Current and future burden of HCV infection in Russia

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Disclosures

• Consultant: MSD, Gilead
• Sponsored Lectures (National or International): BMS, MSD, Janssen, AbbVie, Gilead
Current Disease Burden

Prevalence (Viremic)
- 0.0%-0.6%
- 0.6%-0.8%
- 0.8%-1.3%
- 1.3%-2.9%
- 2.9%-7.8%

Total Infected (Viremic)
- 0-200K
- 200K-650K
- 650K-1.9M
- 1.9M-3.5M
- 3.5M-9.2M

- Gower, E., et al., Global epidemiology and genotype distribution of the hepatitis C virus, J Hepatol (2014)
Current Disease Burden

- The number of chronic HCV cases per 100,000 increased from 12.9 in 1999 to a peak of 40.9 in 2009. In 2012 there were 39.1 cases per 100,000 individuals (1)

\[\text{per 100,000} \]

\[12.9 \quad 20.0 \quad 25.0 \quad 30.0 \quad 35.0 \quad 40.0 \quad 45.0\]

\[1999 \quad 2000 \quad 2001 \quad 2002 \quad 2003 \quad 2004 \quad 2005 \quad 2006 \quad 2007 \quad 2008 \quad 2009 \quad 2010 \quad 2011 \quad 2012 \quad 2013 \quad 2014\]
Current Disease Burden

- The estimate for anti-HCV prevalence in the general Russian population derives from a general consensus of 4.1% in 2010, reported in multiple sources (VHPB 2011, Lavanchy 2011, Pimenov 2012)

<table>
<thead>
<tr>
<th>2010</th>
<th>anti-HCV Prevalence</th>
<th>Total Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>4.10%</td>
<td>5,861,500</td>
</tr>
</tbody>
</table>

- Applying a viremic rate of 71% (Iashina 1993), the viremic prevalence in 2010 was estimated at 2.9%, corresponding to 4.2 million infections

<table>
<thead>
<tr>
<th>2010</th>
<th>Viremic Prevalence</th>
<th>Total Viremic Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>2.91%</td>
<td>4,161,700</td>
</tr>
</tbody>
</table>

Current Disease Burden

Prevalence Age and Gender Distribution

- The age and gender distribution was developed using the age distribution and gender ratio of infection as presented in Pimenov et al (2012)

-Pimenov N.N, Chulanov V.P., Komarova S.V. et al. [Hepatitis C in Russia: current epidemiology and approaches to improving diagnosis and surveillance]. Epidemiology and Infectious Diseases, 2012; (4):4-10.
Current Disease Burden

Genotype Distribution

- The genotype distribution was developed using data from regional registries of more than 40,000 patients with chronic viral hepatitis (Pimenov et al. 2012)

- G1: 54.9%
  - G1a: 2.1%
  - G1b: 52.8%
- G2: 8.1%
- G3: 36.3%
- Other: 0.7%

-Pimenov N.N, Chulanov V.P., Komarova S.V. et al. [Hepatitis C in Russia: current epidemiology and approaches to improving diagnosis and surveillance]. Epidemiology and Infectious Diseases, 2012; (4):4-10.
Current Disease Burden

Distribution of fibrosis

- F0: 39%
- F1: 25%
- F2: 16%
- F3: 9%
- F4: 11%

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>F0-F1</td>
<td>64%</td>
</tr>
<tr>
<td>F2-F4</td>
<td>36%</td>
</tr>
</tbody>
</table>

n=9851

Federal register of patients with viral hepatitis (2014)
Current Disease Burden

Diagnosed

- According to the National Reference Center for Viral Hepatitis, the number of previously diagnosed (viremic) in 2012 was 1,789,500 individuals.
- The number of newly diagnosed (viremic) in 2012 was 55,900 patients (National Reference Center for Viral Hepatitis).
- According to an analysis of regional registries conducted by the Russian National Reference Center for Viral Hepatitis, approximately 43% of the infected population in 2012 had received anti-HCV testing.
Current Disease Burden

Treated Patients

- 2011: 5,500 patients were on treatment (regional registries), corresponding to a 0.1% treatment rate

<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011-2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx Pts</td>
<td>666</td>
<td>1,662</td>
<td>2,254</td>
<td>3,010</td>
<td>2,735</td>
<td>3,807</td>
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[Graph showing treatment rates and countries]
Current Disease Burden

Incidence

- Using the known number of total HCV infections in 2010, a mathematical model was used to calculate the annual number of all-cause mortality, liver-related deaths and cured cases as described by Razavi et al. According to this calculation, there were an estimated 236,000 new cases of HCV in Russia in 2013.

Current Disease Burden

- A progression model constructed to quantify the size of the HCV infected population, by stages of liver disease until 2030

<table>
<thead>
<tr>
<th></th>
<th>Количество в 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>~ 4 500 000</td>
</tr>
<tr>
<td><strong>Treated</strong></td>
<td>5 500</td>
</tr>
<tr>
<td><strong>Compensated cirrhosis</strong></td>
<td>~ 145 500</td>
</tr>
<tr>
<td><strong>Decompensated cirrhosis</strong></td>
<td>~ 17 000</td>
</tr>
<tr>
<td><strong>HCC</strong></td>
<td>~ 5 000</td>
</tr>
<tr>
<td><strong>Total living with the diagnosis</strong></td>
<td>~ 1 800 000</td>
</tr>
<tr>
<td><strong>Annual newly diagnosed</strong></td>
<td>55 900</td>
</tr>
</tbody>
</table>

**Future Disease Burden**

**Continue Current Treatment Program**

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treated (annual)</strong></td>
<td>5,500</td>
<td></td>
</tr>
<tr>
<td><strong>SVR by Genotype (G)</strong></td>
<td>G1 50% and G4 and 75% G2 and 60% G3%</td>
<td></td>
</tr>
<tr>
<td><strong>Impact</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Total infected</td>
<td>4,525,000</td>
<td>6,164,000</td>
</tr>
<tr>
<td>% change</td>
<td></td>
<td>+36%</td>
</tr>
<tr>
<td># Liver-related deaths</td>
<td>5,110</td>
<td>16,100</td>
</tr>
<tr>
<td>% Change</td>
<td></td>
<td>+215%</td>
</tr>
<tr>
<td># Decompensated cirrhosis</td>
<td>17,140</td>
<td>52,000</td>
</tr>
<tr>
<td>% change</td>
<td></td>
<td>+203%</td>
</tr>
<tr>
<td># HCC</td>
<td>5,170</td>
<td>16,530</td>
</tr>
<tr>
<td>% change</td>
<td></td>
<td>+220%</td>
</tr>
</tbody>
</table>

- **Total Infected**
  - 2013: 4,525,000
  - 2030: 6,164,000
  - % change: +36%

- **Liver-related deaths**
  - 2013: 5,110
  - 2030: 16,100
  - % change: +215%

- ** Decompensated cirrhosis**
  - 2013: 17,140
  - 2030: 52,000
  - % change: +203%

- **HCC**
  - 2013: 5,170
  - 2030: 16,530
  - % change: +220%
Future Disease Burden
Can we control the disease? What needs be done?

• 40% reduction in viremic individuals by 2030
• 68% drop in HCV-related mortality by 2030
• We need to:
  – Increase annual number of treated patients to 123,800 with high SVR therapies
  – Increase diagnosed patients accordingly
  – Reduce new infections by 20% annually starting in 2017
Future Disease Burden
Impact of Disease Control Strategy

<table>
<thead>
<tr>
<th></th>
<th>Today</th>
<th>2030 Current Strategy</th>
<th>2030 Control Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treated (Annual)</td>
<td>5,500</td>
<td>5,500</td>
<td>123,800</td>
</tr>
<tr>
<td>Treatment rate</td>
<td>0.1%</td>
<td>0.1%</td>
<td>3%</td>
</tr>
<tr>
<td>SVR by genotype</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>G1 50% and G4 and 75% G2 and 60% G3%</td>
<td>G1 50% and G4 and 75% G2 and 60% G3%</td>
<td>90% for all genotypes</td>
</tr>
<tr>
<td>Total diagnosed</td>
<td>1,800,000</td>
<td>2,200,000</td>
<td>4,100,000</td>
</tr>
<tr>
<td>Common treatment age</td>
<td>15-64</td>
<td>15-64</td>
<td>15-69</td>
</tr>
<tr>
<td>Treated Stages</td>
<td>≥ F1</td>
<td>≥ F1</td>
<td>≥ F2</td>
</tr>
<tr>
<td>Impact</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Total infected</td>
<td>4,500,000</td>
<td>6,200,000</td>
<td>3,700,000</td>
</tr>
<tr>
<td>Change (%)</td>
<td>+27%</td>
<td></td>
<td>-40%</td>
</tr>
<tr>
<td># Compensated cirrhosis</td>
<td>150,000</td>
<td>400,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Change (%)</td>
<td>+63%</td>
<td></td>
<td>-75%</td>
</tr>
</tbody>
</table>

Total Infected

- Today: 4,500,000
- 2030 Current Strategy: 6,200,000
- 2030 Control Strategy: 3,700,000

Change: -40%

# Compensated Cirrhosis

- Today: 150,000
- 2030 Current Strategy: 400,000
- 2030 Control Strategy: 100,000

Change: -75%
Future Disease Burden
Impact of Disease Control Strategy

- Adopting this scenario will result in 2,490,000 fewer viremic individuals in 2030 vs the base case, a 40% reduction
- Between 2015 and 2030
  - 1,610,000 new infections avoided
  - 67,000 HCV-related mortalities prevented
  - 1,500,000 patients cured
  - 300,000 cirrhotic cases averted
Future Disease Burden
Impact of Disease Control Strategy
Importance of Preventing Transmission

- If effective measures are not adopted to reduce incidence and the number of new cases only decreases as an effect of increased cure
- There will be >1.2 million more cases by 2030
- Disease elimination will not be reached

<table>
<thead>
<tr>
<th></th>
<th>Prevalence in 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased treatment, SVR, without incidence reduction</td>
<td>4,930,000 -20%</td>
</tr>
<tr>
<td>Increased treatment, SVR, reduce incidence</td>
<td>3,680,000 -40%</td>
</tr>
</tbody>
</table>
Conclusions

• Without significantly changing treatment strategies, HCV infection will remain a highly prevalent problem for the next 20–30 years
• With treatment rates of 3% and SVR 90% along with treatment initiated at ≥F2, it will be possible to control HCV disease burden in Russia
• The availability of highly effective therapy, coupled with increased diagnosis and treatment, and marked reduction in new cases, has the potential to significantly reduce hepatitis C morbidity and mortality in Russia within the next 15 years
Спасибо
Thank you
References

- Pimenov N.N, Chulanov V.P., Komarova S.V. et al. [Hepatitis C in Russia: current epidemiology and approaches to improving diagnosis and surveillance]. Epidemiology and Infectious Diseases, 2012; (4):4-10.
- UC Berkeley, Max Planck Institute for Demographic Research, The Human Mortality Database (http://www.mortality.org). 2008-2031 mortality rate was calculated from historical trends and allocated to five year age cohorts.
Current Disease Burden

Other Assumptions

- Mortality – 1950-2007 (University of California Berkeley)
- Risk Factors
  - Percent of the population infected through IDU - 16% in 1995 (Abdourakhmanov 1998)
  - Percent of the population infected through Transfusion - 26% in 1995 (Abdourakhmanov 1998)

UC Berkeley, Max Planck Institute for Demographic Research, The Human Mortality Database (http://www.mortality.org). 2008-2031 mortality rate was calculated from historical trends and allocated to five year age cohorts.


Current Disease Burden

Liver Transplants

• Liver transplant data for 2006-2011 was available through Gautier 2011 and Gautier 2012. Estimates for 2004 and 2005 were trended from the available data. The calculated weights were applied to generate the number of HCV-Related Transplants by year

• **Assumed 32% of all transplants were due to HCV** (Granov 2012 and Andreytseva 2009)


