SUMMARY OF PRODUCT CHARACTERISTICS

1 NAME OF THE MEDICINAL PRODUCT

Emtricitabine/Tenofovir disoproxil Teva 200 mg/245 mg Film-coated Tablets.

2 QUALITATIVE AND QUANTITATIVE COMPOSITION

Each film-coated tablet contains 200 mg of emtricitabine and 245 mg of tenofovir disoproxil (equivalent to 291.22 mg of tenofovir disoproxil phosphate or 136 mg of tenofovir).

For the full list of excipients, see section 6.1.

Sodium

This medicinal product contains less than 1 mmol sodium (23 mg) per tablet, i.e. essentially 'sodium- free'.

3 PHARMACEUTICAL FORM

Film-coated tablet.

Green to light green, oval shaped film coated tablets, of approximate dimensions 18mm x 10mm, debossed with "E T" on one side and plain on the other side.

4 CLINICAL PARTICULARS

4.1 Therapeutic indications

Treatment of HIV-1 infection:
Emtricitabine/Tenofovir disoproxil Teva is indicated in antiretroviral combination therapy for the treatment of HIV-1 infected adults (see section 5.1).

Emtricitabine/Tenofovir disoproxil Teva is also indicated for the treatment of HIV-1 infected adolescents, with NRTI resistance or toxicities precluding the use of first line agents, aged 12 to < 18 years (see section 4.2, 4.4 and 5.1).

Pre-exposure prophylaxis (PrEP):

Emtricitabine/Tenofovir disoproxil Teva is indicated in combination with safer sex practices for pre-exposure prophylaxis to reduce the risk of sexually acquired HIV-1 infection in adults and adolescents at high risk (see sections 4.4 and 5.1).

4.2 Posology and method of administration

Emtricitabine/Tenofovir disoproxil Teva should be initiated by a physician experienced in the management of HIV infection.

Posology

Treatment of HIV in adults and adolescents aged 12 years and older, weighing at least 35 kg: One tablet, once daily.

Prevention of HIV in adults and adolescents aged 12 years and older, weighing at least 35 kg: One tablet, once daily.

Separate preparations of emtricitabine and tenofovir disoproxil are available for treatment of HIV-1 infection if it becomes necessary to discontinue or modify the dose of one of the components of Emtricitabine/Tenofovir disoproxil Teva. Please refer to the Summary of Product Characteristics for these medicinal products.

If a dose of Emtricitabine/Tenofovir disoproxil Teva is missed within 12 hours of the time it is usually taken, Emtricitabine/Tenofovir disoproxil Teva should be taken as soon as possible and the normal dosing schedule should be resumed. If a dose of Emtricitabine/Tenofovir disoproxil Teva is missed by more than 12 hours and it is almost time for the next dose, the missed dose should not be taken and the usual dosing schedule should be resumed.

If vomiting occurs within 1 hour of taking Emtricitabine/Tenofovir disoproxil Teva, another tablet should be taken. If vomiting occurs more than 1 hour after taking Emtricitabine/Tenofovir disoproxil Teva a second dose should not be taken.

Special populations

Elderly: No dose adjustment is required (see section 5.2).

Renal impairment: Emtricitabine and tenofovir are eliminated by renal excretion and the exposure to emtricitabine and tenofovir increases in individuals with renal dysfunction (see sections 4.4 and 5.2).

Adults with renal impairment:
Emtricitabine/Tenofovir disoproxil Teva should only be used in individuals with creatinine clearance (CrCl) < 80 mL/min if the potential benefits are considered to outweigh the potential risks. See Table 1.

Table 1: Dosing recommendations in adults with renal impairment

	Treatment of HIV-1 infection	**Pre-exposure prophylaxis**
Mild renal impairment (CrCl 50-80 mL/min)	Limited data from clinical studies support once daily dosing of emtricitabine and tenofovir (see section 4.4).	Limited data from clinical studies support once daily dosing of emtricitabine and tenofovir in HIV-1 uninfected individuals with CrCl 60-80 mL/min. Emtricitabine and tenofovir is not recommended for use in HIV-1 uninfected individuals with CrCl < 60mL/min as it has not been studied in this population (see sections 4.4 and 5.2).
Moderate renal impairment (CrCl 30-49 mL/min)	Administration of Emtricitabine/Tenofovir disoproxil Teva every 48 hours is recommended based on modelling of single-dose pharmacokinetic data for emtricitabine and tenofovir disoproxil in non-HIV infected subjects with varying degrees of renal impairment (see section 4.4).	Emtricitabine/Tenofovir disoproxil Teva is not recommended for use in this population.
Severe renal impairment (CrCl < 30mL/min) and haemodialysis patients	Emtricitabine/Tenofovir disoproxil Teva is not recommended because appropriate dose reductions cannot be achieved with the combination tablet.	Emtricitabine/Tenofovir disoproxil Teva is not recommended for use in this population.

Paediatrics with renal impairment:
Use of Emtricitabine/Tenofovir disoproxil Teva is not recommended in HIV-1 infected paediatric patients under the age of 18 years with renal impairment (see section 4.4).

Hepatic impairment: No dose adjustment is required in patients with hepatic impairment (see sections 4.4 and 5.2).

Paediatric population: The safety and efficacy of emtricitabine and tenofovir disoproxil in children under the age of 12 years have not been established (see section 5.2).

Method of administration

Oral administration. It is preferable that Emtricitabine/Tenofovir disoproxil Teva is taken with food.

Emtricitabine/Tenofovir disoproxil Teva can be disintegrated in approximately 100 mL of water, orange juice or grape juice and taken immediately.

4.3 Contraindications

Hypersensitivity to the active substances or to any of the excipients listed in section 6.1.

Use of Emtricitabine/Tenofovir disoproxil Teva for pre-exposure prophylaxis in individuals with unknown or positive HIV-1 status.

4.4 Special warnings and precautions for use

Patients with HIV-1 harbouring mutations
The combination of emtricitabine and tenofovir disoproxil should be avoided in antiretroviral-experienced patients with HIV-1 harbouring the K65R mutation (see section 5.1).

Overall HIV-1 infection prevention strategy
The combination of emtricitabine and tenofovir disoproxil is not always effective in preventing the acquisition of HIV-1. The time to onset of protection after commencing the combination of emtricitabine and tenofovir is unknown.

Emtricitabine/Tenofovir disoproxil Teva should only be used for pre-exposure prophylaxis as part of an overall HIV-1 infection prevention strategy including the use of other HIV-1 prevention measures (e.g. consistent and correct condom use, knowledge of HIV-1 status, regular testing for other sexually transmitted infections).

Risk of resistance with undetected HIV-1 infection:
Emtricitabine/Tenofovir disoproxil Teva should only be used to reduce the risk of acquiring HIV-1 in individuals confirmed to be HIV negative (see section 4.3). Individuals should be re-confirmed to be HIV-negative at frequent intervals (e.g. at least every 3 months) using a combined antigen/antibody test while taking Emtricitabine/Tenofovir disoproxil Teva for pre-exposure prophylaxis.

Emtricitabine/Tenofovir disoproxil Teva alone does not constitute a complete regimen for the treatment of HIV-1 and HIV-1 resistance mutations have emerged in individuals with undetected HIV-1 infection who are only taking the combination of emtricitabine and tenofovir.

If clinical symptoms consistent with acute viral infection are present and recent (< 1 month) exposures to HIV-1 are suspected, use of Emtricitabine/Tenofovir disoproxil Teva should be delayed for at least one month and HIV-1 status reconfirmed before starting Emtricitabine/Tenofovir disoproxil Teva for pre-exposure prophylaxis.

Importance of adherence:
HIV-1 uninfected individuals should be counselled to strictly adhere to the recommended Emtricitabine/Tenofovir disoproxil Teva dosing schedule. The effectiveness of the combination of emtricitabine and tenofovir in reducing the risk of acquiring HIV-1 is strongly correlated with adherence as demonstrated by measurable drug levels in blood.

Patients with hepatitis B or C virus infection

HIV-1 infected patients with chronic hepatitis B or C treated with antiretroviral therapy are at an increased risk for severe and potentially fatal hepatic adverse reactions. Physicians should refer to current HIV treatment guidelines for the management of HIV infection in patients co-infected with hepatitis B virus (HBV) or hepatitis C virus (HCV).

The safety and efficacy of the combination of emtricitabine and tenofovir for PrEP in patients with HBV or HCV infection has not been established.

In case of concomitant antiviral therapy for hepatitis B or C, please refer also to the relevant Summary of Product Characteristics for these medicinal products. See also under *Use with ledipasvir and sofosbuvir or sofosbuvir and velpatasvir* below.

Tenofovir disoproxil is indicated for the treatment of HBV and emtricitabine has shown activity against HBV in pharmacodynamic studies but the safety and efficacy of the combination of emtricitabine and tenofovir have not been specifically established in patients with chronic HBV infection.

Discontinuation of Emtricitabine/Tenofovir disoproxil Teva therapy in patients infected with HBV may be associated with severe acute exacerbations of hepatitis. Patients infected with HBV who discontinue Emtricitabine/Tenofovir disoproxil Teva should be closely monitored with both clinical and laboratory follow-up for at least several months after stopping treatment. If appropriate, resumption of hepatitis B therapy may be warranted. In patients with advanced liver disease or cirrhosis, treatment discontinuation is not recommended since post-treatment exacerbation of hepatitis may lead to hepatic decompensation.

Liver disease

The safety and efficacy of the combination of emtricitabine and tenofovir disoproxil have not been established in patients with significant underlying liver disorders. The pharmacokinetics of tenofovir has been studied in patients with hepatic impairment and no dose adjustment is required. The pharmacokinetics of emtricitabine has not been studied in patients with hepatic impairment. Based on minimal hepatic metabolism and the renal route of elimination for emtricitabine, it is unlikely that a dose adjustment would be required for the combination of emtricitabine and tenofovir disoproxil in patients with hepatic impairment (see sections 4.2 and 5.2).

HIV-1infected patients with pre-existing liver dysfunction, including chronic active hepatitis, have an increased frequency of liver function abnormalities during combination antiretroviral therapy (CART) and should be monitored according to standard practice. If there is evidence of worsening liver disease in such patients, interruption or discontinuation of treatment must be considered.

Renal and bone effects in adults

Renal effects
Emtricitabine and tenofovir are primarily excreted by the kidneys by a combination of glomerular filtration and active tubular secretion. Renal failure, renal impairment, elevated creatinine, hypophosphataemia and proximal tubulopathy (including Fanconi syndrome) have been reported with the use of tenofovir disoproxil (see section 4.8).

Renal monitoring
Prior to initiating Emtricitabine/Tenofovir disoproxil Teva for the treatment of HIV-1 infection or for use in pre-exposure prophylaxis, it is recommended that creatinine clearance is calculated in all individuals.

In individuals without risk factors for renal disease, it is recommended that renal function (creatinine clearance and serum phosphate) is monitored after two to four weeks of use, after three months of use and every three to six months thereafter.

In individuals at risk for renal disease more frequent monitoring of renal function is required.

See also under *Co-administration of other medicinal products* below.

Renal management in HIV-1 infected patients:
If serum phosphate is < 1.5 mg/dL (0.48 mmol/L) or creatinine clearance is decreased to < 50 mL/min in any patient receiving The combination of emtricitabine and tenofovir disoproxil, renal function should be re-evaluated within one week, including measurements of blood glucose, blood potassium and urine glucose concentrations (see section 4.8, proximal tubulopathy). Consideration should be given to interrupting treatment with the combination of emtricitabine and tenofovir disoproxil in patients with creatinine clearance decreased to < 50 mL/min or decreases in serum phosphate to < 1.0 mg/dL (0.32 mmol/L). Interrupting treatment with the combination of emtricitabine and tenofovir disoproxil should also be considered in case of progressive decline of renal function when no other cause has been identified.

Renal safety with the combination of emtricitabine and tenofovir disoproxil has only been studied to a very limited degree in HIV-1 infected patients with impaired renal function (creatinine clearance < 80 mL/min). Dose interval adjustments are recommended for HIV-1 infected patients with creatinine clearance 30-49 mL/min (see section 4.2). Limited clinical study data suggest that the prolonged dose interval is not optimal and could result in increased toxicity and possibly inadequate response. Furthermore, in a small clinical study, a subgroup of patients with creatinine clearance between 50 and 60 mL/min who received tenofovir disoproxil in combination with emtricitabine every 24 hours had a 2-4-fold higher exposure to tenofovir and worsening of renal function (see section 5.2). Therefore, a careful benefit-risk assessment is needed when The combination of emtricitabine and tenofovir disoproxil is used in patients with creatinine clearance < 60 mL/min, and renal function should be closely monitored. In addition, the clinical response to treatment should be closely monitored in patients receiving the combination of emtricitabine and tenofovir disoproxil at a prolonged dosing interval. The use of the combination of emtricitabine and tenofovir disoproxil is not recommended in patients with severe renal impairment (creatinine clearance < 30 mL/min) and in patients who require haemodialysis since appropriate dose reductions cannot be achieved with the combination tablet (see sections 4.2 and 5.2).

Renal management in PrEP:

The combination of emtricitabine and tenofovir disoproxil has not been studied in HIV-1 uninfected individuals with creatinine clearance < 60 mL/min and is therefore not recommended for use in this population. If serum phosphate is < 1.5 mg/dL (0.48 mmol/L) or creatinine clearance is decreased to < 60 mL/min in any individual receiving the combination of emtricitabine and tenofovir disoproxil for pre-exposure prophylaxis, renal function should be re-evaluated within one week, including measurements of blood glucose, blood potassium and urine glucose concentrations (see section 4.8, proximal tubulopathy). Consideration should be given to interrupting use of with The combination of emtricitabine and tenofovir disoproxil in individuals with creatinine clearance decreased to < 60 mL/min or decreases in serum phosphate to < 1.0 mg/dL (0.32 mmol/L). Interrupting use of the combination of emtricitabine and tenofovir disoproxil should also be considered in case of progressive decline of renal function when no other cause has been identified.

Bone effects:

Bone abnormalities such as osteomalacia which can manifest as persistent or worsening bone pain, and which can infrequently contribute to fractures, may be associated with tenofovir disoproxil-induced proximal renal tubulopathy (see section 4.8). If bone abnormalities are suspected or detected then appropriate consultation should be obtained.

Treatment of HIV-1 infection
Reductions of bone mineral density (BMD) have been observed with tenofovir disoproxil in randomized controlled clinical trials of duration up to 144 weeks in HIV or HBV-infected patients. These BMD decreases generally improved after treatment discontinuation.

In other studies (prospective and cross-sectional), the most pronounced decreases in BMD were seen in patients treated with tenofovir disoproxil as part of a regimen containing a boosted protease inhibitor. Overall, in view of the bone abnormalities associated with tenofovir disoproxil and the limitations of long-term data on the impact of tenofovir disoproxil on bone health and fracture risk, alternative treatment regimens should be considered for patients with osteoporosis or with a history of bone fractures.

If bone abnormalities are suspected or detected then appropriate consultation should be obtained.

The combination of emtricitabine and tenofovir disoproxil for PrEP:
In clinical studies of HIV-1 uninfected individuals, small decreases in BMD were observed. In a study of 498 men, the mean changes from baseline to week 24 in BMD ranged from - 0.4% to - 1.0% across hip, spine, femoral neck and trochanter in men who received daily the combination of emtricitabine and tenofovir disoproxil prophylaxis (n=247) vs. placebo (n=251).

Renal and bone effects in the paediatric population

There are uncertainties associated with the long-term renal and bone effects of tenofovir disoproxil during the treatment of HIV-1 infection in the paediatric population and the long-term renal and bone effects of the combination of emtricitabine and tenofovir disoproxil when used for pre-exposure prophylaxis in uninfected adolescents (see section 5.1).

Moreover, the reversibility of renal toxicity after cessation of tenofovir disoproxil for treatment of HIV-1 or after cessation of the combination of emtricitabine and tenofovir disoproxil for pre-exposure prophylaxis cannot be fully ascertained.

A multidisciplinary approach is recommended to adequately weigh on a case by case basis the benefit/risk balance of treatment, decide the appropriate monitoring during treatment (including decision for treatment withdrawal) and consider the need for supplementation.

When using the combination of emtricitabine and tenofovir disoproxil product for pre-exposure prophylaxis individuals should be reassessed at each visit to ascertain whether they remain at high risk of HIV-1 infection. The risk of HIV-1 infection should be balanced against the potential for renal and bone effects with long-term use of the combination of emtricitabine and tenofovir disoproxil.

Renal effects:
Renal adverse reactions consistent with proximal renal tubulopathy have been reported in HIV-1 infected paediatric patients aged 2 to < 12 years in clinical study GS-US-104-0352 (see sections 4.8 and 5.1).

Renal monitoring
Renal function (creatinine clearance and serum phosphate) should be evaluated prior to treatment, and monitored during treatment as in HIV-1 infected adults (see above).

Renal management
If serum phosphate is confirmed to be < 3.0 mg/dl (0.96 mmol/l) in any paediatric patient receiving the combination of emtricitabine and tenofovir disoproxil, renal function should be re-evaluated within one week, including measurements of blood glucose, blood potassium and urine glucose concentrations (see section 4.8, proximal tubulopathy). If renal abnormalities are suspected or detected then consultation with a nephrologist should be obtained to consider interruption of treatment. Interrupting treatment with the combination of emtricitabine and tenofovir disoproxil should also be considered in case of progressive decline of renal function when no other cause has been identified.

Co-administration and risk of renal toxicity
The same recommendations apply as in adults (see Co-administration of other medicinal products below).

Renal impairment
The use of the combination of emtricitabine and tenofovir disoproxil is not recommended in paediatric patients with renal impairment (see section 4.2). Therapy with the combination of emtricitabine and tenofovir disoproxil should not be initiated in paediatric patients with renal impairment and should be discontinued in paediatric patients who develop renal impairment during therapy with the combination of emtricitabine and tenofovir disoproxil.

Bone effects
Tenofovir disoproxil may cause a reduction in BMD. The effects of tenofovir disoproxil -associated changes in BMD on long-term bone health and future fracture risk are uncertain (see section 5.1).

If bone abnormalities are detected or suspected in paediatric patients, consultation with an endocrinologist and/or nephrologist should be obtained.

Weight and metabolic parameters
An increase in weight and in levels of blood lipids and glucose may occur during antiretroviral therapy. Such changes may in part be linked to disease control and life style. For lipids, there is in some cases evidence for a treatment effect, while for weight gain there is no strong evidence relating this to any particular treatment. For monitoring of blood lipids and glucose reference is made to established HIV treatment guidelines. Lipid disorders should be managed as clinically appropriate.

Mitochondrial dysfunction following exposure *in utero*
Nucleos(t)ide analogues may impact mitochondrial function to a variable degree, which is most pronounced with stavudine, didanosine and zidovudine. There have been reports of mitochondrial dysfunction in HIV negative infants exposed *in utero* and/or postnatally to nucleoside analogues; these have predominantly concerned treatment with regimens containing zidovudine. The main adverse reactions reported are haematological disorders (anaemia, neutropenia) and metabolic disorders (hyperlactatemia, hyperlipasemia). These events have often been transitory. Late onset neurological disorders have been reported rarely (hypertonia, convulsion, abnormal behaviour). Whether such neurological disorders are transient or permanent is currently unknown. These findings should be considered for any child exposed *in utero* to nucleos(t)ide analogues, who present with severe clinical findings of unknown etiology, particularly neurologic findings. These findings do not affect current national recommendations to use antiretroviral therapy in pregnant women to prevent vertical transmission of HIV.

Immune Reactivation Syndrome
In HIV infected patients with severe immune deficiency at the time of institution of CART, an inflammatory reaction to asymptomatic or residual opportunistic pathogens may arise and cause serious clinical conditions, or aggravation of symptoms. Typically, such reactions have been observed within the first few weeks or months of initiation of CART. Relevant examples are cytomegalovirus retinitis, generalised and/or focal mycobacterial infections, and *Pneumocystis jirovecii* pneumonia. Any inflammatory symptoms should be evaluated and treatment instituted when necessary. Autoimmune disorders (such as Graves' disease and autoimmune hepatitis) have also been reported to occur in the setting of immune reactivation; however, the reported time to onset is more variable and these events can occur many months after initiation of treatment.

Opportunistic infections
HIV-1 infected patients receiving the combination of emtricitabine and tenofovir disoproxil or any other antiretroviral therapy may continue to develop opportunistic infections and other complications of HIV infection, and therefore should remain under close clinical observation by physicians experienced in the treatment of patients with HIV associated diseases.

Osteonecrosis
Although the aetiology is considered to be multifactorial (including corticosteroid use, alcohol consumption, severe immunosuppression, higher body mass index), cases of osteonecrosis have been reported particularly in patients with advanced HIV-disease and/or long-term exposure to CART. Patients should be advised to seek medical advice if they experience joint aches and pain, joint stiffness or difficulty in movement.

Co-administration of other medicinal products

Use of the combination of emtricitabine and tenofovir disoproxil should be avoided with concurrent or recent use of a nephrotoxic medicinal product (see section 4.5). If concomitant use of the combination of emtricitabine and tenofovir disoproxil and nephrotoxic agents is unavoidable, renal function should be monitored weekly.

Cases of acute renal failure after initiation of high dose or multiple non-steroidal anti-inflammatory drugs (NSAIDs) have been reported in HIV-1 infected patients treated with tenofovir disoproxil and with risk factors for renal dysfunction. If the combination of emtricitabine and tenofovir disoproxil is co-administered with an NSAID, renal function should be monitored adequately.

A higher risk of renal impairment has been reported in HIV-1 infected patients receiving tenofovir disoproxil in combination with a ritonavir or cobicistat boosted protease inhibitor. Close monitoring of renal function is required in these patients (see section 4.5). In HIV-1 infected patients with renal risk factors, the co-administration of tenofovir disoproxil with a boosted protease inhibitor should be carefully evaluated.

The combination of emtricitabine and tenofovir disoproxil should not be administered concomitantly with other medicinal products containing emtricitabine, tenofovir disoproxil, tenofovir alafenamide, or other cytidine analogues, such as lamivudine (see section 4.5). The combination of emtricitabine and tenofovir disoproxil should not be administered concomitantly with adefovir dipivoxil.

Use with ledipasvir and sofosbuvir, sofosbuvir and velpatasvir or sofosbuvir, velpatasvir and voxilaprevir

Co-administration of tenofovir disoproxil with ledipasvir/sofosbuvir, sofosbuvir/velpatasvir or sofosbuvir/velpatasvir/voxilaprevir has been shown to increase plasma concentrations of tenofovir, especially when used together with an HIV regimen containing tenofovir disoproxil and a pharmacokinetic enhancer (ritonavir or cobicistat).

The safety of tenofovir disoproxil when co-administered with ledipasvir/sofosbuvir, sofosbuvir/velpatasvir or sofosbuvir/velpatasvir/voxilaprevir and a pharmacokinetic enhancer has not been established. The potential risks and benefits associated with co-administration should be considered, particularly in patients at increased risk of renal dysfunction. Patients receiving ledipasvir/sofosbuvir, sofosbuvir/velpatasvir or sofosbuvir/velpatasvir/voxilaprevir concomitantly with tenofovir disoproxil and a boosted HIV protease inhibitor should be monitored for adverse reactions related to tenofovir disoproxil.

Co-administration of tenofovir disoproxil and didanosine:
Co-administration is not recommended (see section 4.5).

Triple nucleoside therapy
There have been reports of a high rate of virological failure and of emergence of resistance at an early stage in HIV-1 infected patients when tenofovir disoproxil was combined with lamivudine and abacavir as well as with lamivudine and didanosine as a once daily regimen. There is close structural similarity between lamivudine and emtricitabine and similarities in the pharmacokinetics and pharmacodynamics of these two agents. Therefore, the same problems may be seen if the combination of emtricitabine and tenofovir disoproxil is administered with a third nucleoside analogue.

Elderly
The combination of emtricitabine and tenofovir disoproxil has not been studied in individuals over the age of 65 years. Individuals over the age of 65 years are more likely to have decreased renal function, therefore caution should be exercised when administering the combination of emtricitabine and tenofovir disoproxil to older people.

Excipients
Emtricitabine/Tenofovir disoproxil Teva contains less than 1 mmol sodium (23 mg) per tablet, i.e. essentially 'sodium- free'

4.5 Interaction with other medicinal products and other forms of interaction

Interaction studies have only been performed in adults.

As this combination contains emtricitabine and tenofovir disoproxil, any interactions that have been identified with these agents individually may occur with the combination of emtricitabine and tenofovir disoproxil. Interaction studies have only been performed in adults.

The steady-state pharmacokinetics of emtricitabine and tenofovir were unaffected when emtricitabine and tenofovir disoproxil were administered together *versus* each medicinal product dosed alone.

In vitro and clinical pharmacokinetic interaction studies have shown the potential for CYP450 mediated interactions involving emtricitabine and tenofovir disoproxil with other medicinal products is low.

Concomitant use not recommended

As a fixed combination, emtricitabine and tenofovir disoproxil should not be administered concomitantly with other medicinal products containing emtricitabine tenofovir disoproxil, tenofovir alafenamide or cytidine analogues, such as lamivudine (see section 4.4). The combination of emtricitabine and tenofovir disoproxil should not be administered concomitantly with adefovir dipivoxil.

Didanosine: The co-administration of the combination of emtricitabine and tenofovir disoproxil and didanosine is not recommended (see section 4.4 and Table 2).

Renally eliminated medicinal products: Since emtricitabine and tenofovir are primarily eliminated by the kidneys, co-administration of the combination of emtricitabine and tenofovir disoproxil with medicinal products that reduce renal function or compete for active tubular secretion (e.g. cidofovir) may increase serum concentrations of emtricitabine, tenofovir and/or the co-administered medicinal products.

Use of the combination of emtricitabine and tenofovir disoproxil should be avoided with concurrent or recent use of a nephrotoxic medicinal product. Some examples include, but are not limited to, aminoglycosides, amphotericin B, foscarnet, ganciclovir, pentamidine, vancomycin, cidofovir or interleukin-2 (see section 4.4).

Other interactions

Interactions between the components of the fixed combination of emtricitabine and tenofovir disoproxil or it's individual component(s) and other medicinal products are listed in Table 2 below (increase is indicated as "↑", decrease as "↓", no change as "↔", twice daily as "b.i.d." and once daily as "q.d."). If available, 90% confidence intervals are shown in parentheses.

Table 2: Interactions between the fixed combination of emtricitabine and tenofovir or its individual component(s) and other medicinal products

Medicinal product by therapeutic areas	**Effects on drug levels Mean percent change in AUC, C_{max}, C_{min} with 90% confidence intervals if available (mechanism)**	**Recommendation concerning co-administration with the combination of emtricitabine and tenofovir disoproxil (emtricitabine 200 mg, tenofovir disoproxil 245 mg)**
ANTI-INFECTIVES		
Antiretrovirals		
Protease inhibitors		
Atazanavir/Ritonavir/Tenofovir disoproxil (300 mg q.d./100 mg q.d./245 mg q.d.)	Atazanavir: AUC: ↓ 25% (↓ 42 to ↓ 3) C_{max}: ↓ 28% (↓ 50 to ↑ 5) C_{min}: ↓ 26% (↓ 46 to ↑ 10) Tenofovir: AUC: ↑ 37% C_{max}: ↑ 34% C_{min}: ↑ 29%	No dose adjustment is recommended. The increased exposure of tenofovir could potentiate tenofovir associated adverse events, including renal disorders. Renal function should be closely monitored (see section 4.4).
Atazanavir/Ritonavir/Emtricitabine	Interaction not studied.	
Darunavir/Ritonavir/Tenofovir disoproxil (300 mg q.d./100 mg q.d./245 mg q.d.)	Darunavir: AUC: ↔ C_{min}: ↔ Tenofovir: AUC: ↑ 22% C_{min}: ↑ 37%	No dose adjustment is recommended. The increased exposure of tenofovir could potentiate tenofovir associated adverse events, including renal disorders. Renal function should be closely monitored (see section 4.4).
Darunavir/Ritonavir/Emtricitabine	Interaction not studied.	

Lopinavir/Ritonavir/Tenofovir disoproxil (400 mg b.i.d./100 mg b.i.d/245 mg q.d.)	Lopinavir/Ritonavir: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Tenofovir: AUC: ↑ 32% (↑ 25 to ↑ 38) C_{max}: ↔ C_{min}: ↑ 51% (↑ 37 to ↑ 66)	No dose adjustment is recommended. The increased exposure of tenofovir could potentiate tenofovir associated adverse events, including renal disorders. Renal function should be closely monitored (see section 4.4).
Lopinavir/Ritonavir/Emtricitabine	Interaction not studied.	
NRTIs		
Didanosine/Tenofovir disoproxil	Co-administration of tenofovir disoproxil and didanosine results in a 40-60% increase in systemic exposure to didanosine.	Co-administration of the combination of emtricitabine and tenofovir disoproxil and didanosine is not recommended (see section 4.4). Increased systemic exposure to didanosine may increase didanosine related adverse reactions. Rarely, pancreatitis and lactic acidosis, sometimes fatal, have been reported. Co administration of tenofovir disoproxil and didanosine at a dose of 400 mg daily has been associated with a significant decrease in CD4 cell count, possibly due to an intracellular interaction increasing phosphorylated (i.e. active) didanosine. A decreased dosage of 250 mg didanosine co administered with tenofovir disoproxil therapy has been associated with reports of high rates of virological failure within several tested combinations for the treatment of HIV 1 infection.
Didanosine/Emtricitabine	Interaction not studied.	
Lamivudine/Tenofovir disoproxil	Lamivudine: AUC: ↓ 3% (↓ 8% to ↑ 15)	Lamivudine and the combination of emtricitabine and

	C_{max}: ↓ 24% (↓ 44 to ↓ 12) C_{min}: NC Tenofovir: AUC: ↓ 4% (↓ 15 to ↑ 8) C_{max}: ↑ 102% (↓ 96 to ↑ 108) C_{min}: NC	tenofovir disoproxil should not be administered concomitantly (see section 4.4).
Efavirenz/Tenofovir disoproxil	Efavirenz: AUC: ↓ 4% (↓ 7 to ↓ 1) C_{max}: ↓ 4% (↓ 9 to ↑ 2) C_{min}: NC Tenofovir: AUC: ↓ 1% (↓ 8 to ↑ 6) C_{max}: ↑ 7% (↓ 6 to ↑ 22) C_{min}: NC	No dose adjustment of efavirenz is required.
ANTI-INFECTIVES		
Hepatitis B virus (HBV) antiviral agents		
Adefovir dipivoxil /Tenofovir disoproxil	Adefovir dipivoxil: AUC: ↓ 11% (↓ 14 to ↓ 7) C_{max}: ↓ 7% (↓ 13 to ↓ 0) C_{min}: NC Tenofovir: AUC: ↓ 2% (↓ 5 to ↑ 0) C_{max}: ↓ 1% (↓ 7 to ↑ 6) C_{min}: NC	Adefovir dipivoxil and the combination of emtricitabine and tenofovir should not be administered concomitantly (see section 4.4).
Hepatitis C virus (HCV) antiviral agents		
Ledipasvir/Sofosbuvir (90 mg/400 mg q.d.) + Atazanavir/Ritonavir (300 mg q.d./100 mg q.d.) + Emtricitabine/Tenofovir disoproxil (200 mg/245 mg q.d.)[1]	Ledipasvir: AUC: ↑ 96% (↑ 74 to ↑ 121) C_{max}: ↑ 68% (↑ 54 to ↑ 84) C_{min}: ↑ 118% (↑ 91 to ↑ 150) Sofosbuvir: AUC: ↔ C_{max}: ↔ GS-331007[2]: AUC: ↔ C_{max}: ↔ C_{min}: ↑ 42% (↑ 34 to ↑ 49) Atazanavir: AUC: ↔ C_{max}: ↔ C_{min}: ↑ 63% (↑ 45 to ↑ 84) Ritonavir: AUC: ↔ C_{max}: ↔ C_{min}: ↑ 45% (↑ 27 to ↑ 64) Emtricitabine: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Tenofovir:	Increased plasma concentrations of tenofovir resulting from co-administration of tenofovir disoproxil, ledipasvir/sofosbuvir and atazanavir/ritonavir may increase adverse reactions related to tenofovir disoproxil , including renal disorders. The safety of tenofovir disoproxil when used with ledipasvir/sofosbuvir and a pharmacokinetic enhancer (e.g. ritonavir or cobicistat) has not been established. The combination should be used with caution with frequent renal monitoring, if other

	AUC: ↔ C_{max}: ↑ 47% (↑ 37 to ↑ 58) C_{min}: ↑ 47% (↑ 38 to ↑ 57)	alternatives are not available (see section 4.4).
Ledipasvir/Sofosbuvir (90 mg/400 mg q.d.) + Darunavir/Ritonavir (800 mg q.d./100 mg q.d.) + Emtricitabine/Tenofovir disoproxil (200 mg/245 mg q.d.)[1]	Ledipasvir: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Sofosbuvir: AUC: ↓ 27% (↓ 35 to ↓ 18) C_{max}: ↓ 37% (↓ 48 to ↓ 25) GS-331007[2]: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Darunavir: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Ritonavir: AUC: ↔ C_{max}: ↔ C_{min}: ↑ 48% (↑ 34 to ↑ 63) Emtricitabine: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Tenofovir: AUC: ↑ 50% (↑ 42 to ↑ 59) C_{max}: ↑ 64% (↑ 54 to ↑ 74) C_{min}: ↑ 59% (↑ 49 to ↑ 70)	Increased plasma concentrations of tenofovir resulting from co-administration of tenofovir disoproxil, ledipasvir/sofosbuvir and darunavir/ritonavir may increase adverse reactions related to tenofovir disoproxil, including renal disorders. The safety of tenofovir disoproxil when used with ledipasvir/sofosbuvir and a pharmacokinetic enhancer (e.g. ritonavir or cobicistat) has not been established. The combination should be used with caution with frequent renal monitoring, if other alternatives are not available (see section 4.4).
Ledipasvir/Sofosbuvir (90 mg/400 mg q.d.) + Efavirenz/Emtricitabine/Tenofovir disoproxil (600 mg/200 mg/245 mg q.d.)	Ledipasvir: AUC: ↓ 34% (↓ 41 to ↓ 25) C_{max}: ↓ 34% (↓ 41 to ↑ 25) C_{min}: ↓ 34% (↓ 43 to ↑ 24) Sofosbuvir: AUC: ↔ C_{max}: ↔ GS-331007[2]: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Efavirenz: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Emtricitabine: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Tenofovir: AUC: ↑ 98% (↑ 77 to ↑ 123) C_{max}: ↑ 79% (↑ 56 to ↑ 104) C_{min}: ↑ 163% (↑ 137 to ↑ 197)	No dose adjustment is recommended. The increased exposure of tenofovir could potentiate adverse reactions associated with tenofovir disoproxil, including renal disorders. Renal function should be closely monitored (see section 4.4).
Ledipasvir/Sofosbuvir (90 mg/400 mg q.d.) + Emtricitabine/Rilpivirine/Tenofovir disoproxil	Ledipasvir: AUC: ↔ C_{max}: ↔ C_{min}: ↔	No dose adjustment is recommended. The increased exposure of tenofovir could

(200 mg/25 mg/245 mg q.d.)	Sofosbuvir: AUC: ↔ C_{max}: ↔ GS-331007[2]: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Emtricitabine: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Rilpivirine: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Tenofovir: AUC: ↑ 40% (↑ 31 to ↑ 50) C_{max}: ↔ C_{min}: ↑ 91% (↑ 74 to ↑ 110)	potentiate adverse reactions associated with tenofovir disoproxil, including renal disorders. Renal function should be closely monitored (see section 4.4).
Ledipasvir/Sofosbuvir (90 mg/400 mg q.d.) + Dolutegravir (50 mg q.d.) + Emtricitabine/Tenofovir disoproxil (200 mg/245 mg q.d.)	Sofosbuvir: AUC: ↔ Cmax: ↔ GS-331007[2] AUC: ↔ Cmax: ↔ Cmin: ↔ Ledipasvir: AUC: ↔ Cmax: ↔ Cmin: ↔ Dolutegravir AUC: ↔ Cmax: ↔ Cmin: ↔ Emtricitabine: AUC: ↔ Cmax: ↔ Cmin: ↔ Tenofovir: AUC: ↑ 65% (↑ 59 to ↑ 71) Cmax: ↑ 61% (↑ 51 to ↑ 72) Cmin: ↑ 115% (↑ 105 to ↑ 126)	No dose adjustment is required. The increased exposure of tenofovir could potentiate adverse reactions associated with tenofovir disoproxil, including renal disorders. Renal function should be closely monitored (see section 4.4).
Sofosbuvir/Velpatasvir (400 mg/100 mg q.d.) + Atazanavir/Ritonavir	Sofosbuvir: AUC: ↔ Cmax: ↔	Increased plasma concentrations of tenofovir resulting from co-administration of tenofovir disoproxil,

(300 mg q.d./100 mg q.d.) + Emtricitabine/Tenofovir disoproxil (200 mg/245 mg q.d.)	GS-331007[2]: AUC: ↔ Cmax: ↔ Cmin: ↑ 42% (↑ 37 to ↑ 49) Velpatasvir: AUC: ↑ 142% (↑ 123 to ↑ 164) Cmax: ↑ 55% (↑ 41 to ↑ 71) Cmin: ↑ 301% (↑ 257 to ↑ 350) Atazanavir: AUC: ↔ Cmax: ↔ Cmin: ↑ 39% (↑ 20 to ↑ 61) Ritonavir: AUC: ↔ Cmax: ↔ Cmin: ↑ 29% (↑ 15 to ↑ 44) Emtricitabine: AUC: ↔ Cmax: ↔ Cmin: ↔ Tenofovir: AUC: ↔ Cmax: ↑ 55% (↑ 43 to ↑ 68) Cmin: ↑ 39% (↑ 31 to ↑ 48)	sofosbuvir/velpatasvir and atazanavir/ritonavir may increase adverse reactions related to tenofovir disoproxil, including renal disorders. The safety of tenofovir disoproxil when used with sofosbuvir/velpatasvir and a pharmacokinetic enhancer (e.g. ritonavir or cobicistat) has not been established. The combination should be used with caution with frequent renal monitoring (see section 4.4).
Sofosbuvir/Velpatasvir (400 mg/100 mg q.d.) + Darunavir/Ritonavir (800 mg q.d./100 mg q.d.) + Emtricitabine/Tenofovir disoproxil (200 mg/245 mg q.d.)	Sofosbuvir: AUC: ↓ 28% (↓ 34 to ↓ 20) Cmax: ↓ 38% (↓ 46 to ↓ 29) GS-331007[2]: AUC: ↔ Cmax: ↔ Cmin: ↔ Velpatasvir: AUC: ↔ Cmax: ↓ 24% (↓ 35 to ↓ 11) Cmin: ↔ Darunavir: AUC: ↔ Cmax: ↔	Increased plasma concentrations of tenofovir resulting from co-administration of tenofovir disoproxil, sofosbuvir/velpatasvir and darunavir/ritonavir may increase adverse reactions related to tenofovir disoproxil, including renal disorders. The safety of tenofovir disoproxil when used with sofosbuvir/velpatasvir and a pharmacokinetic enhancer (e.g. ritonavir or cobicistat) has not been established. The combination should

	Cmin: ↔ Ritonavir: AUC: ↔ Cmax: ↔ Cmin: ↔ Emtricitabine: AUC: ↔ Cmax: ↔ Cmin: ↔ Tenofovir: AUC: ↑ 39% (↑ 33 to ↑ 44) Cmax: ↑ 55% (↑ 45 to ↑ 66) Cmin: ↑ 52% (↑ 45 to ↑ 59)	be used with caution with frequent renal monitoring (see section 4.4).
Sofosbuvir/Velpatasvir (400 mg/100 mg q.d.) + Lopinavir/Ritonavir (800 mg/200 mg q.d.) + Emtricitabine/Tenofovir disoproxil (200 mg/245 mg q.d.)	Sofosbuvir: AUC: ↓ 29% (↓ 36 to ↓ 22) Cmax: ↓ 41% (↓ 51 to ↓ 29) GS-331007[2]: AUC: ↔ Cmax: ↔ Cmin: ↔ Velpatasvir: AUC: ↔ Cmax: ↓ 30% (↓ 41 to ↓ 17) Cmin: ↑ 63% (↑ 43 to ↑ 85) Lopinavir: AUC: ↔ Cmax: ↔ Cmin: ↔ Ritonavir: AUC: ↔ Cmax: ↔ Cmin: ↔ Emtricitabine: AUC: ↔ Cmax: ↔ Cmin: ↔ Tenofovir: AUC: ↔ Cmax: ↑ 42% (↑ 27 to ↑ 57) Cmin: ↔	Increased plasma concentrations of tenofovir resulting from co-administration of tenofovir disoproxil, sofosbuvir/velpatasvir and lopinavir/ritonavir may increase adverse reactions related to tenofovir disoproxil, including renal disorders. The safety of tenofovir disoproxil when used with sofosbuvir/velpatasvir and a pharmacokinetic enhancer (e.g. ritonavir or cobicistat) has not been established. The combination should be used with caution with frequent renal monitoring (see section 4.4).

Sofosbuvir/Velpatasvir (400 mg/100 mg q.d.) + Raltegravir (400 mg b.i.d) + Emtricitabine/Tenofovir disoproxil (200 mg/245 mg q.d.)	Sofosbuvir: AUC: ↔ Cmax: ↔ GS-331007[2]: AUC: ↔ Cmax: ↔ Cmin: ↔ Velpatasvir: AUC: ↔ Cmax: ↔ Cmin: ↔ Raltegravir: AUC: ↔ Cmax: ↔ Cmin: ↓ 21% (↓ 58 to ↑ 48) Emtricitabine: AUC: ↔ Cmax: ↔ Cmin: ↔ Tenofovir: AUC: ↑ 40% (↑ 34 to ↑ 45) Cmax: ↑ 46% (↑ 39 to ↑ 54) Cmin: ↑ 70% (↑ 61 to ↑ 79)	No dose adjustment is recommended. The increased exposure of tenofovir could potentiate adverse reactions associated with tenofovir disoproxil, including renal disorders. Renal function should be closely monitored (see section 4.4).
Sofosbuvir/Velpatasvir (400 mg/100 mg q.d.) + Efavirenz/Emtricitabine/Tenofovir disoproxil (600 mg/200 mg/245 mg q.d.)	Sofosbuvir: AUC: ↔ Cmax: ↑ 38% (↑ 14 to ↑ 67) GS-331007[2]: AUC: ↔ Cmax: ↔ Cmin: ↔ Velpatasvir: AUC: ↓ 53% (↓ 61 to ↓ 43) Cmax: ↓ 47% (↓ 57 to ↓ 36) Cmin: ↓ 57% (↓ 64 to ↓ 48) Efavirenz: AUC: ↔ Cmax: ↔ Cmin: ↔ Emtricitabine: AUC: ↔	Concomitant administration of sofosbuvir/velpatasvir and efavirenz is expected to decrease plasma concentrations of velpatasvir. Co-administration of sofosbuvir/velpatasvir with efavirenz-containing regimens is not recommended.

	Cmax: ↔ Cmin: ↔ Tenofovir: AUC: ↑ 81% (↑ 68 to ↑ 94) Cmax: ↑ 77% (↑ 53 to ↑ 104) Cmin: ↑ 121% (↑ 100 to ↑ 143)	
Sofosbuvir/Velpatasvir (400 mg/100 mg q.d.) + Emtricitabine/Rilpivirine/Tenofovir disoproxil (200 mg/25 mg/245 mg q.d.)	Sofosbuvir: AUC: ↔ Cmax: ↔ GS-331007[2]: AUC: ↔ Cmax: ↔ Cmin: ↔ Velpatasvir: AUC: ↔ Cmax: ↔ Cmin: ↔ Emtricitabine: AUC: ↔ Cmax: ↔ Cmin: ↔ Rilpivirine: AUC: ↔ Cmax: ↔ Cmin: ↔ Tenofovir: AUC: ↑ 40% (↑ 34 to ↑ 46) Cmax: ↑ 44% (↑ 33 to ↑ 55) Cmin: ↑ 84% (↑ 76 to ↑ 92)	No dose adjustment is recommended. The increased exposure of tenofovir could potentiate adverse reactions associated with tenofovir disoproxil, including renal disorders. Renal function should be closely monitored (see section 4.4).
Sofosbuvir/Velpatasvir/Voxilaprevir (400 mg/100 mg/ 100 mg+100 mg q.d.)[3] + Darunavir (800 mg q.d.) + Ritonavir (100 mg q.d.) + Emtricitabine/Tenofovir disoproxil (200 mg/245 mg q.d.)	Sofosbuvir: AUC: ↔ Cmax: ↓ 30% Cmin: N/A GS-331007[2]: AUC: ↔ Cmax: ↔ Cmin: N/A Velpatasvir: AUC: ↔	Increased plasma concentrations of tenofovir resulting from co-administration of tenofovir disoproxil, sofosbuvir/velpatasvir/voxilaprevir and darunavir/ritonavir may increase adverse reactions related to tenofovir disoproxil, including renal disorders. The safety of tenofovir disoproxil when used with sofosbuvir/velpatasvir/vo

	Cmax: ↔ Cmin: ↔ Voxilaprevir AUC: ↑ 143% Cmax :↑ 72% Cmin : ↑ 300% Darunavir: AUC: ↔ Cmax: ↔ Cmin: ↓ 34% Ritonavir: AUC: ↑ 45% Cmax :↑ 60% Cmin : ↔ Emtricitabine: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Tenofovir: AUC: ↑ 39% C_{max}: ↑ 48% C_{min}: ↑ 47%	xilaprevir and a pharmacokinetic enhancer (e.g. ritonavir or cobicistat) has not been established. The combination should be used with caution with frequent renal monitoring (see section 4.4).
Sofosbuvir (400 mg q.d.) + Efavirenz/Emtricitabine/Tenofovir disoproxil (600 mg/200 mg/245 mg q.d.)	Sofosbuvir: AUC: ↔ C_{max}: ↓ 19% (↓ 40 to ↑ 10) GS-331007[2]: AUC: ↔ C_{max}: ↓ 23% (↓ 30 to ↑ 16) Efavirenz: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Emtricitabine: AUC: ↔ C_{max}: ↔ C_{min}: ↔ Tenofovir: AUC: ↔ C_{max}: ↑ 25% (↑ 8 to ↑ 45) C_{min}: ↔	No dose adjustment is required.
Ribavirin/Tenofovir disoproxil	Ribavirin: AUC: ↑ 26% (↑ 20 to ↑ 32) C_{max}: ↓ 5% (↓ 11 to ↑ 1) C_{min}: NC	No dose adjustment of ribavirin is required.
Herpes virus antiviral		

agents		
Famciclovir/Emtricitabine	Famciclovir: AUC: ↓ 9% (↓ 16 to ↓ 1) C_{max}: ↓ 7% (↓ 22 to ↑ 11) C_{min}: NC Emtricitabine: AUC: ↓ 7% (↓ 13 to ↓ 1) C_{max}: ↓ 11% (↓ 20 to ↑ 1) C_{min}: NC	No dose adjustment of famciclovir is required.
Antimycobacterials		
Rifampicin/Tenofovir disoproxil	Tenofovir: AUC: ↓ 12% (↓ 16 to ↓ 8) C_{max}: ↓ 16% (↓ 22 to ↓ 10) C_{min}: ↓ 15% (↓ 12 to ↓ 9)	No dose adjustment is required.
ORAL CONTRACEPTIVES		
Norgestimate/Ethinyl oestradiol/Tenofovir disoproxil	Norgestimate: AUC: ↓ 4% (↓ 32 to ↑ 34) C_{max}: ↓ 5% (↓ 27 to ↑ 24) C_{min}: NC Ethinyl oestradiol: AUC: ↓ 4% (↓ 9 to ↑ 0) C_{max}: ↓ 6% (↓ 13 to ↑ 0) C_{min}: ↓ 2% (↓ 9 to ↑ 6)	No dose adjustment of norgestimate/ethinyl oestradiol is required.
IMMUNOSUPPRESSANTS		
Tacrolimus/Tenofovir disoproxil /Emtricitabine	Tacrolimus: AUC: ↑ 4% (↓ 3 to ↑ 11) C_{max}: ↑ 3% (↓ 3 to ↑ 9) C_{min}: NC Emtricitabine: AUC: ↓ 5% (↓ 9 to ↓ 1) C_{max}: ↓ 11% (↓ 17 to ↓ 5) C_{min}: NC Tenofovir: AUC: ↑ 6% (↓ 1 to ↑ 13) C_{max}: ↑13% (↑ 1 to ↑ 27) C_{min}: NC	No dose adjustment of tacrolimus is required.
NARCOTIC ANALGESICS		
Methadone/Tenofovir disoproxil	Methadone: AUC: ↑ 5% (↓ 2 to ↑ 13) C_{max}: ↑ 5% (↓ 3 to ↑ 14)	No dose adjustment of methadone is required.

	C_{min}: NC	

NC = not calculated

N/A = not applicable

[1] Data generated from simultaneous dosing with ledipasvir/sofosbuvir. Staggered administration (12 hours apart) provided similar results.
[2] The predominant circulating metabolite of sofosbuvir
[3] Study conducted with additional voxilaprevir 100 mg to achieve voxilaprevir exposures expected in HCV-infected patients.

4.6 Fertility, pregnancy and lactation

Pregnancy

A large amount of data on pregnant women (more than 1,000 pregnancy outcomes) indicate no malformations or foetal/neonatal toxicity associated with emtricitabine and tenofovir disoproxil. Animal studies on emtricitabine and tenofovir disoproxil do not indicate reproductive toxicity (see section 5.3). Therefore the use of the combination of emtricitabine and tenofovir disoproxil may be considered during pregnancy, if necessary.

Breast-feeding

Emtricitabine and tenofovir have been shown to be excreted in human milk. There is insufficient information on the effects of emtricitabine and tenofovir in newborns/infants. Therefore the combination of emtricitabine and tenofovir disoproxil should not be used during breast-feeding.

In order to avoid transmission of HIV to the infant it is recommended that women living with HIV do not breast-feed their infants.

Fertility

No human data on the effect of the combination of emtricitabine and tenofovir disoproxil are available. Animal studies do not indicate harmful effects of emtricitabine or tenofovir disoproxil on fertility.

4.7 Effects on ability to drive and use machines

No studies on the effects on the ability to drive and use machines have been performed. However, patients should be informed that dizziness has been reported during treatment with both emtricitabine and tenofovir disoproxil.

4.8 Undesirable effects

Summary of the safety profile

HIV-1 infection: The most frequently reported adverse reactions considered possibly or probably related to emtricitabine and/or tenofovir disoproxil were nausea (12%) and diarrhoea (7%) in an open-label randomised clinical study in adults (GS-01-934,

see section 5.1). The safety profile of emtricitabine and tenofovir disoproxil in this study was consistent with the previous experience with these agents when each was administered with other antiretroviral agents.

Pre-exposure prophylaxis: No new adverse reactions to the combination of emtricitabine and tenofovir disoproxil were identified from two randomised placebo-controlled studies (iPrEx, Partners PrEP) in which 2,830 HIV-1 uninfected adults received the combination of emtricitabine and tenofovir once daily for pre-exposure prophylaxis. Patients were followed for a median of 71 weeks and 87 weeks, respectively. The most frequent adverse reaction reported in the the combination of emtricitabine and tenofovir group in the iPrEx study was headache (1%).

Tabulated summary of adverse reactions

The adverse reactions considered at least possibly related to treatment with the components of the combination of emtricitabine and tenofovir disoproxil from clinical trial and post-marketing experience in HIV-1 infected patients are listed in Table 3, below, by body system organ class and frequency. Within each frequency grouping, undesirable effects are presented in order of decreasing seriousness. Frequencies are defined as very common (≥ 1/10), common (≥ 1/100 to < 1/10), uncommon (≥ 1/1,000 to < 1/100) or rare (≥ 1/10,000 to < 1/1,000).

Table 3: Tabulated summary of adverse reactions associated with the individual components of the combination of emtricitabine and tenofovir disoproxil based on clinical study and post-marketing experience

Frequency	**Emtricitabine**	**Tenofovir disoproxil**
Blood and lymphatic system disorders:		
Common:	neutropenia	
Uncommon:	anaemia[2]	
Immune system disorders:		
Common:	allergic reaction	
Metabolism and nutrition disorders:		
Very common:		hypophosphataemia[1]
Common:	hyperglycaemia, hypertriglyceridaemia	
Uncommon:		hypokalaemia[1]
Rare:		lactic acidosis
Psychiatric disorders:		
Common:	insomnia, abnormal dreams	

Nervous system disorders:		
Very common:	headache	dizziness
Common:	dizziness	headache
Gastrointestinal disorders:		
Very common:	diarrhoea, nausea	diarrhoea, vomiting, nausea
Common:	elevated amylase including elevated pancreatic amylase, elevated serum lipase, vomiting, abdominal pain, dyspepsia	abdominal pain, abdominal distension, flatulence
Uncommon:		pancreatitis
Hepatobiliary disorders:		
Common:	elevated serum aspartate aminotransferase (AST) and/or elevated serum alanine aminotransferase (ALT), hyperbilirubinaemia	increased transaminases
Rare:		hepatic steatosis, hepatitis
Skin and subcutaneous tissue disorders:		
Very common:		rash
Common:	vesiculobullous rash, pustular rash, maculopapular rash, rash, pruritus, urticaria, skin discolouration (increased pigmentation)[2]	
Uncommon:	angioedema[3]	
Rare:		angioedema
Musculoskeletal and connective tissue disorders:		
Very common:	elevated creatine kinase	
Common		bone mineral density decreased
Uncommon:		rhabdomyolysis[1], muscular weakness[1]
Rare:		osteomalacia (manifested as bone pain and infrequently contributing to fractures)[1,3], myopathy[1]

Renal and urinary disorders:		
Uncommon:		increased creatinine, proteinuria, proximal renal tubulopathy including Fanconi syndrome
Rare:		renal failure (acute and chronic), acute tubular necrosis, nephritis (including acute interstitial nephritis)[3], nephrogenic diabetes insipidus
General disorders and administration site conditions:		
Very common:		asthenia
Common:	pain, asthenia	

[1] This adverse reaction may occur as a consequence of proximal renal tubulopathy. It is not considered to be causally associated with tenofovir disoproxil in the absence of this condition.

[2] Anaemia was common and skin discolouration (increased pigmentation) was very common when emtricitabine was administered to paediatric patients.

[3] This adverse reaction was identified through post-marketing surveillance but not observed in randomised controlled clinical trials in adults or paediatric HIV clinical trials for emtricitabine or in randomised controlled clinical trials or the tenofovir disoproxil expanded access program for tenofovir disoproxil. The frequency category was estimated from a statistical calculation based on the total number of patients exposed to emtricitabine in randomised controlled clinical trials (n = 1,563) or tenofovir disoproxil in randomised controlled clinical trials and the expanded access program (n = 7,319).

Description of selected adverse reactions

Renal impairment: As the combination of emtricitabine and tenofovir disoproxil may cause renal damage monitoring of renal function is recommended (see sections 4.4 and 4.8). Proximal renal tubulopathy generally resolved or improved after tenofovir disoproxil discontinuation. However, in some HIV-1 infected patients, declines in creatinine clearance did not completely resolve despite tenofovir disoproxil discontinuation. Patients at risk of renal impairment (such as patients with baseline renal risk factors, advanced HIV disease, or patients receiving concomitant nephrotoxic medications) are at increased risk of experiencing incomplete recovery of renal function despite tenofovir disoproxil discontinuation (see section 4.4).

Lactic acidosis

Cases of lactic acidosis have been reported with tenofovir disoproxil alone or in combination with other antiretrovirals. Patients with predisposing factors such as patients with decompensated liver disease, or patients receiving concomitant medications known to induce lactic acidosis are at increased risk of experiencing severe lactic acidosis during tenofovir disoproxil treatment, including fatal outcomes.

Metabolic parameters: Weight and levels of blood lipids and glucose may increase during antiretroviral therapy (see section 4.4).

Immune Reactivation Syndrome: In HIV infected patients with severe immune deficiency at the time of initiation of CART, an inflammatory reaction to asymptomatic or residual opportunistic infections may arise. Autoimmune disorders (such as Graves' disease and autoimmune hepatitis) have also been reported; however, the reported time to onset is more variable and these events can occur many months after initiation of treatment (see section 4.4).

Osteonecrosis: Cases of osteonecrosis have been reported, particularly in patients with generally acknowledged risk factors, advanced HIV disease or long-term exposure to CART. The frequency of this is unknown (see section 4.4).

Paediatric population

Assessment of adverse reactions related to emtricitabine is based on experience in three paediatric studies (n = 169) where treatment-naïve (n = 123) and treatment-experienced (n = 46) paediatric HIV infected patients aged 4 months to 18 years were treated with emtricitabine in combination with other antiretroviral agents. In addition to the adverse reactions reported in adults, anaemia (9.5%) and skin discolouration (31.8%) occurred more frequently in clinical trials in paediatric patients than in adults (see section 4.8, *Tabulated summary of adverse reactions*).

Assessment of adverse reactions related to tenofovir disoproxil is based on two randomized trials (studies GS-US 104-0321 and GS-US-104-0352) in 184 HIV-1 infected paediatric patients (aged 2 to < 18 years) who received treatment with tenofovir disoproxil (n = 93) or placebo/active comparator (n = 91) in combination with other antiretroviral agents for 48 weeks (see section 5.1). The adverse reactions observed in paediatric patients who received treatment with tenofovir disoproxil were consistent with those observed in clinical studies of tenofovir disoproxil in adults (see section 4.8 *Tabulated summary of adverse reactions* and 5.1).

Reductions in BMD have been reported in paediatric patients. In HIV-1 infected adolescents (aged 12 to < 18 years), the BMD Z-scores observed in subjects who received tenofovir disoproxil were lower than those observed in subjects who received placebo. In HIV-1 infected children (aged 2 to 15 years), the BMD Z-scores observed in subjects who switched to tenofovir disoproxil were lower than those observed in subjects who remained on their stavudine- or zidovudine-containing regimen (see sections 4.4 and 5.1).

In study GS-US-104-0352, 89 HIV-1 infected paediatric patients with a median age of 7 years (range 2 to 15 years) were exposed to tenofovir disoproxil for a median of 331 weeks. Eight of the 89 patients (9.0%) discontinued study drug due to renal adverse events. Five subjects (5.6%) had laboratory findings clinically consistent with proximal renal tubulopathy, 4 of whom discontinued tenofovir disoproxil therapy.. Seven patients had estimated glomerular filtration rate (GFR) values between 70 and 90 mL/min/1.73 m_2. Among them, 3 patients experienced a clinically meaningful decline in estimated GFR during therapy which improved after discontinuation of tenofovir disoproxil.

Other special population(s)

Individuals with renal impairment: Since tenofovir disoproxil can cause renal toxicity, close monitoring of renal function is recommended in any adult with renal

impairment treated with the combination of emtricitabine and tenofovir disoproxil (see sections 4.2, 4.4 and 5.2). The use of Emtricitabine/Tenofovir disoproxil Teva is not recommended in paediatric patients with renal impairment (see sections 4.2 and 4.4).

HIV/HBV or HCV co-infected patients: The adverse reaction profile of emtricitabine and tenofovir disoproxil in a limited number of HIV-infected patients in study GS-01-934 who were co-infected with HBV (n=13) or HCV (n=26) was similar to that observed in patients infected with HIV without co-infection. However, as would be expected in this patient population, elevations in AST and ALT occurred more frequently than in the general HIV infected population.

Exacerbations of hepatitis after discontinuation of treatment: In HBV infected patients, clinical and laboratory evidence of hepatitis have occurred after discontinuation of treatment (see section 4.4).

Reporting of suspected adverse reactions
Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the Yellow Card Scheme Website at: www.mhra.gov.uk/yellowcard or search for MHRA Yellow Card in the Google Play or Apple App Store.

4.9 Overdose

If overdose occurs the individual must be monitored for evidence of toxicity (see section 4.8), and standard supportive treatment applied as necessary.

Up to 30% of the emtricitabine dose and approximately 10% of the tenofovir dose can be removed by haemodialysis. It is not known whether emtricitabine or tenofovir can be removed by peritoneal dialysis.

5 PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic group: Antiviral for systemic use; antivirals for treatment of HIV infections, combinations. ATC code: J05AR03

Mechanism of action

Emtricitabine is a nucleoside analogue of cytidine. Tenofovir disoproxil is converted *in vivo* to tenofovir, a nucleoside monophosphate (nucleotide) analogue of adenosine monophosphate. Both emtricitabine and tenofovir have activity that is specific to human immunodeficiency virus (HIV-1 and HIV-2) and hepatitis B virus.

Emtricitabine and tenofovir are phosphorylated by cellular enzymes to form emtricitabine triphosphate and tenofovir diphosphate, respectively. *In vitro* studies have shown that both emtricitabine and tenofovir can be fully phosphorylated when combined together in cells. Emtricitabine triphosphate and tenofovir diphosphate competitively inhibit HIV-1 reverse transcriptase, resulting in DNA chain termination.

Both emtricitabine triphosphate and tenofovir diphosphate are weak inhibitors of mammalian DNA polymerases and there was no evidence of toxicity to mitochondria *in vitro* and *in vivo*.

Antiviral activity *in vitro*

Synergistic antiviral activity was observed with the combination of emtricitabine and tenofovir *in vitro*. Additive to synergistic effects were observed in combination studies with protease inhibitors, and with nucleoside and non-nucleoside analogue inhibitors of HIV reverse transcriptase.

Resistance

In vitro: Resistance has been seen *in vitro* and in some HIV-1 infected patients due to the development of the M184V/I mutation with emtricitabine or the K65R mutation with tenofovir. Emtricitabine-resistant viruses with the M184V/I mutation were cross-resistant to lamivudine, but retained sensitivity to didanosine, stavudine, tenofovir and zidovudine. The K65R mutation can also be selected by abacavir or didanosine and results in reduced susceptibility to these agents plus lamivudine, emtricitabine and tenofovir. Tenofovir disoproxil should be avoided in patients with HIV-1 harbouring the K65R mutation. In addition, a K70E

substitution in HIV-1 reverse transcriptase has been selected by tenofovir and results in low-level reduced susceptibility to abacavir, emtricitabine, lamivudine and tenofovir.

HIV-1 expressing three or more thymidine analogue associated mutations (TAMs) that included either the M41L or L210W reverse transcriptase mutation showed reduced susceptibility to tenofovir disoproxil.

In vivo treatment of HIV-1: In an open-label randomised clinical study (GS-01-934) in antiretroviral-naïve patients, genotyping was performed on plasma HIV-1 isolates from all patients with confirmed HIV RNA > 400 copies/mL at weeks 48, 96 or 144 or at the time of early study drug discontinuation. As of week 144:

- The M184V/I mutation developed in 2/19 (10.5%) isolates analysed from patients in the emtricitabine/tenofovir disoproxil/efavirenz group and in 10/29 (34.5%) isolates analysed from the lamivudine/zidovudine/efavirenz group (p-value < 0.05, Fisher's Exact test comparing the emtricitabine+tenofovir disoproxil group to the lamivudine/zidovudine group among all patients).
- No virus analysed contained the K65R or K70E mutation.
- Genotypic resistance to efavirenz, predominantly the K103N mutation, developed in virus from 13/19 (68%) patients in the emtricitabine/tenofovir

disoproxil/efavirenz group and in virus from 21/29 (72%) patients in the comparative group.

In vivo -pre-exposure prophylaxis: Plasma samples from 2 clinical studies of HIV-1 uninfected subjects, iPrEx and Partners PrEP, were analysed for 4 HIV-1 variants expressing amino acid substitutions (i.e. K65R, K70E, M184V, and M184I) that potentially confer resistance to tenofovir or emtricitabine. In the iPrEx clinical study, no HIV-1 variants expressing K65R, K70E, M184V, or M184I were detected at the time of seroconversion among subjects who became infected with HIV-1 after enrollment in the study. In 3 of 10 subjects who had acute HIV infection at study enrollment, M184I and M184V mutations were detected in the HIV of 2 of 2 subjects in the combination of emtricitabine and tenofovir disoproxil group and 1 of 8 subjects in the placebo group.

In the Partners PrEP clinical study, no HIV-1 variants expressing K65R, K70E, M184V, or M184I were detected at the time of seroconversion among subjects who became infected with HIV-1 during the study. In 2 of 14 subjects who had acute HIV infection at study enrollment, the K65R mutation was detected in the HIV of 1 of 5 subjects in the tenofovir disoproxil 245 mg group and the M184V mutation (associated with resistance to emtricitabine) was detected in the HIV of 1 of 3 subjects in the combination of emtricitabine and tenofovir disoproxil group.

Clinical data

Treatment of HIV-1 infection: In an open-label randomised clinical study (GS-01-934), antiretroviral-naïve HIV-1 infected adult patients received either a once daily regimen of emtricitabine, tenofovir disoproxil and efavirenz (n=255) or a fixed combination of lamivudine and zidovudine administered twice daily and efavirenz once daily (n=254). Patients in the emtricitabine and tenofovir disoproxil group were given the combination of emtricitabine and tenofovir disoproxil and efavirenz from week 96 to week 144. At baseline the randomised groups had similar median plasma HIV-1 RNA (5.02 and 5.00 $\log_{10}$ copies/mL) and CD4 counts (233 and 241 cells/mm^3). The primary efficacy endpoint for this study was the achievement and maintenance of confirmed HIV-1 RNA concentrations < 400 copies/mL over 48 weeks. Secondary efficacy analyses over 144 weeks included the proportion of patients with HIV-1 RNA concentrations < 400 or < 50 copies/mL, and change from baseline in CD4 cell count.

The 48-week primary endpoint data showed that the combination of emtricitabine, tenofovir disoproxil and efavirenz provided superior antiviral efficacy as compared with the fixed combination of lamivudine and zidovudine with efavirenz as shown in Table 4. The 144 week secondary endpoint data are also presented in Table 4.

Table 4: 48- and 144-week efficacy data from study GS-01-934 in which emtricitabine, tenofovir disoproxil and efavirenz were administered to antiretroviral-naïve patients with HIV-1 infection

	GS-01-934 **Treatment for 48 weeks**	**GS-01-934** **Treatment for 144 weeks**

	Emtricitabine + tenofovir disoproxil + efavirenz	Lamivudine + zidovudine + efavirenz	Emtricitabine + tenofovir disoproxil + efavirenz*	Lamivudine + zidovudine + efavirenz
HIV-1 RNA < 400 copies/mL (TLOVR)	84% (206/244)	73% (177/243)	71% (161/227)	58% (133/229)
p-value	0.002**		0.004**	
% difference (95%CI)	11% (4% to 19%)		13% (4% to 22%)	
HIV-1 RNA < 50 copies/mL (TLOVR)	80% (194/244)	70% (171/243)	64% (146/227)	56% (130/231)
p-value	0.021**		0.082**	
% difference (95%CI)	9% (2% to 17%)		8% (-1% to 17%)	
Mean change from baseline in CD4 cell count (cells/mm^3)	+190	+158	+312	+271
p-value	0.002[a]		0.089[a]	
Difference (95%CI)	32 (9 to 55)		41 (4 to 79)	

* Patients receiving emtricitabine, tenofovir disoproxil and efavirenz were given the combination of emtricitabine and tenofovir disoproxil plus efavirenz from week 96 to 144.

** The p-value based on the Cochran-Mantel-Haenszel Test stratified for baseline CD4 cell count

TLOVR=Time to Loss of Virologic Response

a: Van Elteren Test

In a randomised clinical study (M02-418), 190 antiretroviral-naïve adults were treated once daily with emtricitabine and tenofovir disoproxil in combination with lopinavir/ritonavir given once or twice daily. At 48 weeks, 70% and 64% of patients demonstrated HIV-1 RNA < 50 copies/mL with the once and twice daily regimens of lopinavir/ritonavir, respectively. The mean changes in CD4 cell count from baseline were +185 cells/mm^3 and +196 cells/mm^3, respectively.

Limited clinical experience in patients co-infected with HIV and HBV suggests that treatment with emtricitabine or tenofovir disoproxil in antiretroviral combination therapy to control HIV infection results in a reduction in HBV DNA (3 $\log_{10}$ reduction or 4 to 5 $\log_{10}$ reduction, respectively) (see section 4.4).

Pre-exposure prophylaxis: The iPrEx study (CO-US-104-0288) evaluated the combination of emtricitabine and tenofovir disoproxil or placebo in 2,499 HIV-uninfected men (or transgender women) who have sex with men and who were considered at high risk for HIV infection. Subjects were followed for 4,237 person-years. Baseline characteristics are summarised in Table 5.

Table 5: Study population from study CO-US-104-0288 (iPrEx)

	Placebo (n = 1248)	**Combination of emtricitabine and tenofovir (n = 1251)**
Age (Yrs), Mean (SD)	27 (8.5)	27 (8.6)
Race, N (%)		
Black/African American	97 (8)	117 (9)
White	208 (17)	223 (18)
Mixed/Other	878 (70)	849 (68)
Asian	65 (5)	62 (5)
Hispanic/Latino Ethnicity, N (%)	906 (73)	900 (72)
Sexual Risk Factors at Screening		
Number of Partners Previous 12 Weeks, Mean (SD)	18 (43)	18 (35)
URAI Previous 12 Weeks, N (%)	753 (60)	732 (59)
URAI with HIV+ (or unknown status) Partner Previous 6 Mos, N (%)	1009 (81)	992 (79)
Involved in Transactional Sex Last 6 Month, N (%)	510 (41)	517 (41)
Known HIV+ Partner Last 6 Months, N (%)	32 (3)	23 (2)
Syphilis Seroreactivity, N (%)	162/1239 (13)	164/1240 (13)
Serum Herpes Simplex Virus Type 2 Infection, N (%)	430/1243 (35)	458/1241 (37)
Urine Leukocyte Esterase Positive, N (%)	22 (2)	23 (2)

URAI = unprotected receptive anal intercourse

The incidences of HIV seroconversion overall and in the subset reporting unprotected receptive anal intercourse are shown in Table 6. Efficacy was strongly correlated with adherence as assessed by detection of plasma or intracellular drug levels in a case-control study (Table 7).

Table 6: Efficacy in study CO-US-104-0288 (iPrEx)

	Placebo	**Combination of emtricitabine and tenofovir disoproxil**	**P-value [a, b]**
mITT Analysis			
Seroconversions / N	83 / 1217	48 / 1224	0.002
Relative Risk Reduction (95% CI)[b]	42% (18%, 60%)		

URAI Within 12 Weeks Prior to Screening, mITT Analysis			
Seroconversions / N	72 / 753	34 / 732	0.0349
Relative Risk Reduction (95% CI)[b]	52% (28%, 68%)		

[a] P-values by logrank test. P-values for URAI refer to the null hypothesis that efficacy differed between subgroup strata (URAI, no URAI).

[b] Relative risk reduction calculated for mITT based on incident seroconversion, ie, occurring post-baseline through first post-treatment visit (approximately 1 month after last study drug dispensation).

Table 7: Efficacy and adherence in study CO-US-104-0288 (iPrEx, matched case-control analysis)

Cohort	**Drug Detected**	**Drug Not Detected**	**Relative Risk Reduction (2-sided 95% CI)** [a]
HIV-Positive Subjects	4 (8%)	44 (92%)	94% (78%, 99%)
HIV-Negative Matched Control Subjects	63 (44%)	81 (56%)	—

[a] Relative risk reduction calculated on **i**ncident (post-baseline) seroconversion from the double-blind treatment period and through the 8-week follow-up period. Only samples from subjects randomized to the combination of emtricitabine and tenofovir disoproxil were evaluated for detectable plasma or intracellular tenofovir disoproxil -DP levels.

The Partners PrEP clinical study (CO-US-104-0380) evaluated the combination of emtricitabine and tenofovir disoproxil, tenofovir disoproxil 245 mg or placebo in 4,758 HIV-uninfected subjects from Kenya or Uganda in serodiscordant heterosexual couples. Subjects were followed for 7,830 person-years. Baseline characteristics are summarised in Table 8.

Table 8: Study population from study CO-US-104-0380 (Partners PrEP)

	Placebo (n = 1584)	**Tenofovir disoproxil 245 mg (n = 1584)**	**The combination of emtricitabine and tenofovir disoproxil (n = 1579)**
Age (Yrs), Median (Q1, Q3)	34 (28, 40)	33 (28, 39)	33 (28, 40)
Gender, N (%)			
Male	963 (61)	986 (62)	1013 (64)
Female	621 (39)	598 (38)	566 (36)
Key Couple Characteristics, N (%) or Median (Q1, Q3)			
Married to study partner	1552 (98)	1543 (97)	1540 (98)
Years living with study partner	7.1 (3.0, 14.0)	7.0 (3.0, 13.5)	7.1 (3.0, 14.0)
Years aware of discordant status	0.4 (0.1, 2.0)	0.5 (0.1, 2.0)	0.4 (0.1, 2.0)

The incidence of HIV seroconversion is shown in Table 9. The rate of HIV-1 seroconversion in males was 0.24/100 person-years of the combination of emtricitabine and tenofovir disoproxil exposure and the rate of HIV-1 seroconversion in females was 0.95/100 person-years of the combination of emtricitabine and

tenofovir disoproxil exposure. Efficacy was strongly correlated with adherence as assessed by detection of plasma or intracellular drug levels and was higher among substudy participants who received active adherence counselling and as show in Table 10.

Table 9: Efficacy in study CO-US-104-0380 (Partners PrEP)

	Placebo	**Tenofovir disoproxil 245 mg**	**The combination of emtricitabine and tenofovir disoproxil**
Seroconversions / Na [a]	52 / 1578	17 / 1579	13 / 1576
Incidence per 100 person-years (95% CI)	1.99 (1.49, 2.62)	0.65 (0.38, 1.05)	0.50 (0.27, 0.85)
Relative Risk Reduction (95% CI)	—	67% (44%, 81%)	75% (55%, 87%)

[a] Relative risk reduction calculated for mITT cohort based on incident (post-baseline) seroconversion. Comparisons for active study groups are made versus placebo.

Table 10: Efficacy and adherence in study CO-US-104-0380 (Partners PrEP)

Study Drug Quantification	**Number with Tenofovir Detected/ Total Samples (%)**		**Risk Estimate for HIV-1 Protection: Detection Versus No Detection of Tenofovir**	
	Case	**Cohort**	**Relative Risk Reduction (95% CI)**	**p-value**
FTC/ tenofovir disoproxil Group [a]	3 / 12 (25%)	375 / 465 (81%)	90% (56%, 98%)	0.002
Tenofovir disoproxil Group [a]	6 / 17 (35%)	363 / 437 (83%)	86% (67%, 95%)	< 0.001
	Adherence Substudy Participants [b]			
Adherence Substudy	**Placebo**	**Tenofovir disoproxil 245 mg +the combination of emtricitabine and tenofovir disoproxil**	**Relative Risk Reduction (95% CI)**	**p-value**
Seroconversions / N [b]	14 / 404 (3.5%)	0 / 745 (0%)	100% (87%, 100%)	< 0.001

[a] 'Case' = HIV seroconverter; 'Cohort' = 100 randomly selected subjects from each of the tenofovir disoproxil 245 mg and the combination of emtricitabine and tenofovir disoproxil groups. Only Case or Cohort samples from subjects randomised to either tenofovir disoproxil 245 mg or the combination of emtricitabine and tenofovir disoproxil were evaluated for detectable plasma tenofovir levels.
[b] Substudy participants received active adherence monitoring, e.g. unannounced home visits and pill counts, and counselling to improve compliance with study drug.

Paediatric population

There are no clinical studies conducted with the combination of emtricitabine and tenofovir disoproxil in the paediatric population.

Clinical efficacy and safety of the combination of emtricitabine and tenofovir disoproxil was established from studies conducted with emtricitabine and tenofovir disoproxil when given as single agents.

Studies with emtricitabine
In infants and children older than 4 months, the majority of patients taking emtricitabine achieved or maintained complete suppression of plasma HIV-1 RNA through 48 weeks (89% achieved ≤ 400 copies/mL and 77% achieved ≤ 50 copies/mL).

Studies with tenofovir disoproxil
In study GS-US-104-0321, 87 HIV-1 infected treatment-experienced patients 12 to < 18 years of age were treated with tenofovir disoproxil (n = 45) or placebo (n = 42) in combination with an optimised background regimen (OBR) for 48 weeks. Due to limitations of the study, a benefit of tenofovir disoproxil over placebo was not demonstrated based on plasma HIV-1 RNA levels at week 24. However, a benefit is expected for the adolescent population based on extrapolation of adult data and comparative pharmacokinetic data (see section 5.2).

In patients who received treatment with tenofovir disoproxil or placebo, mean lumbar spine BMD Z-score was -1.004 and -0.809, and mean total body BMD Z-score was -0.866 and -0.584, respectively, at baseline. Mean changes at week 48 (end of double-blind phase) were -0.215 and -0.165 in lumbar spine BMD Z-score, and -0.254 and -0.179 in total body BMD Z-score for the tenofovir disoproxil and placebo groups, respectively. The mean rate of BMD gain was less in the tenofovir disoproxil group compared to the placebo group. At week 48, six adolescents in the tenofovir disoproxil group and one adolescent in the placebo group had significant lumbar spine BMD loss (defined as > 4% loss). Among 28 patients receiving 96 weeks of treatment with tenofovir disoproxil, BMD Z-scores declined by -0.341 for lumbar spine and -0.458 for total body.

In study GS-US-104-0352, 97 treatment-experienced patients 2 to < 12 years of age with stable, virologic suppression on stavudine- or zidovudine-containing regimens were randomised to either replace stavudine or zidovudine with tenofovir disoproxil (n = 48) or continue on their original regimen (n = 49) for 48 weeks. At week 48, 83% of patients in the tenofovir disoproxil treatment group and 92% of patients in the stavudine or zidovudine treatment group had HIV-1 RNA concentrations < 400 copies/mL. The difference in the proportion of patients who maintained < 400 copies/mL at week 48 was mainly influenced by the higher number of discontinuations in the tenofovir disoproxil treatment group. When missing data were excluded, 91% of patients in the tenofovir disoproxil treatment group and 94% of patients in the stavudine or zidovudine treatment group had HIV-1 RNA concentrations < 400 copies/mL at week 48.

Reductions in BMD have been reported in paediatric patients. In patients who received treatment with tenofovir disoproxil, or stavudine or zidovudine, mean lumbar spine BMD Z-score was -1.034 and -0.498, and mean total body BMD Z-score was -0.471 and -0.386, respectively, at baseline. Mean changes at week 48 (end of randomised phase) were 0.032 and 0.087 in lumbar spine BMD Z-score, and -0.184 and -0.027 in total body BMD Z-score for the tenofovir disoproxil and stavudine or zidovudine groups, respectively. The mean rate of lumbar spine bone gain at week 48 was similar between the tenofovir disoproxil treatment group and the stavudine or zidovudine treatment group. Total body bone gain was less in the tenofovir disoproxil treatment group compared to the stavudine or zidovudine treatment group. One tenofovir disoproxil treated subject and no stavudine or

zidovudine treated subjects experienced significant (> 4%) lumbar spine BMD loss at week 48. BMD Z-scores declined by -0.012 for lumbar spine and by -0.338 for total body in the 64 subjects who were treated with tenofovir disoproxil for 96 weeks. BMD Z-scores were not adjusted for height and weight.

In study GS-US-104-0352, 8 out of 89 paediatric patients (9.0%) exposed to tenofovir disoproxil discontinued study drug due to renal adverse events. Five subjects (5.6%) had laboratory findings clinically consistent with proximal renal tubulopathy, 4 of whom discontinued tenofovir disoproxil therapy (median tenofovir disoproxil exposure 331 weeks).

The safety and efficacy of the combination of emtricitabine and tenofovir disoproxil in children under the age of 12 years in the treatment of HIV-1 have not been established. The European Medicines Agency has deferred the obligation to submit the results of studies with the reference medicinal product containing emtricitabine and tenofovir disoproxil in one or more subsets of the paediatric population in the treatment of HIV-1 infection and for pre-exposure prophylaxis (see section 4.2 for information on paediatric use).

5.2 Pharmacokinetic properties

Absorption

The bioequivalence of one the combination of emtricitabine and tenofovir disoproxil film-coated tablet with one emtricitabine 200 mg hard capsule and one tenofovir disoproxil 245 mg film-coated tablet was established following single dose administration to fasting healthy subjects. Following oral administration of the combination of emtricitabine and tenofovir disoproxil to healthy subjects, emtricitabine and tenofovir disoproxil are rapidly absorbed and tenofovir disoproxil is converted to tenofovir. Maximum emtricitabine and tenofovir concentrations are observed in serum within 0.5 to 3.0 h of dosing in the fasted state. Administration of the combination of emtricitabine and tenofovir disoproxil with food resulted in a delay of approximately three quarters of an hour in reaching maximum tenofovir concentrations and increases in tenofovir AUC and C_{max} of approximately 35% and 15%, respectively, when administered with a high fat or light meal, compared to administration in the fasted state. In order to optimise the absorption of tenofovir, it is recommended that the combination of emtricitabine and tenofovir disoproxil should be taken with food.

Distribution

Following intravenous administration the volume of distribution of emtricitabine and tenofovir was approximately 1.4 L/kg and 800 mL/kg, respectively. After oral administration of emtricitabine or tenofovir disoproxil, emtricitabine and tenofovir are widely distributed throughout the body. *In vitro* binding of emtricitabine to human plasma proteins was < 4% and independent of concentration over the range of 0.02 to 200 µg/mL. *In vitro* protein binding of tenofovir to plasma or serum protein was less than 0.7 and 7.2%, respectively, over the tenofovir concentration range 0.01 to 25 µg/mL.

Biotransformation

There is limited metabolism of emtricitabine. The biotransformation of emtricitabine includes oxidation of the thiol moiety to form the 3'-sulphoxide diastereomers (approximately 9% of dose) and conjugation with glucuronic acid to form 2'-O-glucuronide (approximately 4% of dose). *In vitro* studies have determined that neither tenofovir disoproxil nor tenofovir are substrates for the CYP450 enzymes. Neither emtricitabine nor tenofovir inhibited *in vitro* drug metabolism mediated by any of the major human CYP450 isoforms involved in drug biotransformation. Also, emtricitabine did not inhibit uridine-5'-diphosphoglucuronyl transferase, the enzyme responsible for glucuronidation.

Elimination

Emtricitabine is primarily excreted by the kidneys with complete recovery of the dose achieved in urine (approximately 86%) and faeces (approximately 14%). Thirteen percent of the emtricitabine dose was recovered in urine as three metabolites. The systemic clearance of emtricitabine averaged 307 mL/min. Following oral administration, the elimination half-life of emtricitabine is approximately 10 hours.

Tenofovir is primarily excreted by the kidney by both filtration and an active tubular transport system with approximately 70-80% of the dose excreted unchanged in urine following intravenous administration. The apparent clearance of tenofovir averaged approximately 307 mL/min. Renal clearance has been estimated to be approximately 210 mL/min, which is in excess of the glomerular filtration rate. This indicates that active tubular secretion is an important part of the elimination of tenofovir. Following oral administration, the elimination half-life of tenofovir is approximately 12 to 18 hours.

Elderly

Pharmacokinetic studies have not been performed with emtricitabine or tenofovir in the elderly (over 65 years of age).

Gender

Emtricitabine and tenofovir pharmacokinetics are similar in male and female patients.

Ethnicity

No clinically important pharmacokinetic difference due to ethnicity has been identified for emtricitabine. The pharmacokinetics of tenofovir have not been specifically studied in different ethnic groups.

Paediatric population

Pharmacokinetic studies have not been performed with the combination of emtricitabine and tenofovir disoproxil in children and adolescents (under 18 years of age). Steady-state pharmacokinetics of tenofovir were evaluated in 8 HIV-1 infected adolescent patients (aged 12 to < 18 years) with body weight ≥ 35 kg and in 23 HIV-1 infected children aged 2 to < 12 years. Tenofovir exposure achieved in these paediatric patients receiving oral daily doses of tenofovir disoproxil 245 mg or 6.5 mg/kg body weight tenofovir disoproxil up to a maximum dose of 245 mg was similar to exposures achieved in adults receiving once-daily doses of tenofovir

disoproxil 245 mg. Pharmacokinetic studies have not been performed with tenofovir disoproxil in children under 2 years. In general, the pharmacokinetics of emtricitabine in infants, children and adolescents (aged 4 months up to 18 years) are similar to those seen in adults.

Renal impairment

Limited pharmacokinetic data are available for emtricitabine and tenofovir after co-administration of separate preparations or as the combination of emtricitabine and tenofovir disoproxil in patients with renal impairment. Pharmacokinetic parameters were mainly determined following administration of single doses of emtricitabine 200 mg or tenofovir disoproxil 245 mg to non-HIV infected patients with varying degrees of renal impairment. The degree of renal impairment was defined according to baseline creatinine clearance (CrCl) (normal renal function when CrCl > 80 mL/min; mild impairment with CrCl = 50-79 mL/min; moderate impairment with CrCl = 30-49 mL/min and severe impairment with CrCl = 10-29 mL/min).

The mean (%CV) emtricitabine drug exposure increased from 12 (25%) μg•h/mL in subjects with normal renal function, to 20 (6%) μg•h/mL, 25 (23%) μg•h/mL and 34 (6%) μg•h/mL, in patients with mild, moderate and severe renal impairment, respectively.

The mean (%CV) tenofovir drug exposure increased from 2,185 (12%) ng•h/mL in patients with normal renal function, to 3,064 (30%) ng•h/mL, 6,009 (42%) ng•h/mL and 15,985 (45%) ng•h/mL, in patients with mild, moderate and severe renal impairment, respectively.

The increased dose interval for the combination of emtricitabine and tenofovir disoproxil in HIV-1 patients with moderate renal impairment is expected to result in higher peak plasma concentrations and lower C_{min} levels as compared to patients with normal renal function.

In subjects with end-stage renal disease (ESRD) requiring haemodialysis, between dialysis drug exposures substantially increased over 72 hours to 53 (19%) μg•h/mL of emtricitabine, and over 48 hours to 42,857 (29%) ng•h/mL of tenofovir.

A small clinical study was conducted to evaluate the safety, antiviral activity and pharmacokinetics of tenofovir disoproxil in combination with emtricitabine in HIV infected patients with renal impairment. A subgroup of patients with baseline creatinine clearance between 50 and 60 mL/min, receiving once daily dosing, had a 2-4-fold increase in tenofovir exposure and worsening renal function.

The pharmacokinetics of emtricitabine and tenofovir in paediatric patients with renal impairment have not been studied. No data are available to make dose recommendations (see sections 4.2 and 4.4).

Hepatic impairment

The pharmacokinetics of the combination of emtricitabine and tenofovir disoproxil have not been studied in patients with hepatic impairment.

The pharmacokinetics of emtricitabine have not been studied in non-HBV infected subjects with varying degrees of hepatic insufficiency. In general, emtricitabine pharmacokinetics in HBV infected subjects were similar to those in healthy subjects and in HIV infected subjects.

A single 245 mg dose of tenofovir disoproxil was administered to non-HIV infected patients with varying degrees of hepatic impairment defined according to Child-Pugh-Turcotte (CPT) classification. Tenofovir pharmacokinetics were not substantially altered in subjects with hepatic impairment suggesting that no dose adjustment is required in these subjects. The mean (%CV) tenofovir C_{max} and $AUC_{0-\infty}$ values were 223 (34.8%) ng/mL and 2,050 (50.8%) ng•h/mL, respectively, in normal subjects compared with 289 (46.0%) ng/mL and 2,310 (43.5%) ng•h/mL in subjects with moderate hepatic impairment, and 305 (24.8%) ng/mL and 2,740 (44.0%) ng•h/mL in subjects with severe hepatic impairment.

5.3 Preclinical safety data

Emtricitabine: Non-clinical data on emtricitabine reveal no special hazard for humans based on conventional studies of safety pharmacology, repeated dose toxicity, genotoxicity, carcinogenic potential and toxicity to reproduction and development.

Tenofovir disoproxil: Non-clinical safety pharmacology studies on tenofovir disoproxil reveal no special hazard for humans. Repeated dose toxicity studies in rats, dogs and monkeys at exposure levels greater than or equal to clinical exposure levels and with possible relevance to clinical use include renal and bone toxicity and a decrease in serum phosphate concentration. Bone toxicity was diagnosed as osteomalacia (monkeys) and reduced bone mineral density (BMD) (rats and dogs). The bone toxicity in young adult rats and dogs occurred at exposures ≥ 5-fold the exposure in paediatric or adult patients; bone toxicity occurred in juvenile infected monkeys at very high exposures following subcutaneous dosing (≥ 40-fold the exposure in patients). Findings in the rat and monkey studies indicated that there was a substance-related decrease in intestinal absorption of phosphate with potential secondary reduction in BMD.

Genotoxicity studies revealed positive results in the *in vitro* mouse lymphoma assay, equivocal results in one of the strains used in the Ames test, and weakly positive results in an UDS test in primary rat hepatocytes. However, it was negative in an *in vivo* mouse bone marrow micronucleus assay.

Oral carcinogenicity studies in rats and mice only revealed a low incidence of duodenal tumours at an extremely high dose in mice. These tumours are unlikely to be of relevance to humans.

Reproductive toxicity studies in rats and rabbits showed no effects on mating, fertility, pregnancy or foetal parameters. However, tenofovir disoproxil reduced the

viability index and weight of pups in peri and postnatal toxicity studies at maternally toxic doses.

Combination of emtricitabine and tenofovir disoproxil: Genotoxicity and repeated dose toxicity studies of one month or less with the combination of these two components found no exacerbation of toxicological effects compared to studies with the separate components.

6 PHARMACEUTICAL PARTICULARS

6.1 List of excipients

Tablet core:

Mannitol

Cellulose, microcrystalline (E460)

Hydroxypropylcellulose-Low Substituted (E463)

Hypromellose (E464)

Sodium stearyl fumarate

Film-coating:

Polyvinyl alcohol – Part hydrolysed (E1203)

Titanium dioxide (E171)

Macrogol 3350 (E1521)

Talc (E553b)

Indigo carmine aluminium lake (E132)

Iron oxide yellow (E172)

6.2 Incompatibilities

Not applicable.

6.3 Shelf life

Blister: 2 years

HDPE bottle: 2 years

In-use stability

HDPE bottle

The product was found to be stable following 60 days after first opening the bottle.

6.4 Special precautions for storage

Blisters: Do not store above 30°C. Store in the original blister to protect from moisture.

Bottles: Store in the original bottle to protect from moisture. Keep the bottle tightly closed.

6.5 Nature and contents of container

Blisters

OPA/Alu/PVC – Aluminium blister

OPA/Alu/PE+ desiccant – Alu/PE blister

Pack size of 30, 30(30x1) and 90 film-coated tablets

HDPE bottles with child resistant closures

100 ml white opaque HPDE heavy wall bottle with 38 mm polypropylene (PP) closure and 3 g desiccant canister.

Pack size of 30, 90 (3 bottles of 30), multipacks containing 90 (3 packs of 30) film-coated tablets.

Not all pack sizes may be marketed.

6.6 Special precautions for disposal

Any unused medicinal product or waste material should be disposed of in accordance with local requirements.

7 MARKETING AUTHORISATION HOLDER

TEVA UK Limited, Ridings Point, Whistler Drive, Castleford, WF10 5HX, United Kingdom

8 MARKETING AUTHORISATION NUMBER(S)

PL 00289/1997

9 DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION

19/04/2016 25/09/2020

10 DATE OF REVISION OF THE TEXT

12/02/2025