HIV and HCV coinfections in Women: All the same or something different?

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All the same or something different?
Transmission of HCV in Women

- Injection drug use (IDU) is an important route of HIV transmission in women\(^1\).
- According to a study published nearly ten years ago in the journal Emerging Infectious Diseases, researchers found that women are more likely to share needles or start using intravenous drugs with a sexual partner than men are.
- Only few people acquire HCV through unprotected heterosexual intercourse.
- The maximum incidence rate of HCV transmission by sex was 0.07% per y (95% CI, 0.01-0.13) or approximately 1 per 190,000 sexual contacts.\(^2\)
- Some studies indicate that sexual transmission from men to women is more efficient than transmission from women to men, as is also the case with HIV.\(^3\)
  - HCV is more likely to be sexually transmitted when a woman is having her menstrual period.
- More recently, high rates of acute HCV in HIV-positive men have been discussed in the context of sexual transmission with traumatic sex practices and high risk of blood-blood contact; rectal shedding of HCV also has been discussed.\(^4\)

All the same or something different?

- Natural course of HIV/HCV coinfection in women
- Treatment of HCV same for all?
- Drug interactions
- Management of HCV during pregnancy
- Perinatal transmission of HCV
Spontaneous clearance

• High rates of spontaneous clearance have been described in two cohorts of women infected in 1977 with HCV genotype 1b contaminated anti-D immunoglobulin peripartum, one in Ireland\(^1\) (46%) and the other in Germany\(^2\) (44%).

• Based on NHANES data from 1999-2002 in the United States, about 89% of men and 63.4% of women will develop chronic infection.

• In an Egyptian cohort\(^3\) of over 4000 adults with predominantly Genotype 4 HCV infection the overall clearance was 38.5%. Independent of age and modes of acquisition, more women than men in this analysis cleared their infection spontaneously. (44.6 % versus 33.7 %, p=0.001)

The effects of female sex, viral genotype, and IL28B genotype on spontaneous clearance of acute hepatitis C virus infection

- Female gender has been reported as an independent predictor of clearance in a cohort of individuals with acute HCV with various modes of transmission.
Natural history of liver fibrosis progression in patients with chronic HCV

- Poynard et al. analyzed three large cohorts in France and identified an overall 39% increase in rate of fibrosis progression per year in men compared to women (0.154 in men vs. 0.111 in women, p<0.001). These rates correlate with a median duration for progression to cirrhosis of 36 years for women and 26 years for men.
Evaluation of Liver Disease Progression in the German Hepatitis C Virus (1b)-Contaminated Anti-D Cohort at 35 Years After Infection

- In the overall cohort, 9.3% of patients showed clinical signs of liver cirrhosis at 35 years after infection.

Wiese M et al., Hepatology 2014;59:49-57
Disease burden

Stacked prevalence curves showing number of cases by year with cirrhosis according to gender and age at time of initial HCV infection.

Davis GL, Alter MJ, El-Serag H, Poynard T, Jennings LW. Gastroenterology 2010; 138:513-21
Effects of Estrogen

- Estradiol and estrogen receptors in the liver protect hepatocytes from oxidative stress, inflammatory injury and cell death, which can all contribute to fibrosis.
- Estrogen also likely plays a suppressive role in hepatocarcinogenesis. While the exact mechanism is not fully understood, in vivo and in vitro data also suggest that estradiol inhibits activation of hepatic stellate cells which play a central role in hepatic fibrosis.
- Data from animal models show that when both female and male rats are treated with dimethylnitrosamine (DMN) to induce fibrosis the female rat has less evidence of fibrotic change. Moreover, when the ovaries of the female rats are removed or the male rats are pre-treated with anti-estradiol antibody, the level of fibrosis increases with DMN treatment. In both male rats and female rats with ovariectomy, estradiol replacement then decreases the amount of fibrosis induced by DMN.
HCV Disease Progression Remains Faster in Coinfected Patients, Despite Effective ART

Cumulative incidence over time to hepatic decompensation (years)

- HCV-monoinfected patients (n=6079)
- Antiretroviral-treated patients coinfected with HIV/HCV (n=4208)

The Hepatitis C Cascade of Care in a Women-Centred HIV Clinic in Canada

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1Oak Tree Clinic, BC Women’s Hospital & Health Centre, Vancouver; 2University of British Columbia, Division of Infectious Diseases; 3British Columbia Centre for Disease Control, Vancouver

Background
- 220,697 – 245,987 (0.6-0.7%) of Canadians have chronic HCV infection1
- Incidence: 59.6 cases / 100,000 in Canada
- Incidence: 42.9 cases / 100,000 in British Columbia2
- 15-30% of HIV-positive individuals are co-infected with HCV
- HCV treatment in Canada is provided via the provinces and is progressing quickly
- BC Pharmacare currently covers treatment in individuals with ≥F2 fibrosis
- HIV/HCV co-infected women have a greater risk of progression to liver fibrosis and death compared to men3
- The Oak Tree Clinic (Vancouver, BC) uses a multi-disciplinary care model to provide specialized HIV care to HIV+ women, children and families in BC

Objective: With the high pan-genotypic treatment success rates and tolerability of the new HCV direct acting antivirals, we undertook a descriptive analysis of the patient population at the Oak Tree Clinic to assess current state, in order to plan and support our patients through all steps of the HCV treatment cascade of care

Methods
- Cross-sectional analysis of clinic population as part of QI assessment (June 2015)
- Chart review of 694 active HIV+ patients ≥18 y/o, seen in last 3 years (2012-2015)
- Demographic variables: age, sex, ethnicity, drug and alcohol use
- HIV-related data: CD4 counts, HIV viral loads, ART regimen
- HCV-related data: HCV antibody and RNA status, HCV genotype, liver fibrosis stage, liver function tests, APRI and FIB-4 scores, and HCV treatment history

Results

Oak Tree Clinic Population Demographics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Value</th>
</tr>
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<tr>
<td>Age (Mean ± SD, n=694)</td>
<td>42.7 ± 10.9 years</td>
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<tr>
<td>Female Sex (n=694)</td>
<td>565 (81%)</td>
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<tr>
<td>Median CD4 count (n=694)</td>
<td>557 cells/µl (IQR 330-720)</td>
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<tr>
<td>Indetectable HIV viral load (n=694)</td>
<td>526 (76%)</td>
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<tr>
<td>Ethnicity (n=298)</td>
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<tr>
<td>Aboriginal</td>
<td>64 (21%)</td>
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<tr>
<td>Caucasian</td>
<td>93 (41%)</td>
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<tr>
<td>African/Caribbean/Black</td>
<td>38 (13%)</td>
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<tr>
<td>Asian</td>
<td>17 (7%)</td>
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<tr>
<td>Other/missing</td>
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<tr>
<td>Active IDU (n=229)</td>
<td>95 (42%)</td>
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<tr>
<td>Lifetime IDU (n=229)</td>
<td>129 (56%)</td>
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<tr>
<td>Current Alcohol Use (n=229)</td>
<td>117 (51%)</td>
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</table>

HCV RNA Status (n=261)

- Of currently HCV RNA+ patients, 52% (77/149) had APRI or FIB-4 scores corresponding to ≥F2 fibrosis and 17% (26/149) had evidence of F4 fibrosis / cirrhosis

HCV Genotypes (n=132)

- 8% (11/132) had GT 1a
- 48% (64/132) had GT 1b
- 35% (46/132) had GT 4

Conclusions
- Our clinic population is predominantly female (81%) and relatively young (mean 43 yrs)
- Despite cohort’s young age, 52% of co-infected patients had significant fibrosis (≥F2)
- Assessment of all co-infected patients for fibrosis is warranted regardless of age and clinical state, APRI and FIB-4 are non-expensive, suitable indices for this purpose.
- Gender-specific approach to HCV treatment needs to be considered. Given high co-infection rates, HIV clinics are important venues for patients to access HCV care.

References
Hepatic Fibrosis Progression in HIV-Hepatitis C Virus Co-Infection – The Effect of Sex on Risk of Significant Fibrosis Measured by Aspartate-to-Platelet Ratio Index

Kaplan Meier time to significant fibrosis stratified by sex

Rollet-Kurhajec et al. Plos one 2015
Influence of female sex on hepatitis C virus infection progression and treatment outcomes

» Of 1978 chronic HCV-infected patients, 630 (32%) were women.

» Women had lower liver enzyme levels, HCV RNA levels, and weight compared with men.

» Women were more likely to be non-GT-1 infected, Black or Asian, and immigrants from Africa and Asia (all P<0.01).

» Under 50 years of age, women on average had lower fibrosis scores than men. Beyond 50 years, the mean fibrosis scores were similar, suggesting a 'catch-up' phase.

» Women were less likely to have initiated interferon-based HCV antiviral therapy (35.3 vs. 43.3%, P=0.01).

» Women of low socioeconomic status were more likely to be HIV coinfected and had higher rates of fibrosis progression.
HCV screening in a cohort of HIV infected and uninfected homeless and marginally housed women in San Francisco, California.

Among 246 women 45.9% were anti-HCV positive, of whom 61.1% were HIV coinfected; 27.4% of positives reported no prior screening.

Most (72%) women were in the 'baby-boomer' birth cohort; 19% reported recent injection drug use (IDU).

Factors independently associated with anti-HCV positivity were:
- being born in 1965 or earlier (AOR 3.94; 95%CI: 1.88, 8.26)
- IDU history (AOR 4.0; 95%CI: 1.68, 9.55)
- number of psychiatric diagnoses (AOR 1.16; 95%CI: 1.08, 1.25).
All the same or something different?

» Natural course of HIV/HCV coinfection in women
» Treatment of HCV same for all?
» Drug interactions
» Management of HCV during pregnancy
» Perinatal transmission of HCV
EASL recommendations

- All treatment-naïve and treatment-experienced patients with compensated or decompensated chronic liver disease due to HCV must be considered for therapy (A1).

- Treatment should be considered without delay in patients with significant fibrosis or cirrhosis (METAVIR score F2, F3 or F4), including decompensated (Child-Pugh B or C) cirrhosis, in patients with clinically significant extra-hepatic manifestations (e.g. symptomatic vasculitis associated with HCV-related mixed cryoglobulinaemia, HCV immune complex-related nephropathy and non-Hodgkin B cell lymphoma), in patients with HCV recurrence after liver transplantation, and in individuals at risk of transmitting HCV (active injection drug users, men who have sex with men with high-risk sexual practices, women of child-bearing age who wish to get pregnant, haemodialysis patients, incarcerated individuals) (A1).

- Patients with decompensated cirrhosis and an indication for liver transplantation with a MELD score ≥18-20 should be transplanted first and treated after transplantation. If the waiting time is more than 6 months, these patients can be treated before transplantation (B1).

- Treatment is not recommended in patients with limited life expectancy due to non-liver-related comorbidities (B2).
Treatment of chronic hepatitis C, including patients without cirrhosis and patients with compensated (Child-Pugh A) cirrhosis

- Indications for HCV treatment in HCV/HIV coinfected persons are identical to those in patients with HCV monoinfection (A1).
- IFN-free regimens are the best options in HCV-monoinfected and in HIV-coinfected patients without cirrhosis or with compensated (Child-Pugh A) cirrhosis, because of their virological efficacy, ease of use and tolerability (A1).
- The same IFN-free treatment regimens can be used in HIV-co-infected patients as in patients without HIV infection, as the virological results of therapy are identical. Treatment alterations or dose adjustments may be needed in case of interactions with antiretroviral drugs (A1).
### EASL HCV Guidelines 2016

<table>
<thead>
<tr>
<th>Combination regimen</th>
<th>Genotype 1</th>
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<th>Genotype 3</th>
<th>Genotype 4</th>
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</tr>
</tbody>
</table>

EASL guidelines. J Hepatol 2016
ION-3 (GT 1, Treatment-Naive, Non-Cirrhotic, LDV/SOF±RBV x 8 or 12 weeks)

SVR12 by Prespecified Subgroups

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<tr>
<th></th>
<th>LDV/SOF 8 Weeks</th>
<th>LDV/SOF + RBV 8 Weeks</th>
<th>LDV/SOF 12 Weeks</th>
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<td>1a</td>
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<td>1b</td>
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<td>Baseline HCV RNA (IU/mL)</td>
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<td>&lt;800,000</td>
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<td>≥800,000</td>
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<td>Baseline BMI (kg/m²)</td>
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<td>&lt;30</td>
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<tr>
<td>Non-CC</td>
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</tbody>
</table>

- There were no significant differences between subgroup response rates and overall response rates

Kowdley K, EASL, 2014, O56
The Efficacy and Safety of Sofosbuvir/Velpatasvir in Women

**Phase 3 ASTRAL-1, -2, -3 and -5 Study Design**

- **ASTRAL-1**: GT 1, 2, 4–6
  - Women: 250
  - Men: 374
- **ASTRAL-2**: GT 2
  - Women: 48
  - Men: 86
- **ASTRAL-3**: GT 3
  - Women: 107
  - Men: 170
- **ASTRAL-5**: GT 1–4
  - HIV/HCV Coinfection
    - Women: 15
    - Men: 81

**SVR12 by Genotype**

- **GT1a**: Women 96%, Men 98%
- **GT1b**: Women 100%, Men 97%
- **GT2**: Women 100%, Men 99%
- **GT3**: Women 98%, Men 93%
- **GT4**: Women 100%, Men 99%
- **GT5**: Women 100%, Men 93%
- **GT6**: Women 100%, Men 100%

**SVR12 by HIV Status**

- **HIV/HCV Coinfected ASTRAL 5**
  - Women: 87%
  - Men: 96%
- **HCV Monoinfected ASTRAL 1, 2, 3**
  - Women: 99%
  - Men: 97%
Methods:
- To examine a cohort of HCV patients who received care at the Veterans Administration facilities nationwide.
- To evaluate the effect of race and gender on DAA receipt after adjusting for socioeconomic status, liver disease severity, comorbidity, and propensity for healthcare use.
- To determine if disparities had changed over time.

Results:
- Of the 145,596 patients seen in the current DAA era, 17,791 (10.2%) received treatment during the first 16 months of DAA approval.
- Black patients had 21% lower odds of receiving DAA than whites (odds ratio [OR] = 0.79; 95% CI, .75, .84).
- Overall, women were as likely to receive treatment as men (OR = 0.99; 95% CI, 0.90–1.09). However, the odds of receiving DAAs were 29% lower for younger women compared with younger men (OR = 0.71, 95% CI, .54–.93).
Differences in the effects of patient factors on antiviral treatment receipt between the previous standard of care and current treatments. We compared coefficient estimates from the analysis that included patients seen in the current treatment era (primary analysis) with those from the model including patients in the previous (1st generation) direct acting antiviral agent era (secondary analysis). We used a Z test that compared the magnitude of the log-odds difference (d) in the effects of each model covariates. We also calculated 95% confidence intervals (CIs) of the difference. Positive difference indicates higher odds of treatment for a given comparison in the new era compared to previous treatment era. Abbreviations: HCC, hepatocellular cancer; HCV, hepatitis C virus; HIV, human immunodeficiency virus.
Time trends in the effect of gender on receipt of 2nd generation DAA. Time trends in the proportion (along with 95% CI of eligible patients in different gender subgroups who initiated DAA treatment each month from January 2014 to March 2015.

Kanwal F et al. CID 2016
All the same or something different?

» Natural course of HIV/HCV coinfection in women

» Treatment of HCV same for all?

» Drug interactions

» Management of HCV during pregnancy

» Perinatal transmission of HCV
# Drug-drug Interactions between DAAs and ARVs

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<th>HCV Drugs</th>
<th>ATV/r</th>
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<th>DRV/r</th>
<th>LPV/r</th>
<th>EFV</th>
<th>ETV</th>
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<th>RPV</th>
<th>MVC</th>
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<th>ABC</th>
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<td>E32%</td>
<td>D44%</td>
<td>E45%</td>
<td>I19%</td>
<td>E20%</td>
<td>I42%</td>
<td>E22%</td>
<td>E20%</td>
<td>E6%</td>
<td>E39%</td>
<td>E</td>
<td>D</td>
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<td>daclatasvir</td>
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<tr>
<td>obinutuzumab</td>
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<td>↓</td>
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<td>I33%</td>
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**Legend**

- Potential elevated exposure of DAA
- Potential decreased exposure of DAA
- No significant effect
- Potential elevated exposure of ARV drug
- Potential decreased exposure of ARV drug
- Decrease in AUC of DAA and ARV as observed in drug interaction studies. Sofosbuvir/ledipasvir: first/second numbers refer to changes AUC sofosbuvir/ledipasvir.

**Numbers**

- Potential hemolytic toxicity
- Daclatasvir should be reduced to 30 mg qd with ATV/r or EVG/c.
- No dose reduction with unboosted ATV
- Daclatasvir should be increased to 90 mg qd
- Use only with unboosted ATV and in persons without significant HIV PI mutations (ATV increased paritaprevir exposure due to CYP3A4 and OATP1B1/3 inhibition, not recommended without daclabuvir)
- Co-administration decreased DRV trough concentration by approximately 50%. Although co-administration of DRV with omibatavir/paritaprevir + daclabuvir is not recommended in the US prescribing information, the European SPC advises that DRV (dosed at 800 mg qd and administered at the same time as omibatavir/paritaprevir + daclabuvir) can be used in the absence of extensive HIV PI resistance and should be taken without additional RTV.
- Not recommended due to increase in paritaprevir exposure when co-administered with DRV 800 mg given with omibatavir, paritaprevir, ritonavir (Viekira). Of note: exposures of paritaprevir greater than this have been evaluated in phase 2 studies and were not expected to have a clinically meaningful impact on safety
- Severe tolerability issues
- Not recommended unless benefit outweighs the risk due to potential for QT interval prolongation with higher concentrations of ritonavir, co-administration should only be considered in persons without known QT prolongation and without other QT prolongation co-medications
- Frequent monitoring of kidney function due to increase of TDF if contained in the regimen
- The DAA can affect the intracellular activation of TAF

**Colour legend**

- No clinically significant interaction expected.
- These drugs should not be co-administered.
- Potential interaction which may require a dosage adjustment or close monitoring.

Note: the symbol (green, amber, red) used to rank the clinical significance of the drug interaction is based on [http://www.hep-druginteractions.org](http://www.hep-druginteractions.org).
Table: Drug Interactions with Direct-Acting Antivirals and Selected Concomitant Medications (x = assess potential drug interaction)

<table>
<thead>
<tr>
<th>Concomitant Medications</th>
<th>Daclatasvir</th>
<th>Ledipasvir</th>
<th>ParITaprevir / Ritonavir / Omkinavir + Dasabuvir</th>
<th>Simeprevir</th>
<th>Sofosbuvir</th>
<th>Elbasvir / Grazoprevir</th>
<th>Velpatasvir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid-reducing agents*</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Alfuzosin/tamsulosin</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
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<td></td>
<td>X</td>
</tr>
<tr>
<td>Amiodarone</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Anticonvulsants*</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Antiretrovirals*</td>
<td>See HIV section</td>
<td>See HIV section</td>
<td>See HIV section</td>
<td>See HIV section</td>
<td>See HIV section</td>
<td>See HIV section</td>
<td>See HIV section</td>
</tr>
<tr>
<td>Azole antifungals*</td>
<td>X**</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
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<td></td>
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<tr>
<td>Buprenorphine/naloxone</td>
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<td></td>
<td>X</td>
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<tr>
<td>Calcineurin inhibitors*</td>
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<td></td>
<td>X</td>
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<tr>
<td>Calcium channel blockers*</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Cisapride</td>
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<td></td>
<td>X</td>
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<td>Digoxin</td>
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<td>X</td>
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<tr>
<td>Ergot derivatives</td>
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<tr>
<td>Ethinyl estradiol-containing products</td>
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</tbody>
</table>
HEP Drug Interaction Checker
Access our comprehensive, user-friendly, free drug interaction charts. Providing clinically useful, reliable, up-to-date, evidence-based information

Start Now →

<table>
<thead>
<tr>
<th>Drug</th>
<th>Daclatasvir</th>
<th>Elbasvir/Grazoprevir</th>
<th>Ledipasvir/Sofosbuvir</th>
<th>OBV/PTV/r + DSV</th>
<th>Simeprevir</th>
<th>Sofosbuvir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amiodarone</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Antacids</td>
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<td>●</td>
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</tr>
<tr>
<td>Aspirin</td>
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<td>●</td>
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<td>●</td>
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</tr>
<tr>
<td>Cannabis</td>
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<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Carbamazepine</td>
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<td>●</td>
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<td>●</td>
<td>●</td>
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<tr>
<td>Ciclosporin</td>
<td>●</td>
<td>●</td>
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</tr>
</tbody>
</table>
All the same or something different?

» Natural course of HIV/HCV coinfection in women
» Treatment of HCV same for all?
» Drug interactions
» Management of HCV during pregnancy
» Perinatal transmission of HCV
Pregnancy

• Pregnancy does not adversely affect the progression of hepatitis C, and women with HCV do not have a higher rate of pregnancy or birth complications compared to uninfected women.
However, the safety and efficacy of treating women who are already pregnant to prevent transmission to the fetus have not yet been established, and thus treatment is not recommended for pregnant women.
Recommended Monitoring for Pregnancy-related Issues Prior to and During Antiviral Therapy that Includes Ribavirin

- Women of childbearing age should be counseled not to become pregnant while receiving ribavirin-containing antiviral regimens, and for up to 6 months after stopping.

- Male partners of women of childbearing age should be cautioned to prevent pregnancy while they are receiving ribavirin-containing antiviral regimens, and for up to 6 months after stopping.
  
  Rating: Class I, Level C

- Serum pregnancy testing is recommended for women of childbearing age prior to beginning treatment with a regimen that includes ribavirin.

  Rating: Class I, Level C

- Since the safety of DAA regimens that do not include ribavirin has not been established during pregnancy, counseling and serum pregnancy testing should be offered to women of childbearing age before beginning HCV treatment.
  
  Rating: Class I, Level C

- Assessment of contraceptive use and of possible pregnancy is recommended at appropriate intervals during (and for 6 months after) ribavirin treatment for women of childbearing potential, and for female partners of men who receive ribavirin treatment.
  
  Rating: Class I, Level C
Ribavirin
Mild anaemia can occur in IFN-free regimens containing ribavirin; indeed, haemoglobin decreases have been greater and more common when DAAs were combined with ribavirin than in regimens without ribavirin.

**Significant teratogenic and/or embryocidal effects** have been demonstrated in all animal species exposed to ribavirin. Women of childbearing potential and/or their male partners must use an effective form of contraception during treatment and for a period of 6 months after the treatment has concluded.
Special considerations

• Ribavirin is a known teratogen with major implications for fetal abnormalities if administered during pregnancy.
• Boosted HCV protease inhibitors given as part of HCV combination therapy, pose significant drug-drug interactions with oral contraceptives as well as HRT postmenopausal.
• Alternative methods of contraception (e.g., progestin only contraception or non-hormonal methods) are recommended. Ethinylestradiol-containing medications can be restarted approximately 2 weeks following completion of HCV treatment.
All the same or something different?

» Natural course of HIV/HCV coinfection in women

» Treatment of HCV same for all?

» Drug interactions

» Management of HCV during pregnancy

» Perinatal transmission of HCV
MTCT

- Vertical transmission is the most common cause of HCV infection in children.
- The reported rate of transmission is approx. 5%.
- The reported HCV transmission rate in coinfection rate has been as high as 10-30%.
- The risk of transmission is directly related to the level of HCV RNA in the mother.
- No clear evidence that caesarian delivery provides benefit over vaginal delivery.
- Breast feeding poses no significant risk of transmission to the infants.
A significant sex--but not elective cesarean section--effect on mother-to-child transmission of hepatitis C virus infection.

» Overall HCV vertical transmission rate was 6.2% (95% CI, 5.0%-7.5%; 91/1479). Girls were twice as likely to be infected as boys (adjusted OR, 2.07 [95% CI, 1.23-3.48]; P=.006).

» There was no protective effect of elective cesarean section (CS) delivery on HCV vertical transmission (adjusted OR, 1.46 [95% CI, 0.86-2.48]; P=.16).

» HCV/HIV-coinfected women more frequently transmitted HCV than did women with HCV infection only, although the difference was not statistically significant (adjusted OR, 1.82 [95% CI, 0.94-3.52]; P=.08).

» Maternal history of injection drug use, prematurity, and breast-feeding were not significantly associated with transmission. Transmission occurred more frequently from viremic women, but it also occurred from a few nonviremic women.
Summary

- In HCV monoinfection women are characterized by higher spontaneous HCV seroconversion rates and slower fibrosis progression.
- In HIV/HCV coinfection fibrosis progression in females may be more unfavorable.
- Treatment indication and DAA drug selection are independent of gender as SVR rates are similar; female patients may be most likely to respond to shorter treatment durations with SOF/LED.
- No DAA therapy in pregnancy yet recommended.
- Vertical HCV transmission rate is between 5-10%.
- No clear evidence that caesarian delivery provides benefit over vaginal delivery.
- Breast feeding poses no significant risk of transmission to the infants.