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Tele-epidemiology in Chagas Disease Prevention

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Introduction

- Chagas is a parasitic disease
- About 18 million people are infected with Trypanosoma cruzi
- 100 million are in risk to get infected
- Transmission
  - Skin contact, mucus with feces of infected triatomines, transfusion, and congenital
- World Health Organization
Vector Distribution (Species of Triatimines in the New World)
## Epidemiology (International View)

<table>
<thead>
<tr>
<th>Epidemiological Parameters</th>
<th>1990</th>
<th>2000</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anual Deaths</td>
<td>&gt; 45,000</td>
<td>21,000</td>
<td>12,500</td>
</tr>
<tr>
<td>Human infection cases</td>
<td>30 million</td>
<td>18 million</td>
<td>15 million</td>
</tr>
<tr>
<td>New cases per year</td>
<td>700,000</td>
<td>200,000</td>
<td>41,200</td>
</tr>
<tr>
<td>Population in risk</td>
<td>100 million</td>
<td>40 million</td>
<td>28 million</td>
</tr>
<tr>
<td>Number of countries</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
</tbody>
</table>

Clinical Manifestation

Three Phases

- **Acute phase**
  - Asynthetic in approximately 70% of infected cases
  - Incubation in 14 days
  - In the first 15 days may present
    - “Inoculation chagoma” at the sting site
    - In case of ocular inoculation may present the “Romaña Sign”

- **Undetermined**
  - Asynthetic of variable duration
  - Anatomic and functional anomalies
  - Sudden death

- **Chronic**
  - 30% of patients in undetermined phase develop chronic way of disease
    - Chagas heart disease
    - Digestive tube
The Problem

- **Need for early detection**
  - So that treatment can be given
  - Prevent death
  - FACT: 18 million people are infected with Chagas in Mexico
The Project

- Requires a multi-disciplinary / trans-disciplinary workgroup
  - Epidemiology Physician
  - Tele-communications
  - Remote Sensing, GIS, Artificial Intelligence
The behavior of domiciliation of triatomines vectors of Chagas disease increases proportionally to the increase in temperature, seasonal variation and variation of the spot seeing population probably increased with the density and type of vegetation.
General Objective

- The use of tele-epidemiology in order to discover the environmental characteristics and the location of the chagas vectors so that we can predict which are the places where it may migrate and adapt. We will use this information to control and decrease the number of infected cases and deaths.
Early Ideas

Order blood test after 1st predictions

- ECG
- Blood Pressure

Remote Site

UDG

- Elisa Test
- Decide Treatment

CRECTEALC

Predict Chagas Disease from ECG & Blood Pressure
Ideas to Develop

- Remote Sensing and GIS to characterize and predict places where we can find each type of the Chagas vector
  - Characteristics: Temperature, altitude, vegetation type, etc.
- Training courses for physicians to accurately diagnose Chagas
- Medical support system to diagnose chagas
- Simulation system to study the behavior of the Chagas vector
**Conclusion**

- Chagas is becoming a public health problem
- People really wants to join this project
- I think the reason for this is:
  - This is not only a research project, it is also a “cause”