Identification of new antigen candidates of Bartonella bacilliformis

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Introduction

Bartonella bacilliformis is the aetiological agent of Carrion’s disease, an overlooked illness with a lethal febrile stage and a benign warty phase. Its endemic in Andean areas, mainly affecting Peru, but also reported in Ecuador, Colombia, Bolivia and Chile.¹

Two well-established phases: in the acute stage, the so-called Oroya fever, severe haemolytic anaemia is present; resulting in 40–85% deaths in untreated people. Peruvian wart is the chronic stage non life-threatening phase, characterized by cutaneous vascular proliferative lesions. This chronic phase may take place some weeks or months after the acute infection.²,³

The human is the only reservoir known, and in endemic areas about 40% of asymptomatic carriers have been described.⁴

In endemic areas the diagnosis of the acute phase is usually made by clinical data and/or by thick blood smear. Despite having a specificity of 96%, this method is expertise-dependent, showing very low sensitivity (24–36%).⁵ Bacterial culture has also low sensitivity due to slow growth of bacteria.⁶ Molecular and serologic tools are able to detect acute cases more efficiently than aforementioned methods, but are very difficult for routine practice in rural endemic areas.⁵

NO EFFECTIVE DIAGNOSTIC TOOL EXISTS NOWADAYS

The objective of this study was to identify new B. bacilliformis antigenic candidates that could be used in a rapid diagnostic tool able to be implemented in rural areas.

Methods

Serum samples from 177 people were collected in 5 different localities of northern Peru (4 localities in which an outbreak occurs few months earlier and the remaining is an endemic area).

• Inclusion criteria: People from post-outbreak areas that were diagnosed during the outbreak were recruited.
• Additionally, a small number of people were also included. In the endemic area, the volunteers were recruited at random.

The amino acid sequencing identified both Pap31 (D) and Bb65/GroEL (A), already described in the literature as B. bacilliformis antigens:

Two non-described antigenic candidates were also identified:
Antigens B and C (both subunits of the same protein) were detected with IgG and IgM, respectively.

These new antigenic candidates are involved in the tricarboxylic acid cycle and antigen B was recently described as being able to play a role in the invasion process and in the pathogenesis of other Bartonella spp. infection.

Results

Four proteins were considered dominant antigens:

Two dominant antigens were detected by IgG (A and B) and other two by IgM (C and D).

<table>
<thead>
<tr>
<th>Antigen</th>
<th>Size* (kDa)</th>
<th>WB 2nd Ab</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>57.62</td>
<td>IgG</td>
</tr>
<tr>
<td>B</td>
<td>42.75</td>
<td>IgG</td>
</tr>
<tr>
<td>C</td>
<td>30.99</td>
<td>IgM</td>
</tr>
<tr>
<td>D</td>
<td>31.15</td>
<td>IgM</td>
</tr>
</tbody>
</table>

*According to NCBI published sequences.

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• The new antigens identified could be useful on the development of a rapid diagnostic tool to Carrion’s disease.
• Further studies focused on the antigenic peptide are to be developed in order to advance towards the development of a rapid diagnostic tool able to be implemented in isolated Andean rural areas.