Cardiovascular disease in Latin America: What are the issues and opportunities?

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Disclosure

• Honoraria received for consult and/or speaker: Astra Zeneca, Amgen, Genzyme/ISIS, BMS, Pfizer, Eli Lilly, Biolab, Jansen, Boehringer-Ingelheim, Unilever, Sanofi/Regeneron, Novartis.
Burden of CVD & Public Health

• Epidemiology of CV disease
  – World
  – LATAM

• Risk factors
  – FH

• Unmet needs
Epidemiology
Global Ischemic Heart Disease Mortality

The rate of ischemic heart disease among men varies around the world, and similar variation exists for women.

Russia: In 60 percent of men, smoking contributes to high rates of heart disease.

China: Vegetable-intensive diet reduces cardiovascular disease.

Indonesia: Socioeconomic improvements led to increases in cardiovascular disease.

Age-standardized ischemic heart disease, per 100,000 men:
- 19-94
- 95-135
- 136-190
- 191-541*

*Ranges given here reflect those used in the original publication.

Symbol denotes higher prevalence for women.
Cardiovascular Disease Event Rates in High-, Middle-, and Low-Income Countries.

LATAM: Argentina, Chile, Colombia and Brazil

Epidemiological Transition: Latin America

Changing economy
Affluence
Mass media

Cigarette smoking
Reduced physical activity
Increased caloric intake
More meat consumption

Obesity
Diabetes
Hyperlipidemia
Ischemic Stroke
MI
Increase in excess body weight in Brazilian young low-income subjects an ominous future?

Estimated prevalence of diabetes in the Americas, 2000-2025*

2000: 35 million

2025: 64 Million

Risk-Factor Burden in High-, Middle-, and Low-Income Countries, as Measured by the INTERHEART Risk Score.

Score: sex; smoking, diabetes, high blood pressure, and family history of heart disease; waist-to-hip ratio; psychosocial factors; diet; and physical activity.

The Familial Hypercholesterolemia Problem
Threshold for CVD in Familial Hypercholesterolemia

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Eur Heart J. 2013;34:3478-90
FH is more frequent than we thought

Adapted from Benn et al. J Clin Endocrinol Metab. 2012;97:3956–3964.
Brazil

+ 200 million people
Sao Paulo

+ 10 million people
West Zone

+ 908,000 people
Active genetic cascade screening program

HipercolBrasil

Index Cases

- IC on Sequenc. N=200
- IC NL N=322
- IC Mutated N=233

Total: 755

192 Families under screening

Relatives

- F on sequenc. N=72
- F NL N=555
- F mutated N=512

Total: 1139

101 pathogenic mutations found
Heterozygous FH is Underdiagnosed and Undertreated

Nordestgaard et al. Eur Heart J. 2013;34:3478-90
FH: Current Situation in Iberoamérica (conservative)

- **Brazil 400 000** Sao Paulo. 20 000 cases
  - 223 IC /1139 studied relatives / molecular diagnosis in 745
- **Chile 33 000**
  - 65 families with clinical FH criteria / molecular diagnosis in 21 cases.
- **Mexico 240 000**
  - 108 index cases / 56 with molecular diagnosis
- **Uruguay 6000**
  - 115 index cases / 51 with mol. diag
- **Portugal 20 000**
  - 703 IC /586 Mol diag.
- **Spain 100 000**
  - 10 000 IC / 7000 mol diag

Adequate diag and treatment estimated in < 1%

Courtesy Dr. Mario Stoll
## Expected births of FH subjects in LATAM

<table>
<thead>
<tr>
<th>HF Natality</th>
<th>URUGUAY</th>
<th>ARGENTINA</th>
<th>BRASIL</th>
<th>LATAM and Caribbean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate 2012</td>
<td>15/1000</td>
<td>17</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Total birth</td>
<td>48,905</td>
<td>70,4481</td>
<td>3,064,763</td>
<td>10,528,000</td>
</tr>
<tr>
<td>Expected FH 1/500</td>
<td>97.8</td>
<td>1,409</td>
<td>6,129</td>
<td>21,056</td>
</tr>
<tr>
<td>Every 10 years</td>
<td>978</td>
<td>14,090</td>
<td>61,290</td>
<td>210,560</td>
</tr>
<tr>
<td>Every 30 years</td>
<td>2,934</td>
<td>42,270</td>
<td>183,870</td>
<td>631,680</td>
</tr>
</tbody>
</table>

Tasa y población según BM 2012

Courtesy Dr. Mario Stoll
Decline of CVD Deaths in Brazil?

Unmet needs
Dyslipidemia control in 7 Latin American Cities: CARMELA

| Table 3. Levels of assessment, awareness, treatment, and control of hypercholesterolemia. |
|---------------------------------|---|---|---|---|---|---|---|---|
|                                | Barquisimeto | Bogota | Buenos Aires | Lima | Mexico City | Quito | Santiago | Overall |
| Percentage of general population (Overall N = 11,550) |   |   |   |   |   |   |   |   |
| n   | 1,848 | 1,553 | 1,482 | 1,652 | 1,722 | 1,638 | 1,655 | 11,550 |
| Total cholesterol ever measured | 68.7 | 51.6 | 81.2 | 35.5 | 46.1 | 40.3 | 51.0 | 49.9 |
| Hypercholesterolemia prevalence* | 5.7  | 11.7 | 18.7 | 11.6 | 16.4 | 20.2 | 15.3 | 14.2 |
| Treated and controlled† | 9.5  | 7.1  | 10.4 | 3.8  | 5.9  | 2.1  | 6.4  | 6.3  |

Adapted from Silva H et al. Am J Ther 17, 159–166 (2010)
Association of LDL Cholesterol, Non–HDL Cholesterol, and Apolipoprotein B Levels With Risk of Cardiovascular Events Among Patients Treated With Statins
A Meta-analysis

N = 38,153

**Figure 3.** Risk of Major Cardiovascular Events by LDL and non-HDL Cholesterol Categories

<table>
<thead>
<tr>
<th>Target Level</th>
<th>LDL-C</th>
<th>Non–HDL-C</th>
<th>No. of Major Cardiovascular Events</th>
<th>Total No. of Participants</th>
<th>HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥100 mg/dL</td>
<td>≥130 mg/dL</td>
<td>1877</td>
<td>10,419</td>
<td>1.21 (1.13-1.29)</td>
<td></td>
</tr>
<tr>
<td>≥100 mg/dL</td>
<td>&lt;130 mg/dL</td>
<td>467</td>
<td>2,873</td>
<td>1.02 (0.92-1.12)</td>
<td></td>
</tr>
<tr>
<td>&lt;100 mg/dL</td>
<td>≥130 mg/dL</td>
<td>283</td>
<td>1,435</td>
<td>1.32 (1.17-1.50)</td>
<td></td>
</tr>
<tr>
<td>&lt;100 mg/dL</td>
<td>&lt;130 mg/dL</td>
<td>2,760</td>
<td>23,426</td>
<td>1.00 [Reference]</td>
<td></td>
</tr>
</tbody>
</table>

Boekholdt et al JAMA. 2012;307:1302-1309
A comparison of non-HDL and LDL cholesterol goal attainment in a large, multinational patient population: The Lipid Treatment Assessment Project 2

Raul D. Santos \textsuperscript{a.*,1}, David D. Waters \textsuperscript{b,1}, Lisa Tarasenko \textsuperscript{c,1}, Michael Messig \textsuperscript{c,1}, J. Wouter Jukema \textsuperscript{d,1}, Cheng-Wen Chiang \textsuperscript{e,1}, Jean Ferrieres \textsuperscript{f,1}, JoAnne M. Foody \textsuperscript{h,1}

\begin{table}
\centering
\caption{Table 2.}
\begin{tabular}{lcccccc}
\hline
Characteristics & All population & Asia & Europe & Latin America & North America & \textit{p}-value\textsuperscript{a} \\
\hline
N & 9926 & 1949 & 2920 & 988 & 4069 & -- \\
LDL-C success and non-HDL-C success & 81.8\% & 79.2\% & 86.6\% & 80.2\% & 80.2\% & <0.001 \\
LDL-C success and non-HDL-C failure & 18.1\% & 20.7\% & 13.3\% & 19.7\% & 19.7\% & <0.001 \\
LDL-C failure and non-HDL-C success & 11.1\% & 9.3\% & 13.7\% & 6.0\% & 11.0\% & 0.001 \\
LDL-C failure and non-HDL-C failure & 88.8\% & 90.6\% & 86.2\% & 93.9\% & 88.9\% & 0.001 \\
\hline
\end{tabular}
\end{table}

\textsuperscript{a} Comparison among world regions by \textsuperscript{chi^2} test.
Hypertension in seven Latin American cities: the Cardiovascular Risk Factor Multiple Evaluation in Latin America (CARMELA) study
Rafael Hernández-Hernández\textsuperscript{a}, Honorio Silva\textsuperscript{b}, Manuel Velasco\textsuperscript{c}, Fabio Pellegrini\textsuperscript{d}, Alejandro Macchia\textsuperscript{e}, Jorge Escobedo\textsuperscript{f}, Raul Vinueza\textsuperscript{b}, Herman Schargrodsky\textsuperscript{g}, Beatriz Champagne\textsuperscript{h}, Palmira Pramparo\textsuperscript{i} and Elinor Wilson\textsuperscript{j}, on behalf of the CARMELA Study Investigators

Table 7  Weighted prevalence of levels of assessment, awareness, treatment, and control of hypertension

<table>
<thead>
<tr>
<th>Percentage of overall population</th>
<th>Barquisimeto</th>
<th>Bogota</th>
<th>Buenos Aires</th>
<th>Lima</th>
<th>Mexico City</th>
<th>Quito</th>
<th>Santiago</th>
<th>All participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure ever measured</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>95.6 (94.4–96.8)</td>
<td>93.3 (91.2–95.4)</td>
<td>97.5 (96.5–98.4)</td>
<td>73.4 (70.3–76.6)</td>
<td>97.5 (96.3–98.6)</td>
<td>87.9 (85.5–90.4)</td>
<td>88.7 (86.7–90.7)</td>
<td>89.5 (88.3–90.8)</td>
<td></td>
</tr>
<tr>
<td>Percentage of population with hypertension\textsuperscript{b} (n = 2631)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prior diagnosis\textsuperscript{b}</td>
<td>72.0 (67.8–76.2)</td>
<td>68.8 (62.2–75.5)</td>
<td>64.1 (59.9–68.2)</td>
<td>53.1 (46.5–59.6)</td>
<td>75.7 (70.1–81.2)</td>
<td>67.6 (60.2–74.9)</td>
<td>60.1 (55.4–64.7)</td>
<td>64.4 (62.0–66.9)</td>
</tr>
<tr>
<td>Unknown hypertenion\textsuperscript{c}</td>
<td>28.0 (23.7–32.2)</td>
<td>31.2 (24.5–37.8)</td>
<td>35.9 (31.8–40.1)</td>
<td>46.9 (40.4–53.5)</td>
<td>24.3 (18.8–29.9)</td>
<td>32.4 (25.1–39.8)</td>
<td>39.9 (35.3–44.6)</td>
<td>34.3 (31.9–36.8)</td>
</tr>
<tr>
<td>Treated and controlled\textsuperscript{d}</td>
<td>20.7 (17.4–24.0)</td>
<td>30.6 (25.8–25.5)</td>
<td>18.0 (14.8–21.2)</td>
<td>12.0 (8.4–15.7)</td>
<td>41.0 (36.2–45.8)</td>
<td>28.0 (19.9–36.1)</td>
<td>20.3 (16.4–24.2)</td>
<td>24.0 (21.8–28.1)</td>
</tr>
</tbody>
</table>

All prevalence at issue showed a between-cities heterogeneity $P < 0.0001$. CARMELA, the Cardiovascular Risk Factor Multiple Evaluation in Latin America. \textsuperscript{a} Blood pressure $\geq 140/90$ mmHg or receiving pharmacologic treatment for hypertension. \textsuperscript{b} Individuals reporting they had been told they were hypertensive. \textsuperscript{c} Individuals first diagnosed with hypertension at the time of the CARMELA assessment. \textsuperscript{d} Treated and controlled defined as blood pressure $< 140/90$ mmHg.

Less 1 in 4 hypertensives in LATAM are treated and controlled
Annualized Case Fatality Rates after Specific Cardiovascular Events.

LATAM: Argentina, Chile, Colombia And Brazil

Event Rates and Case Fatality Rates for Major Cardiovascular Disease, According to Urban or Rural Area.

# Use of Antiplatelet drugs and Statins in CHD and CVD: Latin America vs. North America and Europe

<table>
<thead>
<tr>
<th></th>
<th>Antiplatelet %</th>
<th>Statins %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coronary Heart Disease</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latin America</td>
<td>32.8</td>
<td>19</td>
</tr>
<tr>
<td>North America + Europe</td>
<td>55.4</td>
<td>56.7</td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latin America</td>
<td>22</td>
<td>7.9</td>
</tr>
<tr>
<td>North America + Europe</td>
<td>43.3</td>
<td>38.7</td>
</tr>
</tbody>
</table>

LATAM=Argentina, Brazil, Chile & Colombia

Conclusions

• CVD is the leading cause of death worldwide
• CVD in Latin America
  – Epidemiological transition
  – Higher mortality but lower burden of risk factors than developed world
  – FH is underdiagnosed and undertreated
  – Patients are undertreated regarding their risk factors in LATAM