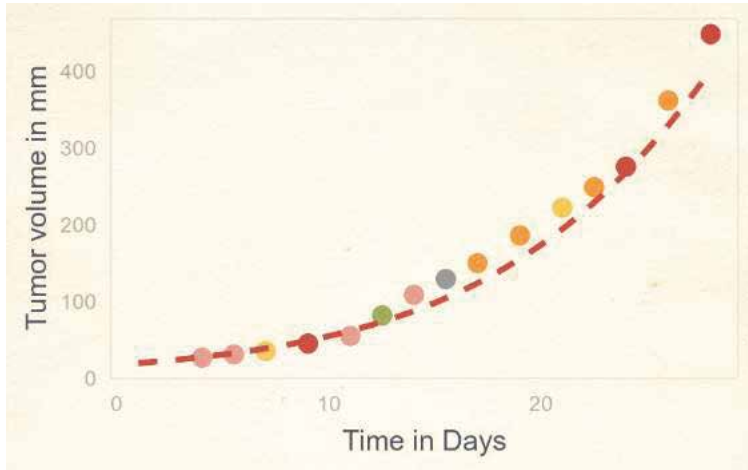


mouse 7

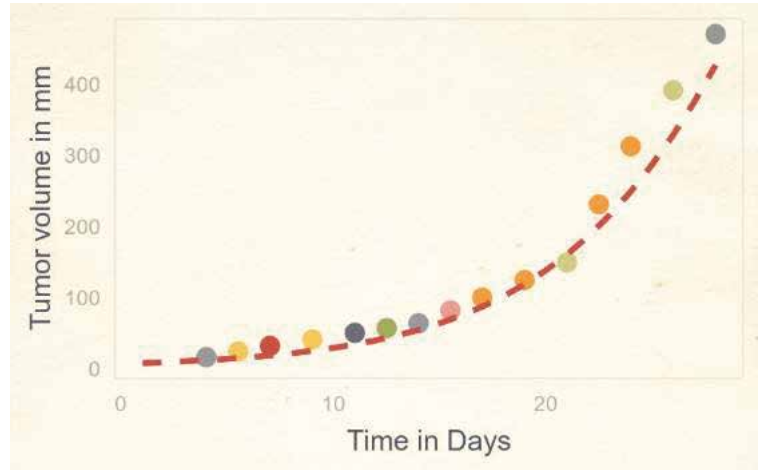


Supplementary figure 27. H520 lung cancer cell line (replicate 1)

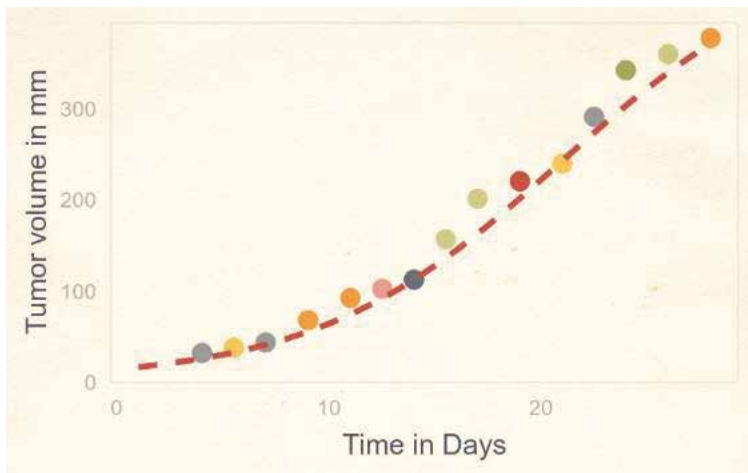
mouse 2



mouse 3

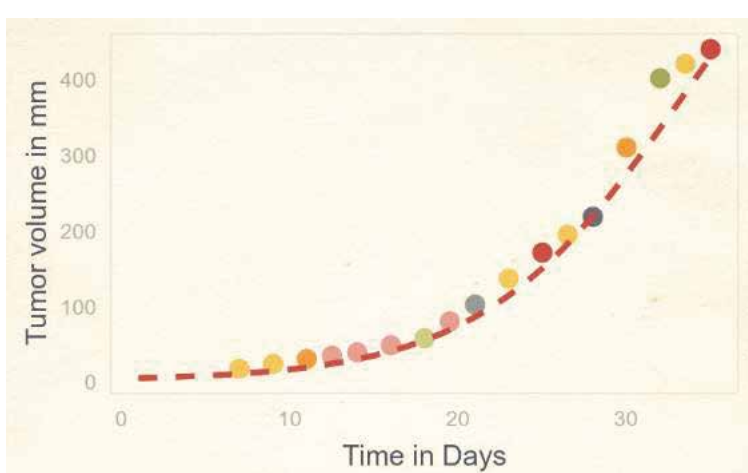


mouse 5

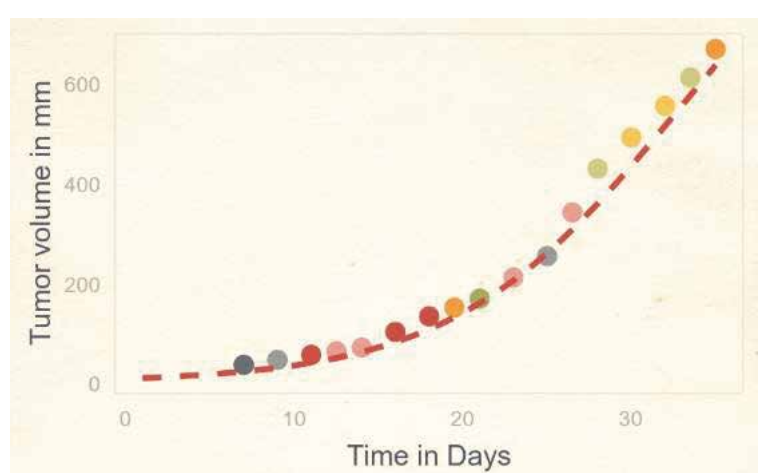


Supplementary figure 28. H520 lung cancer cell line (replicate 2)

mouse 2

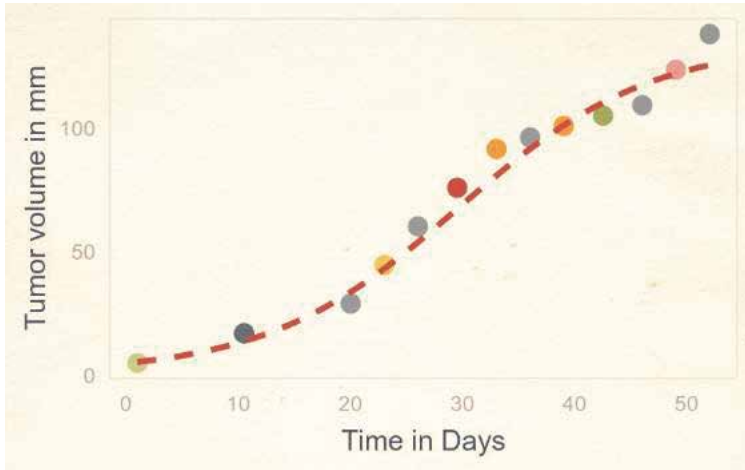


mouse 3

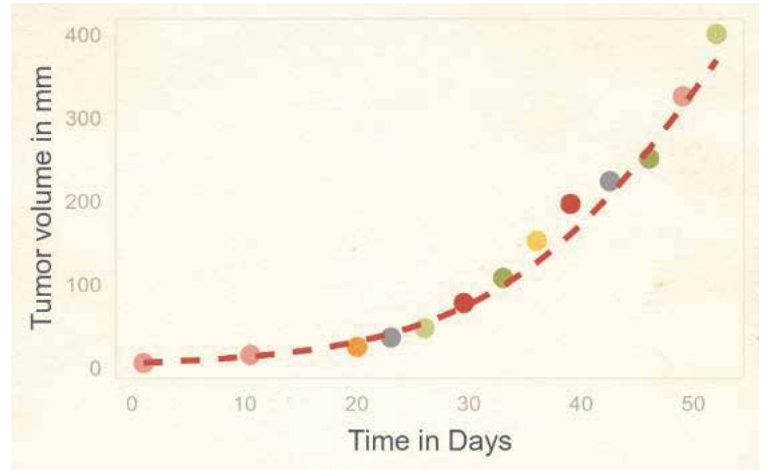


Supplementary figure 29. MCF7 breast cancer cell line

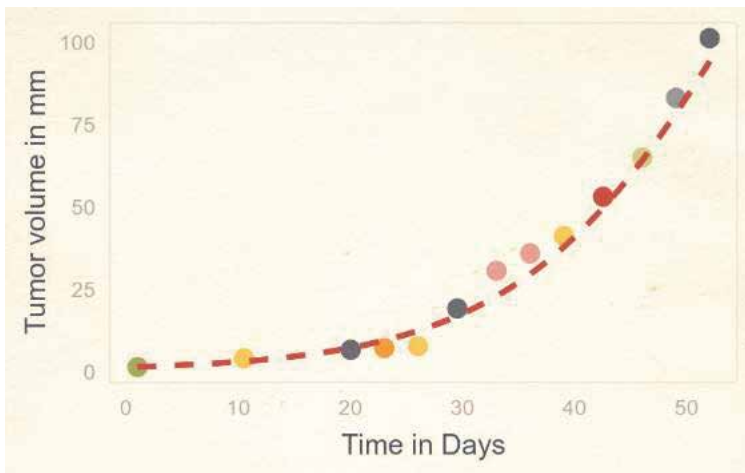
mouse 1



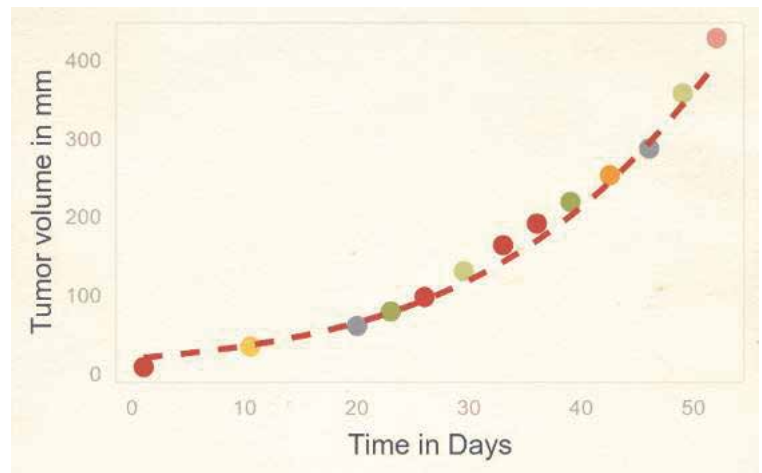
mouse 2



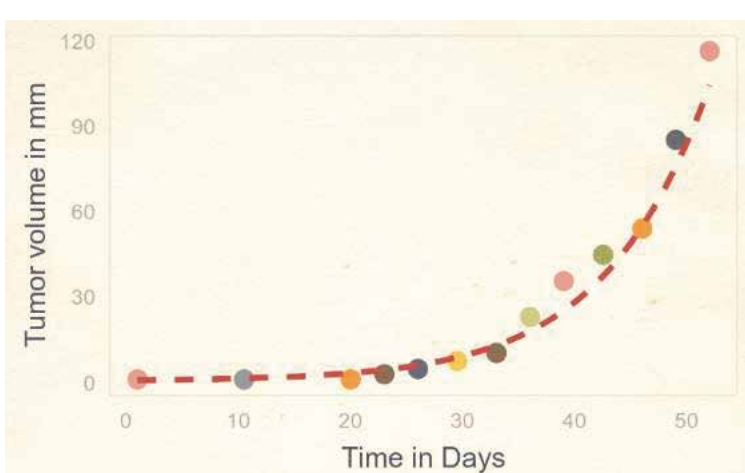
mouse 3



mouse 4



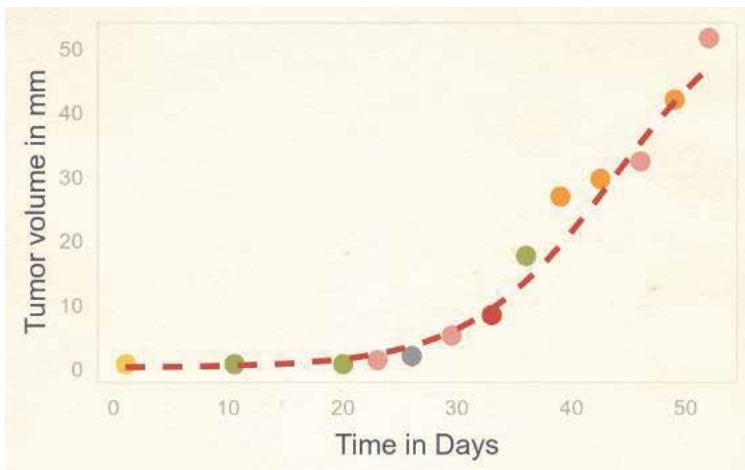
mouse 7



mouse 8

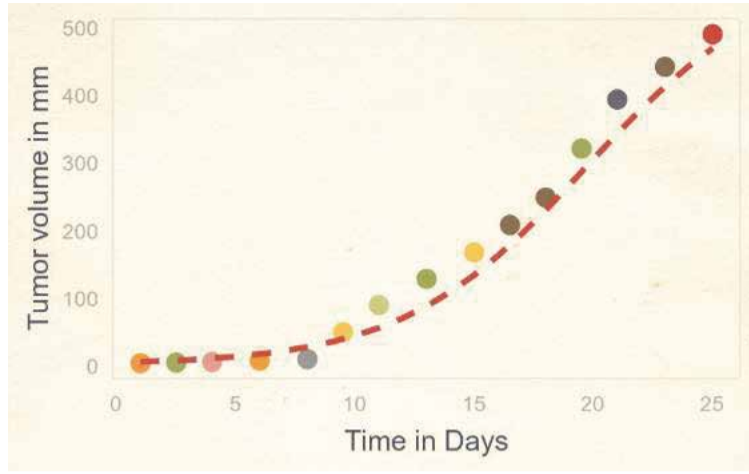


mouse 9

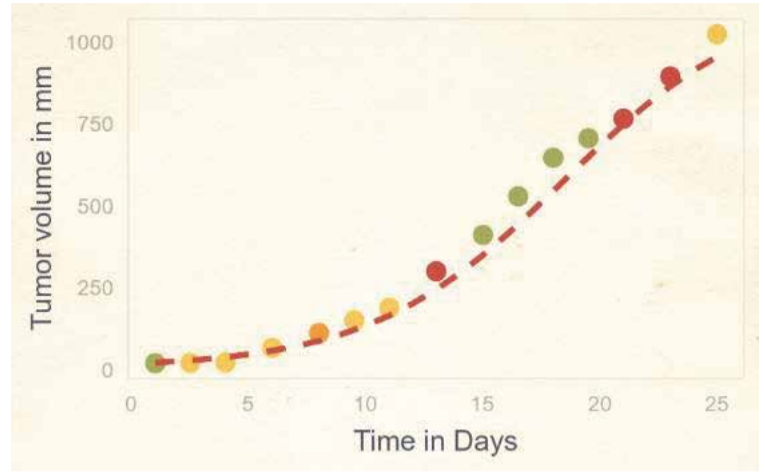


Supplementary figure 30. MDA-MB-231 breast cancer cell line

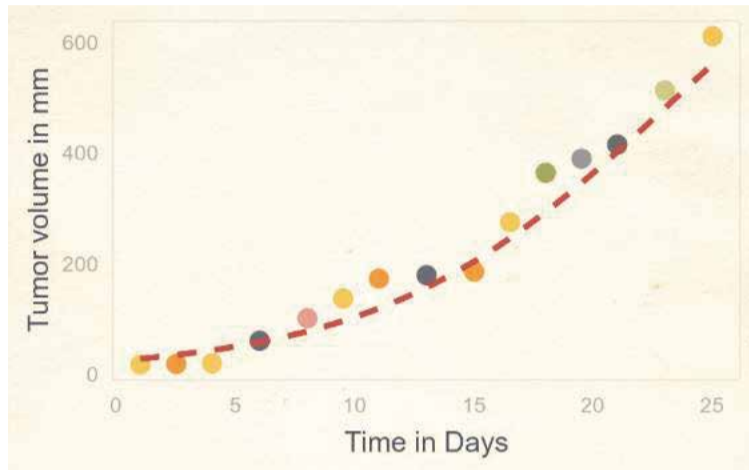
mouse 1



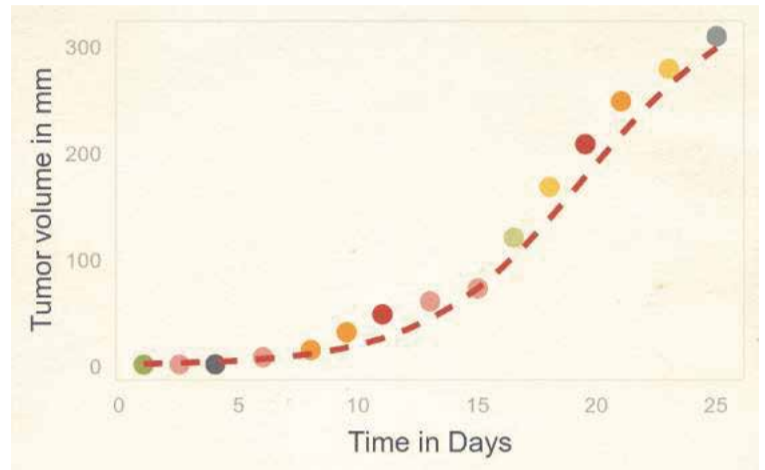
mouse 2



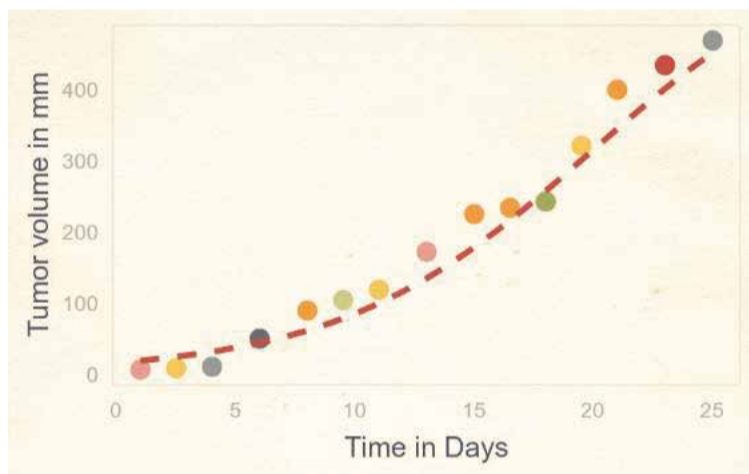
mouse 4



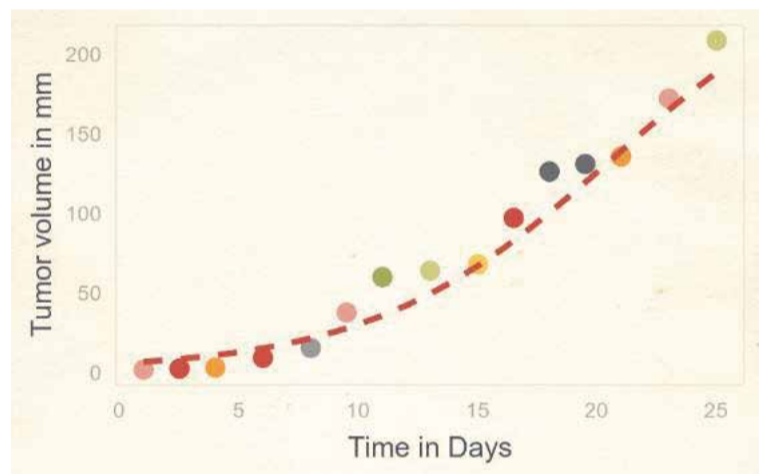
mouse 5



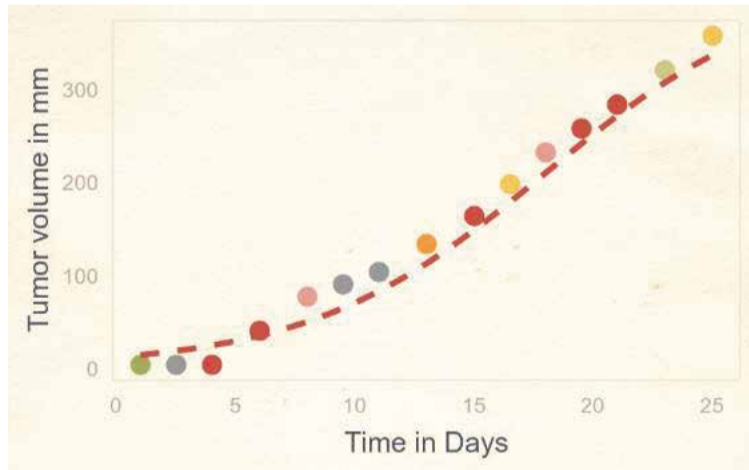
mouse 6



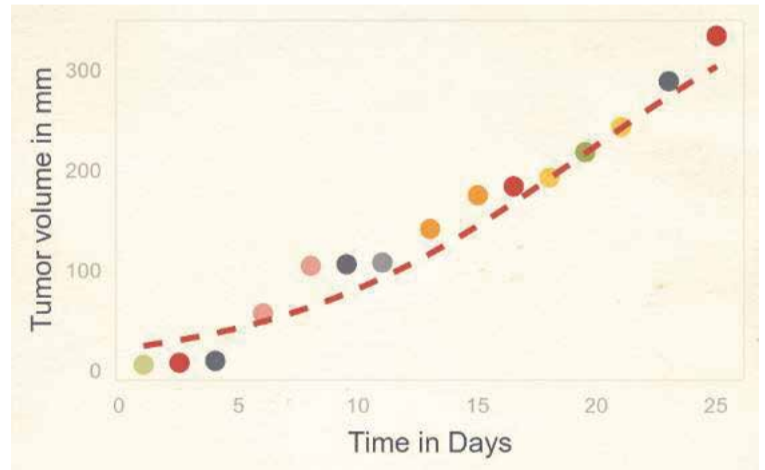
mouse 7



mouse 8



mouse 9



mouse 10

