INFLUENCE OF FTG PHOSPHOLIPASE ON BREAD'S RHEOLOGICAL PROPERTIES

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Introduction

Recent structural advances include solution structures of a pancreatic phospholipase A2 in the absence and presence of a micellar interface, crystal structures of a bacterial phosphatidylinositol-phospholipase C whose active site is reminiscent of ribonuclease, and a Ca^{2+} *lipid binding domain with high homology to regions in several cytoplasmic phospholipases that can model the way those proteins interact with the membrane surface.*
Phospholipases also have a wide and complex array of regulatory mechanisms involving cytoplasmic proteins, notably G-proteins, as well as different effector lipids (e.g., phosphatidylinositol-4,5-biphosphate, or PIP2) or Ca^{2+} *. Deconvolution of these interactions is necessary to understand their roles in different signal transduction pathways (Roberts, M. F. Phospholipases: structural and functional motifs for working at an interface).*
Keywords : *phospholipase, wide, complex, mechanisms.*

Experimental

We appreciate bread's behavior when we supplement dough with phospholipase FTG using an Alaska BM 2000 machine with an standard program. We follow a recipe with whole meal, dry yeast, salt, enzyme FTG in breeder amounts. For comparition we keep a sample without exogene enzyme and we determine the same thing to it.

For our analysis we have take sampling with 2.5x2.5x2.5 mm^3 and we have tested them with an JTL Janz machine. We have studied bread's rheological behaviour to all eight samples and to control sample.

Table 1: Dough's samples with FTG

Nr.	Flour (g)	Water (ml)	Salt (g)	Dry yeast	Enzyme (FTG /LysoMax)	Enzymes concentration (g/100 g flour)
0	437	245	8.7	7	0	0.00
1	437	245	8.7	7	0.437	0.10
2	437	245	8.7	7	0.874	0.20
3	437	245	8.7	7	1.311	0.30
4	437	245	8.7	7	1.748	0.40
5	437	245	8.7	7	2.185	0.50
6	437	245	8.7	7	2.622	0.60
7	437	245	8.7	7	3.059	0.70
8	437	245	8.7	7	3.496	0.80

We determine compression strength in 0.7-2 seconds interval with a constant speed of 6 mm/minut and after compression we let the sample to relax.

Results and Discussions

We can observ in table number 3 that compression strength increases in time till the values of approximately 7.2 N. Notwithstanding, the graphic curve varies once with enzyme's concentration. We choose like exemple of compression strength in time the control sample and the sample with 0.4% FTG enzyme.

Table 2: Bread's compression at control sample

Time (s)	F (LM 0) N	Time (s)	F (LM 0) N	Time (s)	F (LM 0) N
0	0.34	30	2.60	56	4.85
4	0.85	32	2.93	58	4.90
6	0.90	34	3.09	60	5.0
8	1.11	36	3.41	62	5.18
12	1.30	38	3.5	64	5.30
14	1.52	40	3.70	66	5.37
16	1.75	42	3.81	68	5.50
18	1.84	44	4.07	70	5.59
20	1.93	46	4.13	72	5.68
22	2.11	48	4.40	74	5.82
24	2.20	50	4.45	76	5.88
26	2.35	52	4.62	78	5.91
28	2.48	54	4.70	80	6.11

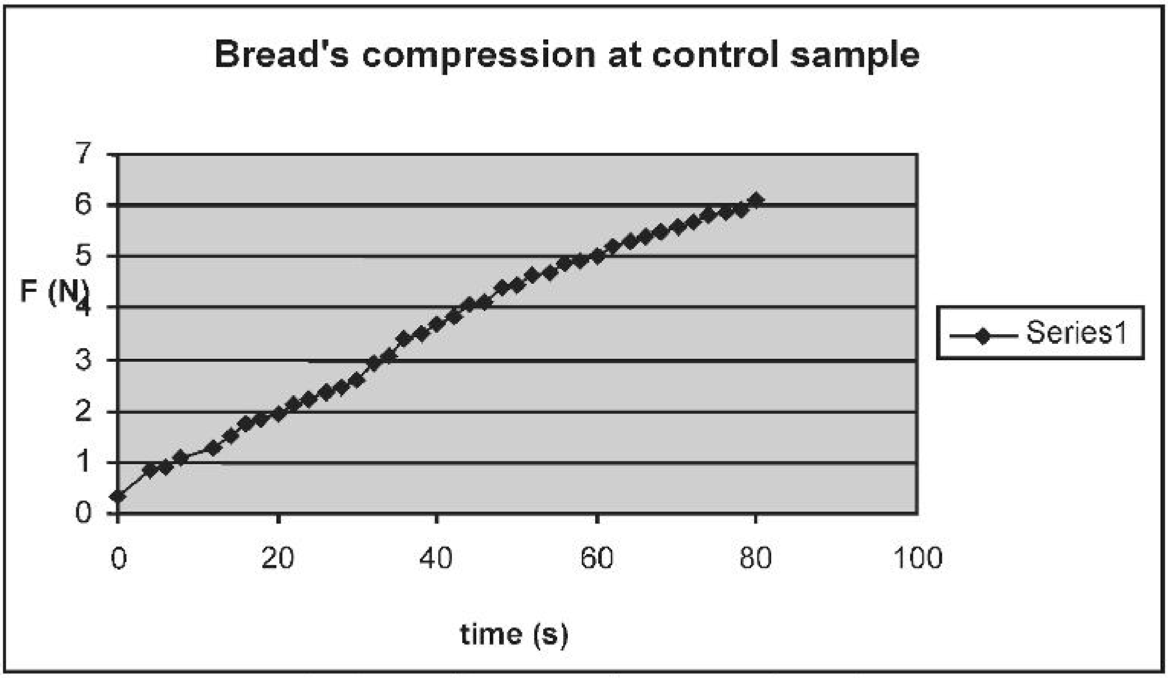

Fig. 1: Bread's compression at control sample

Table 3: Bread's compression with FTG enzyme, concentration 0.4g/100g flour

Time (s)	F (LM7) N	Time (s)	F (LM7) N	Time (s)	F (LM7) N
0	0.27	15.4	1.96	31.1	5.0
1.2	0.32	16.3	2.31	32.3	5.22
2.5	0.40	17.9	2.60	33.5	5.50
3.5	0.48	19.1	2.80	34.6	5.81
4.6	0.56	20.2	2.97	35.9	6.00
5.9	0.63	21.4	3.19	37.1	6.30
7.0	0.79	22.7	3.65	38.3	6.56
8.2	0.98	24	4.00	39.4	6.68
9.3	1.07	25.1	4.20	40.6	6.90
10.1	1.18	26.5	4.38	41	7.00
11.9	1.40	27.5	4.65	43.1	7.11
13.0	1.62	28.7	4.74	44.1	7.17
14.1	1.87	30	4.88		

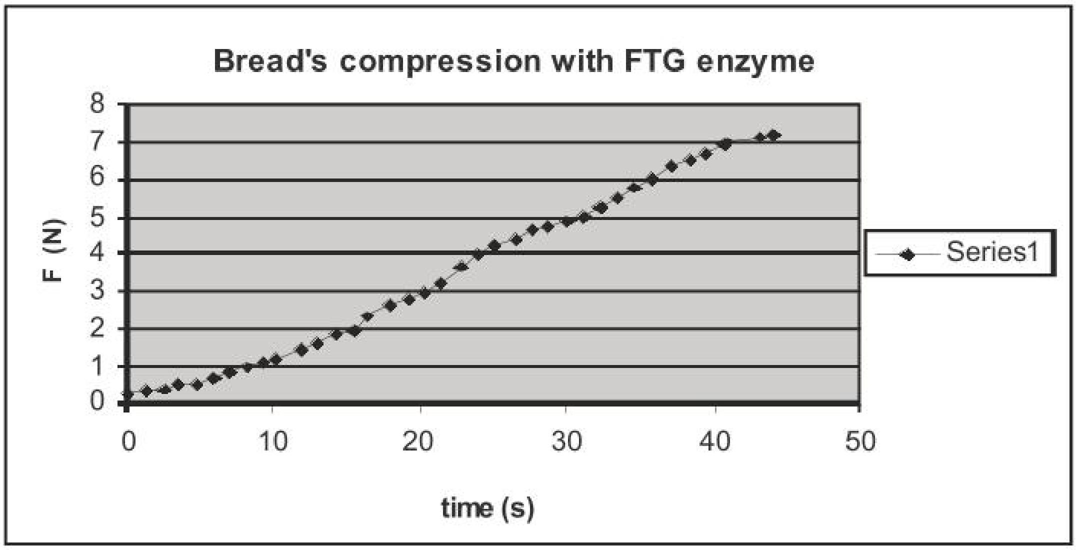

Fig. 2: Bread's compression with FTG enzyme

We have also determinate the elasticity (Young modulus) for all nine samples (including control sample) and we descover that it wasn't varies meaningful after different enzyme concentration (table number 4). We have registred a medium value of 57353±104 Pa.

Table 4: Experimental data

Nr.	C_{FTG}	F/A (N/m²)	$L_{0\ (m)}$	Δl (m)	$Δl/L_0$	E (Pa)
0	0.00	11520	0.025	0.005	0.2	57600
1	0.10	11488	0.025	0.005	0.2	57440
2	0.20	11472	0.025	0.005	0.2	57360
3	0.30	11440	0.025	0.005	0.2	57200
4	0.40	11472	0.025	0.005	0.2	57360
5	0.50	11456	0.025	0.005	0.2	57280
6	0.60	11456	0.025	0.005	0.2	57280
7	0.70	11472	0.025	0.005	0.2	57360
8	0.80	11472	0.025	0.005	0.2	57360
9	0.90	11472	0.025	0.005	0.2	57360

Conclusions

- compression/relaxation cant' be correlate with FTG concentration;
- the compression strength varies exponential, even that this fact is not very evident;
- samples with FTG have an pseudoelastic behaviour;
- elasticity modulus wasn't varies meaningful in different enzyme's concentration and neither for control sample.

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