Supplementary Materials

Table S1. Proteins and their positive and negative regulators in the core control systems of mammalian cell cycle shown in Figure 1

Proteins	Regulators of proteins and their influence (positive or negative
MYC	MYC
CDH1	CYCE(-), CYCA(-),CYCB(-)
P27	CYCD(-), CYCE(-), CYCA(-)
RB	CYCD(-), CYCE(-),CYCA(-)
CYCD	MYC(+), P27(-), SCF(-), CDC20(-)
E2F	RB(-), CYCD(+),CYCE(+),CYCA(-)
SCF	CYCE(+), CDH1(-)
CYCE	E2F(+), P27(-), SCF(-)
CYCA	E2F (+), CDH1(-), P27(-), CDC20(-), NFY(+)
NFY	CYCA (+)
CYCB	NFY (+), CDH1(-), CDC20(-)
CDC20	CYCB (+), CDH(-)

Table S2. Weights from the trained whole system AANN with sigmoid functions and *a priori* unspecified protein interactions

	Myc	Cdh1	P27	Rb	CycD	E2F	CycE	CycA	NFY	CycB	Cdc20	SCF
Myc	0.71232	0.043135	0.25901	-0.11512	0.18411	0.057162	-0.23824	-0.04369	-0.22765	0.17382	-0.25373	0.46314
Cdh1	0.015385	0.75034	-0.07471	0.16083	0.056748	0.29599	**-0.39267**	**0.014365**	-0.09965	**-0.12104**	-0.04598	0.009257
P27	0.084807	0.19986	0.045941	0.41273	**-0.01442**	0.20669	**-0.43004**	**-0.09371**	0.33957	0.070941	-0.10206	0.12309
Rb	-0.14938	0.06587	0.40583	0.75802	**0.027315**	0.095822	**0.069725**	**0.092425**	-0.35027	0.20974	0.29517	-0.04294
CycD	**0.073531**	0.14003	**0.14492**	-0.13748	0.57787	0.20352	0.13962	0.037342	0.42037	0.24281	**-0.3111**	**-0.05589**
E2F	-0.03273	0.24068	-0.17628	**-0.01373**	**0.016593**	0.48787	**0.51467**	**-0.07031**	0.24834	-0.05773	0.21125	0.007797
CycE	-0.01807	-0.117	**-0.29717**	0.20867	0.36042	**0.24819**	0.34248	-0.14425	0.14064	-0.0028	-0.2434	**0.17088**
CycA	-0.22712	**0.008517**	**-0.22912**	0.14145	0.62471	**-0.07607**	-0.26242	0.7814	**0.30522**	0.5021	**0.079285**	0.064954
NFY	0.12385	-0.33867	0.16296	0.052355	-0.12862	-0.18802	0.078836	**0.1693**	-0.06216	-0.333	0.10861	0.14271
CycB	0.081312	**-0.19927**	0.37995	-0.12696	-0.17912	-0.2826	0.407	0.020728	**0.037869**	0.43916	**0.29099**	-0.03553
Cdc20	-0.14736	**0.21917**	-0.05412	-0.04425	0.15074	0.13609	-0.20132	-0.12829	0.56471	**0.5472**	0.37138	0.12885
SCF	-0.0426	**0.22372**	-0.26709	0.034652	0.24776	0.046368	0.041646	0.001778	0.084025	0.35188	0.4263	0.60648

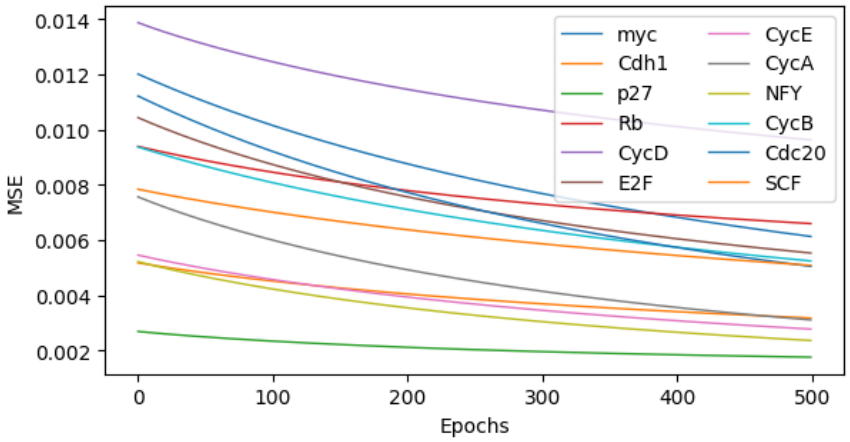
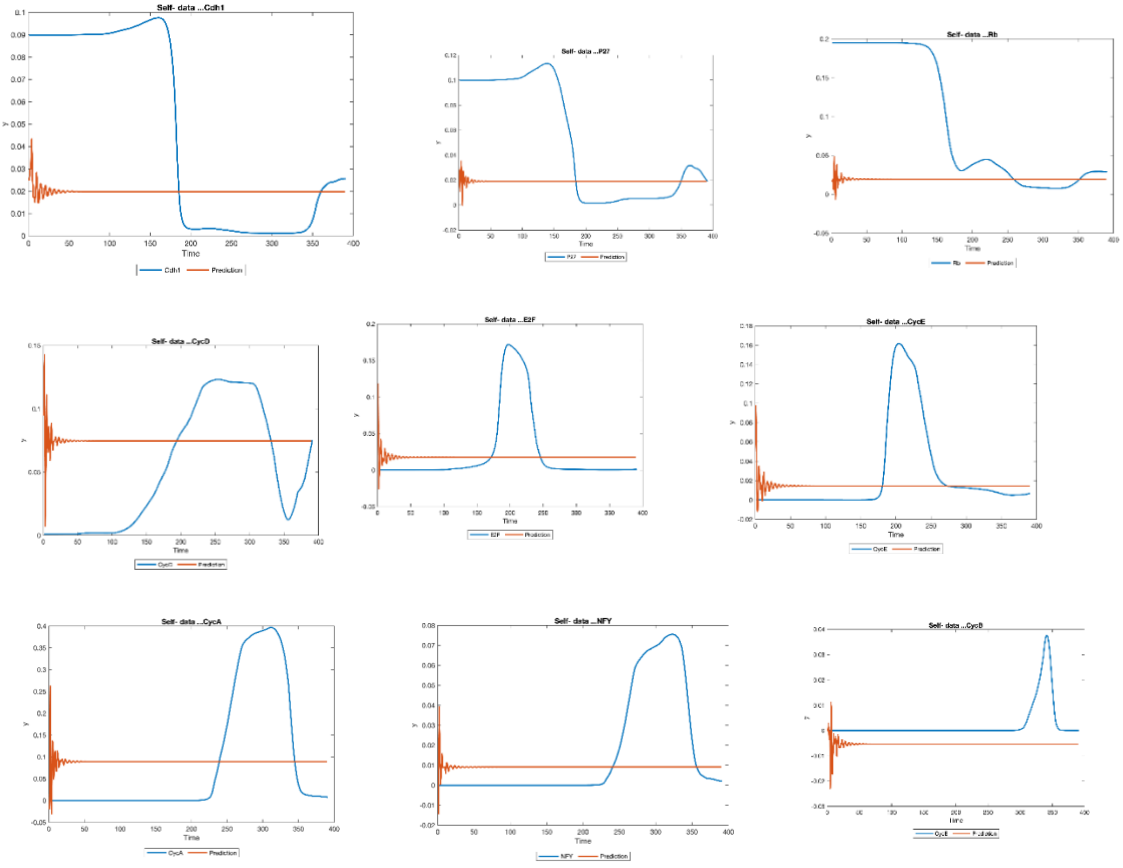


Figure S1: Training MSE plots for whole system AANN with all sigmoid neurons for the *a priori* specified connections in the protein network.



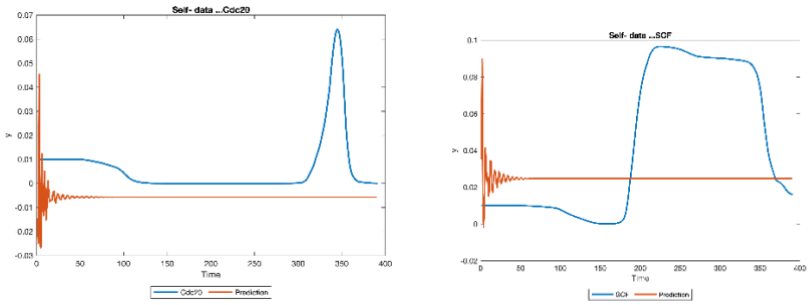


Figure S2. AANN whole system model prediction from its own system generated data (predicted (brown) and target (blue))

Table S3. Recurrent AANN weight matrix for recurrent inputs and standard inputs (all linear activation functions). Weights along the diagonal in the second half the matrix represent recurrent weights indicative of the strength of influence of past output.

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0.00606616	-0.0069552	0	0.021199959	0	0	0.932960432	0	0	0	0	0	0	0	0	0	0
0	0	0	0	-0.05786996	0	0.10933112	0.0679637	0	0	0	0	0	0.980784147	0	0	0	0	0	0	0	0	0
0	0	0	0	-0.023996361	0	0.054989817	0.0343568	0	0	0	0	0	0	0.954709998	0	0	0	0	0	0	0	0
0.079342732	0	-0.033329928	0	0	0	0	0	0	0	-0.014475412	-0.075445	62	0	0	0	0.957976999	0	0	0	0	0	0
0	0	0	-0.022488364	0.0485877	54	0	-0.380396317	-0.008480631	0	0	0	0	0	0	0	0	0	1.315532748	0	0	0	0
0	0	-0.015916518	0	0	0.279643283	0	0	0	0	0	0.023571526	0	0	0	0	0	0.71760533	0	0	0	0	0
0	-0.022825857	0.041521795	0	0	0.010771399	0	0	-0.384780363	0	0.038985482	0	0	0	0	0	0	0	1.353381274	0	0	0	0
0	0	0	0	0	0	0	0.263681918	0	0	0	0	0	0	0	0	0	0	0	0.744843727	0	0	0
0	0.002019971	0	0	0	0	0	0	0.050910378	0	-0.420346488	0	0	0	0	0	0	0	0	0	1.309594954	0	0
0	-0.003482297	0	0	0	0	0	0	0	0.391565168	0	0	0	0	0	0	0	0	0	0	0	0.631108312	0
0	0.000616259	0	0	0	0	0.116409212	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.936453717

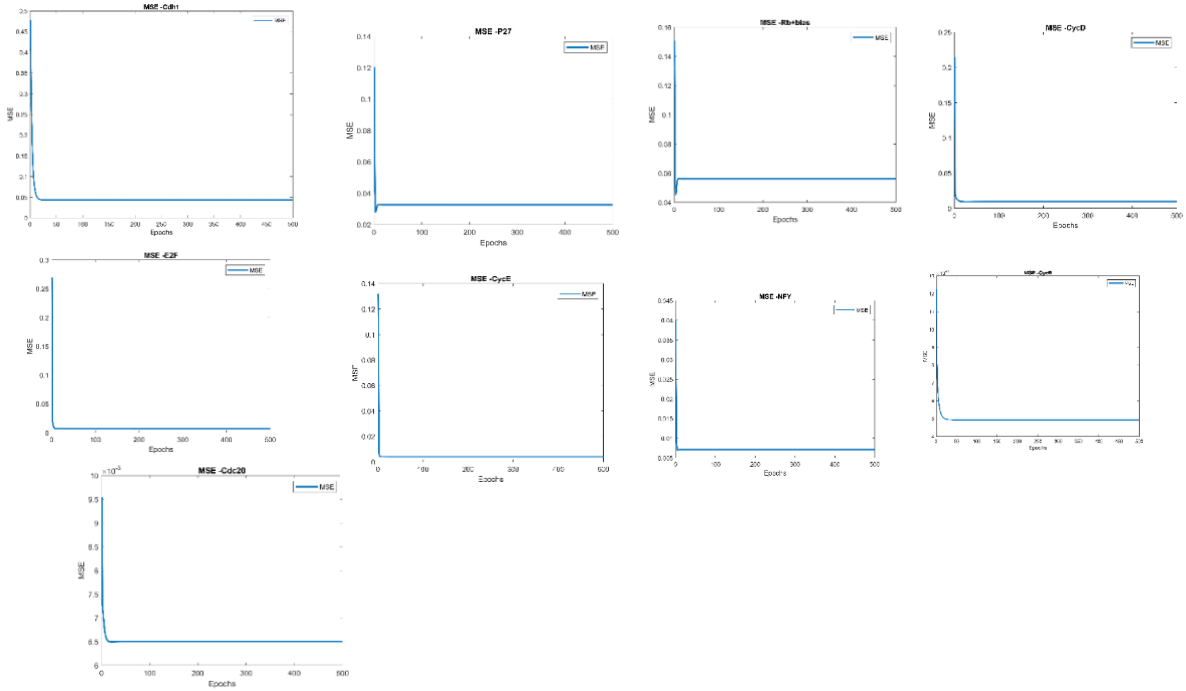


Figure S3. MSE graphs of training individual linear neurons for individual proteins

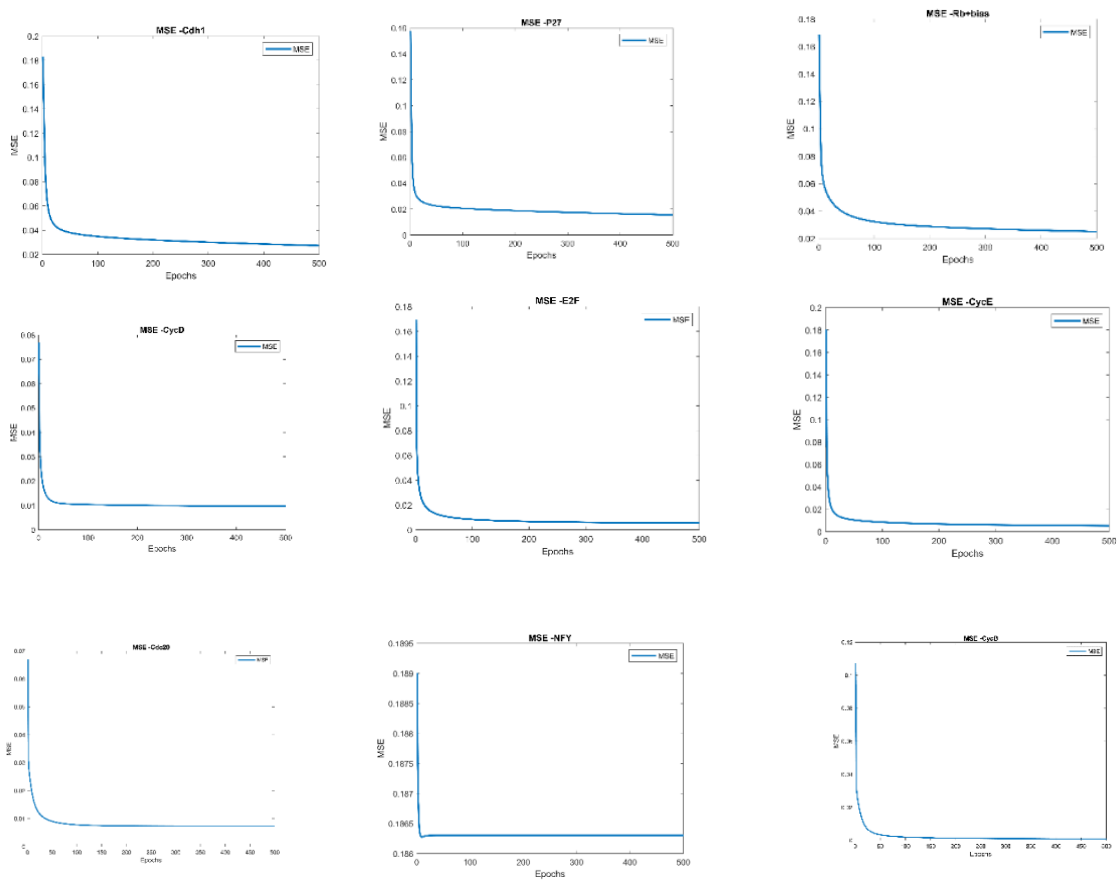


Figure S4. MSE graphs for training individual sigmoid neuron models for individual proteins

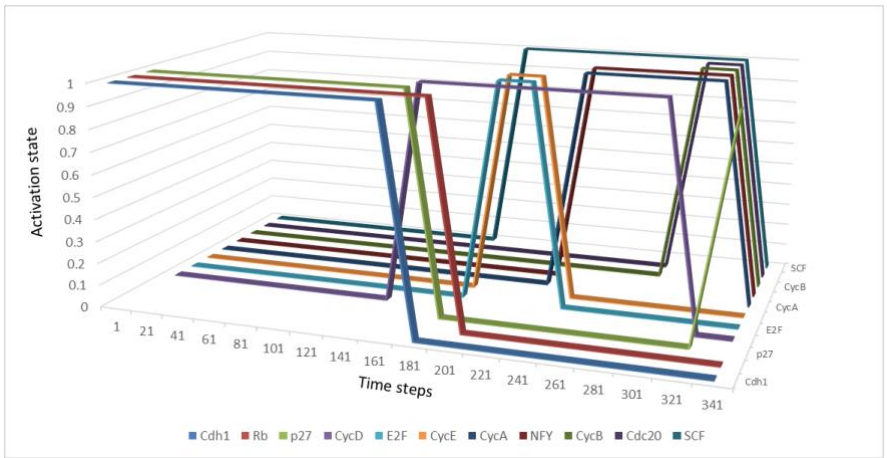


Figure S5. Performance of the Binary AANN model assembled from the individual binary neuron models trained from binary data generated from the ODE model data.