

CADTH COMMON DRUG REVIEW

Patient Input

Tenofovir alafenamide (VEMLIDY)

(Gilead Sciences Canada, Inc.)

Indication: Hepatitis B, chronic

CADTH received patient input for this review from:

Canadian Liver Foundation

HepCBC Hepatitis C Education & Prevention Society

October 20, 2017

Disclaimer: The views expressed in each submission are those of the submitting organization or individual; not necessarily the views of CADTH or of other organizations.

While CADTH formats the patient input submissions for posting, it does not edit the content of the submissions.

CADTH does use reasonable care to prevent disclosure of personal information in posted material; however, it is ultimately the submitter's responsibility to ensure no personal information is included in the submission. The name of the submitting patient group and all conflict of interest information are included in the posted patient group submission; however, the name of the author, including the name of an individual patient or caregiver submitting the patient input, are not posted.

1. About Your Patient Group

Founded in 1969, the Canadian Liver Foundation (CLF) was the first organization in the world dedicated to supporting education and research into all forms of liver disease. Today, the CLF continues to be the only national health charity committed to reducing the incidence and impact for Canadians of all ages living with or at risk for liver disease. The CLF is the only registered charity in Canada directing funds specifically for liver disease research in all its forms and has invested more than \$29 million in the scientific search for causes, preventative measures and potential treatments for liver disease, including chronic hepatitis B which is estimated to affect approximately 600,000 Canadians. The CLF reaches millions of Canadians through our public and professional education programs, patient support programs and other awareness, fundraising and outreach efforts. Over the past 45+ years, the CLF has invested more than \$50 million in health education and prevention programs.

2. Information Gathering

To gather input for our submission, the CLF invited patients, caregivers and health care professionals from across Canada to fill out an online questionnaire modelled on the CADTH, CDR and pCODR Programs submission template. The online questionnaire was open from October 2 to October 10, 2017 and promoted on the CLF website, via CLF social media channels and to CLF patient, caregiver and health care professional contacts across the country. The online survey was available in English, French and Chinese.

The responses received have been used to compile the feedback for this submission. While the CLF received input from patients who had chronic hepatitis B and who are receiving currently-available treatment, none of these patients had any experience with the drug under review. Health care professionals provided additional input on their experience with patients and with the drug under review. Feedback Quotes from CLF questionnaire respondents are included in *italics* in various sections of this submission.

Demographic information of the respondents was requested in the questionnaire, but response was not mandatory. Below is a summary of the demographic information voluntarily provided by the respondents:

Respondent Categories:

Patient	Caregiver	Health Professional	TOTAL
5		3	

PATIENT Demographics: Age:

Under 18	18 – 24	25 – 34	35 – 44	45 – 54	55 – 64	65 and over
			2	1	2	

Sex:

Male	Female	X
4	1	

CAREGIVER Demographics: Age:

Under 18	18 – 24	25 – 34	35 – 44	45 – 54	55 – 64	65 and over

Sex:

Male	Female	X

HEALTH PROFESSIONAL Demographics: Age:

Under 18	18 – 24	25 – 34	35 – 44	45 – 54	55 – 64	65 and over
						1

Sex:

Male	Female	X

3. Disease Experience

Hepatitis B is one of the most common infections in the world, with more than 360 million chronic carriers. In Canada, the prevalence of chronic hepatitis B is estimated to be approximately 600,000, with prevalence varying across different population groups: estimated 2% in the general population, 2 – 15% in the immigrant population and 4% in the indigenous population.

Chronic hepatitis B is a “silent” disease because often no symptoms appear until the liver is severely damaged. With an absence of early symptoms of this disease, many people with the chronic hepatitis B can live for decades without experiencing the negative life impact from this liver disease. While living symptom-free may seem like a blessing, it does not mean that the damage is not continuing to wreak havoc inside the body.

The onset of symptoms may be the first sign of the disease for many patients, however these symptoms may actually indicate a late stage of infection and complications may have already developed. Some of the symptoms experienced by chronic hepatitis B patients who have developed liver damage include fatigue, muscle weakness, poor appetite, weight loss, itchy skin and jaundice. Some symptoms of advanced cirrhosis may also include bleeding from blood vessels in the digestive tract (varices), fluid accumulation in the abdomen (ascites) and lower extremities (edema) and cognitive confusion (hepatic encephalopathy).

“I feel internal tremors in my body and spasm in my extremities. I also feel pain on the right upper quadrant and back.” – Patient 1

“I get tired very easily and I have a bad temper. My sleep is not good and I do not have a good appetite.”
– Patient 2

After decades of chronic hepatitis B infection, the rate of cirrhosis or chronic liver failure is 20% to 25% and the rate of hepatocellular carcinoma (liver cancer) is 5% per year. In addition to progressive damage to the liver, chronic hepatitis B patients have also shown to be associated with comorbidities such as diabetes, high blood pressure, high cholesterol, chronic kidney disease and osteoporosis.

“If untreated, a proportion of patients will die from liver cancer.” – Health Professional 1

“Most are asymptomatic until they develop decompensated cirrhosis and need a liver transplant or have advanced cancer in which case, there are no curative options, only palliative options including sorafenib.” – Health Professional 2

Early diagnosis of the disease is critical as this is the first step towards development of a treatment plan aimed at slowing down the progression of the disease. This may include lifestyle measures such as improving nutrition and exercise, reducing/eliminating alcohol consumption and medication management, both pharmaceutical and complementary or Traditional Chinese Medicine. Regular monitoring is also critical in order to track and manage the progression of the disease, in particular the development of liver cancer.

4. Experiences with Currently Available Treatments

Combined with early diagnosis, the key objectives of treatment in chronic hepatitis B are to improve quality of life, to prevent or reverse liver disease progression to liver failure, to minimize the risk of developing liver cancer and to decrease the risk of viral transmission.

Currently available treatments in Canada do not provide a cure, but they offer control of the virus so that further damage to the liver can be prevented. Treatment should reduce the viral load to a consistently low level while maintaining a barrier to resistance.

Chronic hepatitis B oral medications currently available in Canada include lamivudine (Heptovir), adefovir (Hepsera), telbivudine (Sebivo), tenofovir (Viread) and entecavir (Baraclude). The Canadian Association for the Study of the Liver (CASL) currently recommends that tenofovir or entecavir be the first-line therapy options for treatment-naïve patients because they are the most potent agents available with no or very low rates of antiviral resistance.

“I am taking Viread. I don’t have any side effects, but I am worried of the long term effect of the medicine.” Patient 1

“I have three Hep B patients on treatment for 15 years. No side effect reported.” –
Health Professional 1

One of the most common non-liver-related manifestations of chronic hepatitis B infection is kidney dysfunction. Suppression of the hepatitis B virus can result in improved kidney function, but caution must be taken while on treatment because all antiviral treatments are excreted by the kidney so dosing of treatment needs to be monitored very closely.

“Current treatment (re: Entecavir and Tenofovir) is quite effective. Potential side effects of Entecavir is small chance of resistance, and for Tenofovir is potential for metabolic bone disease and renal dysfunction.” – Health Professional 2

“The current antiviral agents are suboptimal. Lamivudine is associated with a high incidence of resistance. Entecavir is often not available because of provincial shortages. Tenofovir is associated with a small risk of nephrotoxicity and metabolic bone disease.” – Health Professional 3

5. Improved Outcomes

Current treatments for chronic hepatitis B are good, but patient experience, outcomes and safety could be improved if new treatment options could maintain an effective barrier to resistance with a high level of viral suppression and address the identified risks for kidney and bone disease complications.

“Hepatitis B patients need a new, safer and effective antiviral agent.” – Health Professional 3

Chronic hepatitis B can be effectively controlled through medication but patients must take it for life. This type of prolonged treatment, while protecting the liver, can lead to other health complications. The more options physicians have to customize treatment and lower doses with improved safety to meet their patients' needs, the better the outcomes will be over the long term.

6. Experience with Drug Under Review

Tenofovir alafenamide fumarate (VEMLIDY) is indicated for the treatment of chronic hepatitis B in adults with compensated liver disease. Patients with compensated cirrhosis do not have overt symptoms related to their cirrhosis but may have asymptomatic esophageal or gastric variceal bleeding. Patients with decompensated cirrhosis have symptomatic complications related to cirrhosis, such as jaundice, fluid build-up in the abdomen (ascites) or dementia-like cognitive complications (hepatic encephalopathy).

As noted previously, the CLF did not receive any input from patients with experience with the drug under review or their caregivers, however, healthcare providers have identified areas of consideration for any new treatment option for chronic hepatitis B:

- a) **Maintain an effective barrier to resistance with a high level of viral suppression** – Studies have shown that tenofovir alafenamide fumarate (VEMLIDY) has similar hepatitis B virus suppression rates as currently available treatments and no resistance was detected through the 96 week trial period.
- b) **Address the risk for kidney and bone disease complications** – Tenofovir alafenamide fumarate (VEMLIDY) can deliver the same level of viral suppression, but at a dose that is one-tenth less tenofovir in the bloodstream than currently available treatment tenofovir disoproxil fumarate (VIREAD). The lower level of tenofovir in long-term treatment of chronic hepatitis B has shown improved kidney and bone safety compared to tenofovir disoproxil fumarate (VIREAD).

“I have had a good experience prescribing VEMLIDY to patients. I have nothing negative to say.” – Health Professional 3

7. Anything Else?

This call for patient input prompted some of the patient respondents to investigate this new treatment option to better understand what it was and how it could impact their lives. Two of the patients had expressed concern over the long-term use of the current treatment and after learning that this new treatment could provide a similar level of viral suppression and barrier to resistance with less drug in their system and less chance of kidney or bone disease, there was a keen interest to discuss this new treatment option with their physician.

“I will ask my doctor about Vemlidy.” – Patient 1

“I want to take this treatment.” – Patient 3

Physicians have seen improvements in treatments for chronic hepatitis B over the years. Each new generation of treatment usually starts well with their patients, but over time, the long-term treatments have demonstrated a cause for concern; initially with resistance issues and more recently, some patients have experienced issues pertaining to kidney and bone disease. Health professionals see the merit in having other treatment options available which would have similar treatment efficacy but may also address some of the long-term safety concerns.

“I will use this if patients show resistance to present treatment.” – Health Professional 2

“Tenofovir dipivoxil (Viread) is an efficacious antiviral agent but the risk of nephrotoxicity after many years of use is very problematic as is the risk of metabolic bone disease. Vemlidy is a safer option that has antiviral efficacy.” – Health Professional 3

In summary, the Canadian Liver Foundation believes that patients and their physicians should have access to a broad range of treatment options regardless of geographic location, financial status, treatment status or disease severity in order to ensure the best possible outcomes. It is up to the physicians to make individual treatment recommendations based on the needs of their patients

Appendix: Patient Group Conflict of Interest Declaration

To maintain the objectivity and credibility of the CADTH CDR and pCODR programs, all participants in the drug review processes must disclose any real, potential, or perceived conflicts of interest. This Patient Group Conflict of Interest Declaration is required for participation. Declarations made do not negate or preclude the use of the patient group input. CADTH may contact your group with further questions, as needed.

1. Did you receive help from outside your patient group to complete this submission? If yes, please detail the help and who provided it.

No outside assistance was utilized to complete this submission. This submission was completed by CLF staff and volunteers. The only outside input for this submission came from the patients, caregivers and health care professionals who responded to the CLF's online questionnaire.

2. Did you receive help from outside your patient group to collect or analyze data used in this submission? If yes, please detail the help and who provided it.

No outside assistance was utilized to collect or analyze data used in this submission. This submission was completed by CLF staff and volunteers. The only outside input for this submission came from the patients, caregivers and health care professionals who responded to the CLF's online questionnaire.

3. List any companies or organizations that have provided your group with financial payment over the past two years AND who may have direct or indirect interest in the drug under review.

The Canadian Liver Foundation (CLF) is committed to bringing liver research to life for all Canadians through liver research, education, patient support and advocacy. The CLF receives funding from a variety of sources with the majority coming from donations from individuals across the country. We use these funds to support CLF liver awareness, education, patient support and research grant programs.

The CLF receives some program funding in the form of unrestricted educational grants from pharmaceutical companies. Grant agreements are established in support of activities initiated by the CLF and prohibit the funder from having any input or influence in program objectives or deliverables.

Company	Check Appropriate Dollar Range			
	\$0 to 5,000	\$5,001 to 10,000	\$10,001 to 50,000	In Excess of \$50,000
Gilead Sciences Canada				✓ not related to hepatitis B
Bristol-Myers Squibb Canada				✓ not related to hepatitis B
Novartis Pharmaceuticals Canada				
GlaxoSmithKline				

I hereby certify that I have the authority to disclose all relevant information with respect to any matter involving this patient group with a company, organization, or entity that may place this patient group in a real, potential, or perceived conflict of interest situation.

Name: Karen Seto
 Position: Director, Professional Education & Partnerships
 Patient Group: Canadian Liver Foundation
 Date: September 19, 2017

1. About Your Patient Group

Founded in 1996, HepCBC is a registered non-profit society run by and for people infected with, or affected by, viral hepatitis. Our mission is to provide education, prevention and support to those living with HCV; we are now in the process of adding HBV and any other type of viral hepatitis to our mandate. We have an office in Victoria and another in downtown Vancouver, BC. Most of our staff are volunteers with lived experience (either past or present) with hepatitis C. We also employ four contractors on part-time, short-term contracts. We run activities in many areas of the Lower Mainland and travel throughout the province doing outreach. Our representatives attend provincial, federal and international conferences and participate at health-related events. In addition, we provide support and information globally through our website. Other activities include: Online publication of a weekly bulletin (the Weekly.Bull), plus peer support, anti-stigma activities and prevention education to the general public, general hepatitis information, particularly to baby-boomer, aboriginal and immigrant communities and those living in rural/remote locations or incarcerated. We support and encourage testing among at-risk groups, including those who no longer fall into this category but may have contracted viral hepatitis decades ago, either through the blood system (whether in Canada or abroad), sexually, vertically, or through recreational drug use. We also work alongside other organizations, including local HIV/AIDS organizations to support those co-infected (for example with HIV).

2. Information Gathering

1. We tried to collect current first-person data from patient and caregiver surveys which were advertised through our website, Facebook Page, our weekly email bulletin, and a Vancouver HBV physician. Unfortunately none of these requests were successful. We think it may be due to the demographics of HBV which will be addressed later in this document. We will continue to work on increasing the HBV profile of our organization while gaining the trust of those affected by this disease who belong to very diverse communities. We hope to make our future patient surveys more accessible and presenting them in various languages and modes (oral, written, online, in person) required to locate and communicate with the diverse HBV affected populations.
2. One author of this report is a researcher and patient advocate who has worked closely with HBV+ Asian immigrants and their associations, and is familiar with common HBV patient concerns, particularly in immigrant communities, as well as current HBV research, treatments, and scholarship.
3. The other author has living experience of HCV and has actively staffed HepCBC's phone and email support lines over the course of several years. She is very familiar with liver disease in general, and the devastating effects it can have on lives of those infected with viral hepatitis and on their families. She has also talked to numerous HBV patients through the years at info and testing booths and other events and is familiar with the health concerns in particular of aboriginal, immigrant (from endemic nation), sex worker, and IVDU patients plus those of physicians and nurses who are working with these populations.

[For information about the drug being reviewed] The information was gathered in the same way as for previous submissions (section 2.1). We started by examining background information, research, and product monographs from the manufacturer, Gilead. However, we also attended several webinars about the new HBV treatment landscape offered by Clinical Care Options (quite focused on TAF as an additional treatment option). We also looked at PHAC info bulletins for health professionals, professional (CASL) Guidelines, and consulted with a local HBV specialist. We noted one problem with the online Gilead Patient Monograph, the part about Patients co-infected with HIV at increased risk of developing resistance to HIV treatment while on TAF. Page 5 is cut off and this section needs to be completed. We have notified Gilead about this issue.

3. Disease Experience

A large number of people who are infected with HBV never have symptoms and may never realize they are infected, while unknowingly passing the disease on to family members, friends, and others. However, for those who do experience symptoms, these can be serious and deadly, impacting their lives physically, financially, emotionally, and socially.

ACUTE HEPATITIS B INFECTION: Possible symptoms of acute infection, which occurs with less than 10% of children and 30-50% of adults are: jaundice, fatigue, loss of appetite, nausea, and joint or abdominal pain. Acute infection is treated primarily by alleviating symptoms; there is no cure. This impacts patients severely but usually for a short time; some patients, however, die of liver failure during the acute phase.

CHRONIC HEPATITIS B (CHB) INFECTION: An estimated 420,000 persons are living with chronic hepatitis B (CHB) in Canada. Over time CHB may result in liver cirrhosis, liver cancer, decompensated liver disease and premature death. The risk of developing CHB is highest among those infected at birth (90%); risk decreases according to age at infection (as low as 5% in those who acquire HBV as older adults). Both prevalence and incidence of co-morbidities diabetes, hypertension, hyperlipidemia, renal impairment, chronic kidney disease, bone fracture, and osteoporosis increase in both CHB and non-CHB controls as income decreases and age increases. However, the presence of CHB, regardless of income or age, increases the risk of all of the above co-morbidities, particularly renal impairment and chronic kidney disease, in which the risk among those with CHB is about 2.5X that to those without CHB. HBV was the primary diagnosis for 4.2% of liver transplant recipients in Canada between 2005 and 2014.

IGNORANCE of risk factors and **STIGMA** against those with hepatitis B is still very strong, which can affect access to many important life opportunities such as employment, marriage and other sexual relationships, immigration, loans, and life insurance. Those who have the disease often hide it and may even refuse testing and treatment due to fear others might find out they are positive, or that their family members may suffer from stigma and prejudice as well. When their disease finally reaches its end stage there is shame that people who do not know the person has hepatitis B will think the person had cirrhosis because they were an alcoholic.

It is important to note there are two completely different epidemics of hepatitis B in Canada. Age, lifestyle, risk factors, testing, education and support needs, and treatment can vary greatly among the two epidemics:

(1) Epidemic among “Prevalent” populations, primarily immigrants from HBV-endemic countries (mostly from Asia, Africa and the Middle East, Spain, Eastern Europe, and northern South America), their spouses who contracted the disease sexually and children who contracted the disease vertically. Those who contracted HBV through blood transfusion can also be considered “prevalent” as their risk of spreading the disease to others is limited. This is generally an older population with higher % of CHB.

(2) Epidemic among “Incident” (risk-based) populations such as IVDU, sex workers, current or former prisoners, and men who have sex with men (MSM). These are populations at high risk of both contracting HBV and passing it on to others. While it is generally a younger population with lower % of CHB, the population is aging and the need for CHB treatment will increase proportionately.

NOTE: Aboriginal-majority northern areas Alaska, Canada’s North, and Greenland are both high-incidence and endemic areas so it’s hard to know which category to put aboriginal people and residents of remote northern areas into. Really, it depends on each individual members’ risk profile.

PREVALENT EPIDEMIC: Hepatitis B is on track to slowly disappear from the prevalent populations with the passing of the infected generations, as immunization will protect the younger generation, including intense therapy available as needed immediately after birth. CHB still severely affects current elders, however (estimated % of Cdn immigrants with CHB varies from 3% to almost 7%). We hope they will all be found and treated to enhance the quality and increase the length of their lives. Education and support of these people and their families, and availability of new treatments such as tenofovir alafenamide (also known as tenofovir alafenamide

fumarate or tenofovir alafenamide hemifumarate or TAF) will be key. People in this population are sometimes confused with people in the incident population; as such they often suffer the same stigma associated with IVDU, prisoners, or sex workers.

INCIDENT EPIDEMIC: A hepatitis B epidemic continues to run through the incident populations; these people are at risk of both contracting and passing on the disease, but as they are generally younger than those in the prevalent populations, and not yet suffering symptoms, public health attention is more focused on providing them with harm reduction supplies and education than on treatment. In the early years of the disease, even if it has become CHB, there may be no symptoms and little interest in getting tested. Other problems may seem more acute in patients' lives such as housing, addiction, other (more acute) STDs, food security, stigma or prejudice, violence, abuse, and crime. It is generally once the patient has gotten older that CHB becomes a pressing issue, and the patient seeks treatment. Also sometimes considered among the at-risk 'incident' population are healthcare workers (from needle-stick injury), dialysis patients (from improperly sterilized equipment), and tattoo/piercing clients (from improperly sterilized or re-used equipment, ink, etc). However, these last three groups are not generally engaging in high-risk behaviours which would result in passing HBV to others (except possibly to family).

4. Experiences with Currently Available Treatments

The treatments now in use include immunosuppressive therapy such as injected interferon for 48 weeks or less (rarely used now - for very mild CHB, or patients with compensated cirrhosis) and lamivudine (LAM) (no longer in preferred guidelines but still used by many). The current standard used throughout the world is generally a long term nucleos(t)ide oral therapy such as entecavir (ETV), or tenofovir disoproxil fumarate (TDF). It is widely accepted that ETV and TDF suppress HBV virus replication, prevent fibrosis progression, and can even reverse fibrosis, cirrhosis, and even decompensation; however, while reducing the risk of liver cancer, this risk is not eliminated. ETV and TDF are both effective and well-tolerated. The main problems are that (1) TDF has toxicity over long term use – it carries the risk of weakening the renal system and the bones and (2) resistance - it is high with LAM but very low with ETV (unless the person is already LAM-resistant). Resistance does not occur with TDF (a similar result is expected with TAF). The main downside to TDF seems to be the long-term damage to kidneys and bones. Lots of people are still taking ETV, and physicians we've heard from seem to think most current ETV and TDF patients will remain on their current treatment for now, if they're doing well.

*With both ETV and TDF, once creatinine clearance goes below 50 mL/min, the dosage must be reduced in order to prevent serious kidney/renal system damage.

5. Impact on Caregivers

The impact of CHB is felt by the whole family. The burden on caregivers cannot be overstated. Among the prevalent population, this role is primarily borne by spouses, siblings, and children of patients (who may also be infected). The caregiver often has to quit his/her job, so the family loses both the patient's and caregiver's income. Stigma falls on the caregiver as well as the patient, as many in the community may not understand HBV risk factors, mistakenly thinking that they can contract HBV through casual contact with the patient such as a cough or sneeze or from eating at the same table, thus the family may become socially isolated. Divorce and mental illness may result from the stress of this situation. When both the mother and child have CHB, there can also be an emotional toll due to the potential of guilt on the mother's part or resentment on the child's.

6. Information about the Drug Being Reviewed

Based on no experience using the drug:

CHB patients hope that with proper medication, they will not get liver cancer, that their liver and kidneys will not fail, that they need not be in fear of accidentally passing on HBV, especially to their newborn babies or their spouse. They want to be able to provide for their families or at least not be a burden. They know there is not yet a cure, so they hope for suppression of the disease, its effects, and its virulence. They would prefer not to have to take treatment for extended periods, but realize in some cases that this will be necessary.

Given that Health Canada has issued a Notice of Compliance (June 19, 2017) and in the US the drug has FDA approval, patients and physicians seem to have a high degree of confidence in the medical value of TAF. TAF has been shown to be generally equivalent to the older drug TDF in efficacy in viral suppression, likelihood of becoming resistant, and safety. Total adverse events were the same (between 866 patients taking TAF and 432 patients taking TDF in a control group), and we were pleased to note that rates of HCC and death were lower in the TAF group.

Moreover, TAF is an improvement in two ways that we know of:

First, due to slight changes in the molecular structure, tenofovir alafenamide fumarate (TAF) is taken in by the blood much more efficiently than is tenofovir disoproxil fumarate (TDF). Thus, dosage of tenofovir can be reduced 90%. TAF's adult dosage (to patients with CHB and compensated liver disease) is only one 25 mg tablet per day. This contrasts to the 300 mg daily dosage for TDF. Because of the lower dosage of tenofovir, patients expect that they can take the medication TAF for extended periods with less potential for damage to their kidneys and bones. The indicators of renal safety (estimated glomerular filtration rates, serum creatine levels, and renal tubular function markers) as well as markers of bone degeneration show that TAF does significantly less damage to kidneys and bones than TDF through week 96. However, research into the long-term effects of TAF will continue into the future; patients likely expect that they will remain "guinea pigs" to some degree, but we predict they would be willing to accept this in return for the chance to prevent or lessen the long-term kidney and bone damage currently documented for long-term use of TDF. Related to this, patients with any kind of renal impairment now taking ETV or TDF require dose reduction when their creatinine clearance falls below 50 mL/minute. In contrast, no dose reduction is required for TAF until their creatinine clearance falls below 15 mL/minute, a significant advantage.

Second, for reasons not clearly understood, TAF seems to result in faster and greater normalization of ALT (indicator of ongoing liver damage) scores. Four different major studies have all shown this to be the case, with the difference in normalization rates averaging around 10% greater for TAF than TDF at the end of Week 96. Patients will likely be confused about what the best ALT upper limit of normal should be. Central Lab puts it at 43 for males and 35 for females. AASLD puts it at 30 for males and 19 for females. In all cases, however, this relationship (better normalization of ALT with TAF) holds. When using the Central Lab upper limit criteria, the relationship is more pronounced.

Downsides: The main downside of TAF will likely be its price. Patients must decide if the long-term benefits are worth the increased price this product will likely have for many years. Physicians we have talked to and heard (over Clinical Care Options webinars) suspect that the trend will be not to change to TAF as long as there is no obvious damage to kidneys or bones. This is too bad, considering that the use of TAF could well prevent such damage, adding significantly to QALYs preserved.

TAF's product label has two "Serious Warnings and Precautions" for which physicians must monitor: (1) lactic acidosis/severe hepatomegaly with steatosis during treatment, especially noted among females and the obese and (2) severe acute exacerbation of hepatitis B once treatment is stopped.

There are a few other possible safety concerns which may warrant further research, warnings and/or close monitoring, however. We had some concerns about significantly higher rates (in TAF patients vs. TDF patients) of lab abnormalities in fasting LDL cholesterol (6% vs. 1%), fasting glucose (1% vs. 0) and urine glucose (4% vs. 2%). So we'd like to see a recommendation that these factors in particular must be monitored closely in all TAF patients, at least until research shows it's unneeded.

Finally, the product monograph warns that "The safety and efficacy of VEMOLIDY have not been established in patients co-infected with HIV-1 and HBV. HIV antibody testing should be offered to all HBV infected patients before initiating therapy with VEMOLIDY."

Based on patients' experiences with the new drug as part of a clinical trial or through a manufacturer's compassionate supply:

We were not, unfortunately, able to find anyone to answer this question

7. Anything Else?

The points we have made in [Information about the Drug Being Reviewed] support the following recommendations:

- Approval of tenofovir alafenamide (TAF) for use in adult patients with chronic hepatitis B, with acknowledgement that in some cases it could be the preferred, first line of treatment option; for example, in those now elderly or exhibiting signs of renal or bone disease, or not responding well to current treatment with ETV or TDF, or simply to prevent future renal or bone problems.

- Close monitoring of all patients on CHB treatment is required, whatever the regime. With TAF, we recommend particularly close monitoring of fasting LDL cholesterol, fasting glucose, and urine glucose.
- Close monitoring on both individual and population levels of possible development of resistance (not because there appears to be any increased danger of resistance, but simply because this development could have such serious consequences, particularly among the sex worker, MSM, and IVDU populations who are currently still spreading and contracting this disease). After all, this is the first new HBV treatment in a decade, so to quickly develop an alternative is unlikely.
- Doctors and specialists being mindful of contraindications and the importance of keeping abreast of emerging data reflecting "real world" use.
- While we applaud Gilead's announced generous inclusion of TAF into its patient support program, efforts by all stakeholders and agencies that have influence over pricing decisions should strive to ensure that all patients who would benefit from TAF have affordable access to it, regardless of lifestyle or insurance coverage.
- Further research into TAF's use among those co-infected with HIV, HCV, or both viruses, particularly among IVDU, sex workers, current and former prisoners, and men who have sex with men as they are more likely to be co-infected. This is a most critical research need.
- Further research in 'real world' usage into the place, if any, played by factors such as genotype, age, gender, lifestyle, presence of serological markers, etc. in response to TAF vs. other CHB treatments.
- Constant monitoring for drug interactions which may be unforeseen. The U. of Liverpool international drug reaction database should be consulted when prescribing any new medication to someone on TAF treatment.

8. References

Evolving Options for HBV Therapy: Navigating the New Treatment Landscape (Clinical Care Options Power point presentation released October 10, 2017) https://www.clinicaloptions.com/Hepatitis/Treatment%20Updates/2017%20HBV%20Therapy/Downloadable%20Slideset/HBV_Treatment_Landscape_Slides.aspx [access on 2017-10-20]

Gilead Receives Approval in Canada for VEMLIDY™ (Tenofovir Alafenamide) for the Treatment of Chronic Hepatitis B Virus Infection (June 19, 2017) <http://www.newswire.ca/news-releases/gilead-receives-approval-in-canada-for-vemlidy-tenofovir-alafenamide-for-the-treatment-of-chronic-hepatitis-b-virus-infection-629352103.html>

[accessed on 2017-10-20]

Management of chronic hepatitis B: Canadian Association for the Study of the Liver consensus guidelines (Cdn Assn for the Study of the Liver [CASL], Dec. 26, 2012) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3551569/> [accessed on 2017-10-20]

Primary Care Management of Hepatitis B – Quick Reference (HBV-QR) (Public Health Agency of Canada, Feb. 26, 2014) <https://www.canada.ca/en/public-health/services/reports-publications/primary-care-management-hepatitis-b-quick-reference.html> [accessed on 2017-10-20; problem at bottom of page 5 noted and passed along to Gilead]

Product Monograph Including Patient Medication Information PrVEMLIDY™ (May 17, 2017) http://www.gilead.ca/application/files/8514/9704/5557/vemlidy_pm_english.pdf [accessed on 2017-10-20]

Report on Hepatitis B and C in Canada: 2014 (Public Health Agency of Canada, published 2017) <https://www.canada.ca/en/services/health/publications/diseases-conditions/report-hepatitis-b-c-canada-2014.html> [accessed on 2017-10-20]

Appendix: Patient Group Conflict of Interest Declaration

HepCBC Hepatitis C Education & Prevention Society has received funding for viral hepatitis-oriented projects such as: Publishing educational materials, organizing educational forums, attending and presenting at educational conferences, advertising in newspapers (events and viral hepatitis patient awareness), and holding awareness activities from the following pharmaceutical companies over the last four years: Merck Pharmaceuticals, Lupin Pharmaceuticals, Gilead Sciences, Janssen Pharmaceuticals, Bristol-Myers Squibb, and AbbVie, plus support from Rx&D, the pharmaceutical umbrella organization.

Both of the authors of this report have attended several educational conferences and meetings for which registration and travel expenses were funded by the pharmaceutical companies listed in (a).