

POSTER PRESENTATION

Open Access

Production of recombinant 503 antigen of *Leishmania infantum chagasi* using cultivation in batch and fed-batch

Michelle Rossana Ferreira Vaz^{1*}, Francisco Canindé de Sousa Junior², Carlos Eduardo de Araújo Padilha², Daniella Regina Arantes Martins³, Everaldo Silvino Santos², Gorete Ribeiro Macedo²

From 5th Congress of the Brazilian Biotechnology Society (SBBIOTEC)
Florianópolis, Brazil. 10-14 November 2013

Background

Visceral leishmaniasis is an infecto-parasitarian disease caused by obligatory intracellular protozoa belonging to the genus *Leishmania*, and might be lethal since there is no precocious diagnosis and proper treatment. Despite the considerable effort, there is no effective and safe vaccine for human use [1]. Genetically modified microorganisms are used industrially in general for production of hormone, antibiotics and proteins. In the production of heterologous molecules, both the expression and the production step are important [2]. Therefore, the study of cultivation conditions in bioreactor plays an important role for the process viability of batch and fed-batch [3]. Thus, the aim of this work was to study strategies for production of the 503 antigen of *Leishmania infantum chagasi* using cultivation in batch and fed-batch.

Methods

The strain of *E. coli* expressing 503 antigen of *Leishmania infantum chagasi* was kindly provided by Dr. Mary Wilson (University of Iowa, USA) [1]. The clone was cultured in 2xTY medium supplemented with ampicillin and kanamycin. The cultivations were carried out using a bench bioreactor with a work volume of 1.5 L, at frequency of agitation of 400 rpm and constant output aeration of 1 vvm. The expression of the recombinant protein was induced by the addition of lactose to the cultivation medium at the final concentration of 10 g/L [4]. Optimization of cultivation conditions of 503 antigen was performed in batch and fed-batch. Then, assays of the fractions were performed by Lowry method and

electrophoresis, Biomass concentration was monitored by the dry weigh and the acetic acid concentration was assayed by high-performance liquid chromatography.

Results and conclusions

Fed-batch culture is one of the most performed strategies to reach high cell densities of *E. coli* and consequently high recombinant protein productivities. It was observed that to the cultivations in fed-batch, the agitation of 400 rpm resulted increased the biomass of 2.5 g/L to 11 g/L. It was observed the same behavior for the protein using both batch and fed-batch (0.11 g/L). In the present study in the both processes it was not observed the inhibitory effect in the cellular growth as well as on the 503 protein expression. The highest acetic acid concentration was obtained at the agitation speed of 400 rpm (0.2 g/L) that occurred during the first two hours of cultivation. However, this concentration was inferior to 0.9 g/L that according to [5] have no inhibitory effect in the growth.

Acknowledgements

The authors thank the CNPq (*Conselho Nacional de Pesquisa e Desenvolvimento Tecnológico*) for the financial support and Dr. Mary E. Wilson (University of Iowa, USA) for providing the microorganism strain.

Authors' details

¹Centro de Desenvolvimento Sustentável do Semiárido, Universidade Federal de Campina Grande, Sumé, PB, 58540-000, Brazil. ²Departamento de Engenharia Química, Universidade Federal do Rio Grande do Norte, Natal, RN, 59078-970, Brazil. ³Departamento de Biologia Celular e Genética, Universidade Federal do Rio Grande do Norte, Natal, RN, 59078-970, Brazil.

Published: 1 October 2014

References

1. Martins DR, Jeronimo SM, Donelson JE, Wilson ME: *Leishmania chagasi* T-cell antigens identified through a double library screen. *Infect Immun* 2006, **74**:6940-6948.

¹Centro de Desenvolvimento Sustentável do Semiárido, Universidade Federal de Campina Grande, Sumé, PB, 58540-000, Brazil
Full list of author information is available at the end of the article

2. Selvapandiyar A, Dey R, Gannavaram S, Lakkhal-Naouar I, Duncan R, Salotra P, Nakhasi HL: **Immunity to visceral leishmaniasis using genetically defined live-attenuated parasites.** *J Trop Med* 2012, **1**:1-12.
3. Son YJ, Bae JY, Chong SH, Lee HS, Mo SH, Kim TY, Choe H: **Expression, high cell density culture and purification of recombinant EC-SOD in *Escherichia coli*.** *Appl Biochem Biotechnol* 2010, **162**:1585-1598.
4. Carvalho RJ, Crabera-Crespo J, Tanizaki MM, Gonçalves VM: **Development of production and purification processes of recombinant fragment of pneumococcal surface protein A in *Escherichia coli* using different carbon sources and chromatography sequences.** *Appl Microbiol Biotechnol* 2012, **94**:683-694.
5. Xue W, Fan D, Shang L, Zhu C, Ma X, Zhu X, Yu Y: **Effects of acetic acid and its assimilation in fed-batch cultures of recombinant *Escherichia coli* containing human-like collagen cDNA.** *J Biosci Bioeng* 2010, **109**:257-261.

doi:10.1186/1753-6561-8-S4-P186

Cite this article as: Ferreira Vaz et al.: Production of recombinant 503 antigen of *Leishmania infantum chagasi* using cultivation in batch and fed-batch. *BMC Proceedings* 2014 **8**(Suppl 4):P186.

**Submit your next manuscript to BioMed Central
and take full advantage of:**

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.biomedcentral.com/submit

