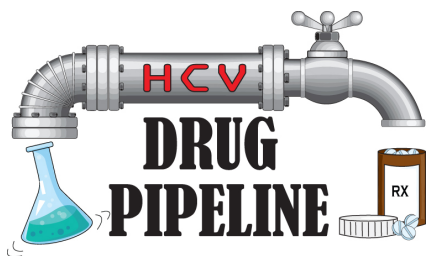


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HCV Advocate

Monthly Pipeline Update

A brief overview of how this pipeline is laid out:

Date: The Pipeline will be updated on a monthly basis and will be included with the HCV Advocate Newsletter.

Genotype (s): This lists the drugs or combination of drugs and the particular genotype or genotypes that the drug is active against.

Comments: This section will list the study results. Within this section, I will list the genotype(s) being studied and the phase of the study with a brief recap of the study.

You will note that many of the drugs or combinations of drugs are pan-genotypic—that is they work on many or most of the HCV genotypes. **Note:** There is more detailed information about the drugs in development in our newsletter (<http://hcvadvocate.org/publications/newsletter/2016-2/>) and our blog (<http://hepatitisc.hcvadvocate.org/>) and in the HCV Advocate Hepatitis C Drug Pipeline & Conference Coverage Site hcvdrugs.com

If you are interested in finding out about clinical trials visit HCV Advocate Clinical Trial Reference Guide (<http://hcvclinical.hcvadvocate.org/>) for a list of trials that are currently recruiting patients.

AbbVie	Genotype(s): 1, 2, 3, 4, 5, 6 (Pan-genotypic)
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COMMENTS:

The combination of glecaprevir (ABT-493) plus pibrentasvir (ABT-530) to treat genotype 1, 3, 4, 5, 6 for a treatment duration of 8 weeks. The sustained virological results (SVR12/cure) released on 11/12/2016 are listed below:

Study Name	Patient Population	Treatment Duration	Treatment Regimen	SVR ₁₂ Rates
ENDURANCE-1	GT1 without cirrhosis, new to treatment or not cured with previous IFN-based treatments (pegIFN +/- RBV or SOF/RBV +/- pegIFN), and patients co-infected with HIV-1	8 week	G/P	99% (348 of 351 pts)
ENDURANCE-3	GT3 without cirrhosis, new to treatment	8 week	G/P	95% (149 of 157 pts)
SURVEYOR-2 (Part 4)	GT2, 4, 5, or 6 without cirrhosis, new to treatment or not cured with previous IFN-based treatments (pegIFN, SOF/RBV or pegIFN/SOF)	8 week	G/P	97% (196 of 203 pts)

*pegIFN = pegylated interferon; RBV= ribavirin; SOF=sofosbuvir;

This combination was granted Breakthrough Therapy designation by the Food and Drug Administration (FDA) for those with HCV genotype 1 who had failed a previous course of therapy that contained a NS5A inhibitor.

In December 2016 AbbVie applied to the FDA to market and treat all HCV genotypes with the combination listed above. On February 02, 2017 the FDA granted AbbVie Priority review for this combination.



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Gilead – Sofosbuvir, Velpatasvir & Voxilaprevir (GS-9857) Genotype(s) 1,2,3,4,6, (Pan-genotypic)

COMMENTS:

Gilead released the results of four phase 3 studies (POLARIS) of the triple combination of sofosbuvir (polymerase inhibitor), velpatasvir (NS5A inhibitor), and voxilaprevir (protease inhibitor). The study included 1,056 patients who received the triple combination (sofosbuvir (SOF), velpatasvir(VEL), plus voxilaprevir (VOX)—611 were treatment naïve and 455 were treatment experienced.

Note: I am only listing the results from the triple therapy below – you will note that the percentage and numbers include all the patients treated. For a complete breakdown of all treatment regimens see November 2016 newsletter: http://hcvadvocate.org/news/NewsUpdates_pdf/Advocate_2016/advocate1116.pdf

Study	Population	Genotype	Treatment	Duration	SVR12 Rates
POLARIS-1	NS5A inhibitor-experienced 41 percent (172/415) had cirrhosis	1, 2, 3, 4, 5, 6	SOF/VEL/VOX	12 Weeks	96% (253/263)
			Placebo	12 Weeks	0% (0/152)
POLARIS-4	DAA-experienced (No NS5A inhibitor) 46 percent (153/333) had cirrhosis	1, 2, 3, 4	SOF/VEL/VOX	12 Weeks	97% (177/182)
			SOF/VEL	12 Weeks	90% (136/151)
POLARIS-2	DAA-naïve 18 percent (174/941) had cirrhosis	1, 2, 3, 4, 5, 6	SOF/VEL/VOX	8 Weeks	95% (476/501)
			SOF/VEL	12 Weeks	98% (432/440)
POLARIS-3	DAA-naïve All had cirrhosis	3	SOF/VEL/VOX	8 Weeks	96% (106/110)
			SOF/VEL	12 Weeks	96% (105/109)

The side effects were similar between the placebo (sugar pills) group, sofosbuvir plus velpatasvir, and the sofosbuvir, velpatasvir plus voxilaprevir groups. The most common side effects were headache, fatigue, diarrhea and nausea. Only one patient in the entire study discontinued therapy due to side effects.

This combination was granted Breakthrough Therapy designation by the Food and Drug Administration (FDA) for those with HCV genotype 1 who had failed a previous course of therapy that contained a NS5A inhibitor.

In December 2016 Gilead applied to the FDA to market and treat all HCV genotypes with the combination listed above--combined into one pill taken once-a-day.



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Janssen (Achillion/Alios)	Genotype(s) 1,2,3,4,5,6 (Pan-genotypic)
<p>COMMENTS:</p> <ul style="list-style-type: none"> • Genotype 1 – Phase 1: In a small study of samatasvir, it was found to be safe and have antiviral properties against genotype 1, 2, 3 and 4. There is now a phase 2 study of samatasvir plus Olysio (simeprevir) in treatment-naïve patients with genotype 1b or 4. • Genotype 1 – Phase 2a Study Janssen (Alios Pharma) has initiated a of AL-335, odalasvir, and simeprevir to treat HCV genotype 1 treatment-naïve patients. There will be 60 patients divided into three treatment arms who are treated for 4, 6 or 8 weeks. The results were listed in the October 2016 HCV Advocate newsletter. (http://hcvadvocate.org/news/NewsUpdates_pdf/Advocate_2016/advocate1016.pdf) • Genotype 1 – Phase 2 Study: ACH-3422 and Odalasvir (ACH-3102) and Sovaprevir are in studies with various combinations. Recently, Johnson & Johnson Innovation – JJDC, INC (Janssen) made an investment in Achillion for co-development and distribution. • Genotype 1 – Phase 2 Study: Odalasvir plus sofosbuvir (used as a proxy drug) to treat genotype 1 patients for 6 weeks achieved 100% (12 of 12 patients) cure rates. A proxy drug is a drug used to stand in for another drug. Sofosbuvir is a polymerase inhibitor so it is assumed that odalasvir plus a polymerase inhibitor that is being developed by Achillion will produce similar cure rates. • Genotypes 1 through 6–Phase 2b Study: Odalasvir, AL-335, and simeprevir in treatment-naïve and treatment-experienced patients with and without cirrhosis. The trial will enroll 400 patients for six or eight weeks. The study will include four arms with different combinations of drugs. The trial began in June 2016 and will end in July 2017. 	





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Merck	Genotype(s) 1, 2, 3, 4, 5, 6 (Pan-genotypic)
<p>COMMENTS:</p> <ul style="list-style-type: none"> Phase 2- AASLD 2016: <p>C-Crest: The trial was a phase 2 study of a 3-drug co-formulation of MK-3682 (polymerase inhibitor), grazoprevir (protease inhibitor) plus ruzasvir (NS5A inhibitor) with and without ribavirin to treat HCV genotypes 1, 2 and 3. The treatment period was 8, 12 or 16 weeks. In the people who were previously treated with pegylated interferon plus ribavirin the SVR12/cure rates were 95% to 100% in genotype 1a, 1b and 3. In people with genotype 2 the cure rate was 87% in the 8-week group and a 100% rate in the 12 week group and 96% to 98% in the 16 week groups. There was very little difference in cure rates between the groups who had cirrhosis, and who did/did not receive ribavirin.</p> <p>C-Surge: An on-going phase 2 study to treat people with genotype 1 who had failed a previous course of a direct-acting antiviral therapy (Harvoni or Zepatier) using MK-3682, grazoprevir and ruzasvir with and without ribavirin. In the group that received ribavirin the treatment duration was 16 weeks; in the group that did not receive ribavirin the treatment duration was 24 weeks. The SVR 8 results were 98% in the 16 week group that received ribavirin and 100% in the 24 week group that did not receive ribavirin.</p> 	

Regulus	Genotype(s) 1, 2, 3, 4, 6																						
<p>COMMENTS:</p> <p>Regulus Therapeutic Inc.</p> <p>The study included 79 treatment-naive genotype 1 and 4 patients. RG-101 is a GalNAc-conjugated anti-miR targeting miR- 122, a host factor for HCV infection. It is an injectable medication given at Day 1 and Day 29 plus 4 weeks of a once-a-day direct-acting antiviral medication –Harvoni (27 patients), Olysio (27 patients), Daklinza (25 patients). Regulus issued a press release on June 7, 2016 that reported through 24 weeks of follow-up an additional 4 patients relapsed.</p> <table border="1" data-bbox="126 1543 1485 1848"> <thead> <tr> <th>Time Since Treatment Completion</th> <th>RG-101 + Harvoni</th> <th>RG-101 + Olysio</th> <th>RG-101 + Daklinza</th> </tr> </thead> <tbody> <tr> <td>Week 12</td> <td>27/27 pts (100%)</td> <td>26/27 pts (96.3%)</td> <td>22/24 pts (91.7%)*</td> </tr> <tr> <td>Week 16</td> <td>21/21 pts (100%)</td> <td>19/20 pts (95.0%)</td> <td>20/22 pts (90.9%)</td> </tr> <tr> <td>Week 20</td> <td>14/14 pts (100%)</td> <td>13/15 pts (86.7%)</td> <td>13/13 pts (100%)</td> </tr> <tr> <td>Week 24</td> <td>10/10 pts (100%)</td> <td>8/10 pts (80.0%)</td> <td>8/9 pts (88.9%)</td> </tr> </tbody> </table> <p>* One patient missed the Week 12 visit. Viral load results for this patient at week 8 and 16 were collected and indicate that the patient was a responder at both time points. This trial is on clinical hold due to safety concerns.</p>				Time Since Treatment Completion	RG-101 + Harvoni	RG-101 + Olysio	RG-101 + Daklinza	Week 12	27/27 pts (100%)	26/27 pts (96.3%)	22/24 pts (91.7%)*	Week 16	21/21 pts (100%)	19/20 pts (95.0%)	20/22 pts (90.9%)	Week 20	14/14 pts (100%)	13/15 pts (86.7%)	13/13 pts (100%)	Week 24	10/10 pts (100%)	8/10 pts (80.0%)	8/9 pts (88.9%)
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