University of Ioannina, School of Health Sciences, Department of Medicine
Inter-institutional Interdepartmental Program of Postgraduate Studies "Molecular and Cellular Biology and Biotechnology"

Extra content - Spindle measures and colocalization values

THESIS ANNEX

MSc thesis **Annex**

Role of the ubiquitin-like protein SUMO in spindle organization

Role of SUMO protein in the regulation of the yeast chromosome passenger complex

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1. Metaphase and late anaphase spindle length for wild type and triple mutant cells

Wild Type			
cell no.	**Minutes from t_0 to telophase (m)**	**Early anaphase spindle length (t_1) (µm)**	**Maximum spindle length (Late anaphase) (µm)**
1	18	2.571	6.646
2	20	1.457	6.009
3	20	2.32	7.233
4	20	2.161	5.267
5	18	3.051	6.831
6	18	1.748	6.706
7	20	2.613	7.556
8	17	2.381	6.563
9	20	2.334	7.689
10	17	2.411	6.86
11	20	2.748	7.207
12	19	1.805	6.944
13	20	2.607	7.201
14	19	1.717	6.452
15	18	2.734	7.561
16	19	3.001	6.604

Triple Mutant			
cell no.	**Minutes from t_0 to telophase (m)**	**Early anaphase spindle length (t_1) (µm)**	**Maximum spindle length (Late anaphase) (µm)**
1	19	2.985	8.713
2	17	2.699	7.834
3	19	2.891	8.721
4	18	2.45	8.842
5	18	3.925	7.643
6	17	2.475	7.24
7	18	2.513	8.139
8	17	2.705	7.208
9	16	3.615	8.044
10	19	2.318	8.539
11	18	2.68	8.082
12	19	2.988	8.669
13	18	2.794	8.761
14	17	2.341	7.335
15	19	2.142	8.654
16	18	2.649	7.983

2. Maximum spindle length measures on all mutants and wild type

	Wild Type	Double Mutant	Triple Mutant
cell no.	**Maximum spindle length (Late anaphase) (µm)**		
1	6.627	7.628	7.018
2	6.372	6.574	7.603
3	7.278	7.132	7.084
4	6.845	6.755	7.463
5	6.352	6.928	6.894
6	5.935	6.78	6.963
7	6.697	8.684	7.348
8	8.066	7.456	7.989
9	6.349	7.174	7.624
10	6.064	7.218	6.719
11	6.626	7.265	6.769
12	6.926	6.847	7.29
13	6.494	6.894	6.306
14	6.096	6.61	6.721
15	6.733	7.645	6.386
16	7.139	7.417	6.821
17	8.626	7.111	6.29
18	6.285	6.309	6.998
19	7.151	6.355	6.993
20	6.197	6.569	8.51
21	6.654	7.655	7.12
22	6.179	6.665	7.162
23	7.19	8.211	6.805

24	6.862	6.992	7.373
25	6.976	7.227	7.25
26	6.646	7.427	7.521
27	6.009	6.431	6.865
28	7.233	6.465	7.719
29	5.267	7.627	7.513
30	6.831	6.573	8.713
31	6.706		7.834
32	7.556		8.721
33	6.563		8.842
34	7.689		7.643
35	6.86		7.24
36	7.207		8.139
37	6.944		7.208
38	7.201		8.044
39	6.452		8.539
40	7.561		8.082
41	6.604		8.669
42			8.761
43			7.335
44			8.654

Average	6.768	7.099	7.142

Significant Difference			
strains	**WT vs 2R**	**WT vs 3R**	**2R vs 3R**
t.test	0.0547	0.0184	0.662
conclusion	not significant	significant	not significant

3. Spindle length measures by time in wild type and mutants

Wild Type								
Time	**WT1**	**WT5**	**WT7**	**WT11**	**WT12**	**WT24**	**WT AVG**	**St.Dv.**
t1	2.541	2.157	2.595	1.967	2.183	2.061	2.251	0.235
t2	3.367	3.189	3.424	2.66	2.601	1.979	2.870	0.511
t3	3.149	3.633	3.887	2.941	2.99	3.028	3.271	0.359
t4	3.284	3.747	4.474	3.094	3.467	3.65	3.619	0.440
t5	3.822	4.499	4.616	3.092	4.121	3.895	4.008	0.502
t6	4.089	5.034	4.814	3.47	4.642	4.232	4.380	0.520
t7	4.082	4.797	4.779	3.578	4.49	4.38	4.351	0.423
t8	4.622	5.231	5.384	3.706	5.102	4.374	4.737	0.578
t9	4.577	5.043	5.358	4.148	5.023	4.604	4.792	0.394
t10	4.274	5.378	5.406	5.162	5.327	4.383	4.988	0.474
t11	5.269	5.745	6.038	5.447	5.572	4.559	5.438	0.461
t12	5.016	5.871	5.835	5.103	5.605	5.248	5.446	0.341
t13	5.03	6.507	6.07	5.658	5.626	5.445	5.723	0.467
t14	5.033	6.365	5.824	5.784	5.902	5.649	5.760	0.394
t15	5.808	6.676	6.035	5.985	6.721	5.667	6.149	0.407
t16	5.854	6.755	6.411	6	6.61	5.394	6.171	0.470
t17	5.794	6.741	6.425	6.626	6.508	5.699	6.299	0.404
t18	5.729	6.82	6.697		6.926	6.247	6.484	0.443
t19	6.627	6.845				6.493	6.655	0.145
t20						6.733	6.733	0.000

Double Mutant								
time	**2R3**	**2R9**	**2R10**	**2R11**	**2R24**	**2R25**	**2R AVG**	**St.Dv.**
t1	1.812	1.44	2.013	2.039	1.838	2.154	1.883	0.230
t2	2.301	2.716	2.216	3.47	2.602	2.423	2.621	0.415
t3	2.993	2.691	3.153	3.746	3.446	2.769	3.133	0.370

t4	3.15	3.333	3.605	4.162	3.869	2.922	3.507	0.422
t5	3.712	3.466	3.305	4.369	3.955	2.709	3.586	0.521
t6	4.92	4.203	3.745	4.394	4.389	2.745	4.066	0.684
t7	4.954	4.268	4.599	4.412	4.885	3.837	4.493	0.380
t8	5.325	4.491	4.779	5.313	4.844	4.575	4.888	0.327
t9	5.596	4.815	4.904	5.565	5.068	4.900	5.141	0.320
t10	5.918	4.293	4.764	5.556	5.518	5.386	5.239	0.545
t11	5.913	5.325	5.236	5.735	5.356	5.945	5.585	0.289
t12	6.039	5.072	5.45	6.212	5.708	6.033	5.752	0.393
t13	6.122	6.179	5.586	5.926	6.131	6.793	6.123	0.360
t14	6.127	6.498	5.719	6.774	6.458	6.661	6.373	0.355
t15	6.442	6.754	6.189	7.293	6.713	7.211	6.767	0.391
t16	6.741	6.74	6.563	7.299	6.815	7.189	6.891	0.263
t17	6.927	6.954	6.847	7.234	6.839	6.968	6.962	0.131
t18	7.069	7.174	7.218	7.265	7.111		7.167	0.071
t19	7.094						7.094	0.000
t20	7.132						7.132	0.000

Triple Mutant								
Time	**3R1**	**3R3**	**3R7**	**3R13**	**3R22**	**3R23**	**3R AVG**	**St.Dv.**
t1	1.412	2.827	2.283	1.814	1.741	1.709	1.964	0.463
t2	2.019	3.566	2.704	2.787	2.234	2.744	2.676	0.489
t3	2.549	3.64	3.243	2.941	3.087	3.183	3.107	0.329
t4	3.09	4.169	3.51	3.934	4.684	3.255	3.774	0.550
t5	3.568	5.047	4.535	4.083	4.602	3.819	4.276	0.503
t6	4.103	5.261	5.206	4.744	4.957	3.869	4.690	0.530
t7	4.449	5.458	5.643	5.189	5.697	3.829	5.044	0.684
t8	4.57	5.889	5.503	5.126	5.944	4.252	5.214	0.635
t9	5.054	5.847	5.913	5.172	5.974	4.208	5.361	0.629
t10	4.953	6.148	6.288	5.521	5.878	4.31	5.516	0.695

t11	5.432	6.432	6.415	5.947	6.032	4.036	5.716	0.822
t12	5.265	6.636	6.433	6.304	6.495	5.021	6.026	0.636
t13	5.939	6.926	6.71	5.845	6.17	5.114	6.117	0.595
t14	5.345	7.014	6.834	6.436	6.314	5.56	6.251	0.614
t15	6.656	7.01	6.921	6.41	6.715	5.844	6.593	0.386
t16	6.858	7.248	7.1	6.548	6.791	6.013	6.760	0.402
t17	6.942	7.65	7.17	6.873	6.808	6.214	6.943	0.429
t18	6.982	7.206	7.231	6.987	7.023	6.789	7.036	0.149
t19	7.059		7.348	7.192	7.496	6.411	7.101	0.375
t20	7.001			7.094	7.12	6.841	7.014	0.109
	7.018			7.115		7.162	7.098	0.060

Spindle growth significance based on standard deviation			
Cells	WT vs 2R	WT vs 3R	2R vs 3R
t.test results	0.0547	0.0184	0.662
conclusion	not significant	significant	not significant

4. Colocalization measures with Pearson's R value in wild type and mutants

Wild Type			
EARLY anaphase			**LATE anaphase**
Cell	**Pearson's R value**		**Pearson's R value**
1	0.957		0.981
2	0.978		0.975
3	0.979		0.954
4	0.973		0.976
5	0.969		0.935
6	0.97		0.871
7	0.981		0.93
8	0.99		0.966
9	0.986		0.974
10	0.981		0.957
12	0.956		0.961
13	0.939		0.985

Double Mutant			
EARLY anaphase			**LATE anaphase**
Cell	**Pearson's R value**		**Pearson's R value**
1	0.914		0.955
2	0.833		0.925

3	0.937	0.922
4	0.718	0.946
5	0.80	0.944
6	0.779	0.944
7	0.763	0.924
8	0.727	0.946
9	0.766	0.944
10	0.845	0.971

Triple Mutant		
EARLY anaphase		**LATE anaphase**
Cell	**Pearson's R value**	**Pearson's R value**
1	0.993	0.989
2	0.992	0.995
3	0.991	0.995
4	0.994	0.995
5	0.994	0.989
6	0.99	0.991
7	0.989	0.984
8	0.987	0.993
9	0.993	0.979
10	0.989	0.984