PRODUCT INFORMATION

TRIZIVIR® Tablets
(abacavir, lamivudine and zidovudine tablets)

In clinical trials approximately 5% of subjects who received abacavir sulfate developed a hypersensitivity reaction, which in rare cases has proved fatal. TRIZIVIR, or any other medicinal product which contains abacavir sulfate (KIVEXA®, ZIAGEN®), MUST NEVER be restarted following a hypersensitivity reaction (see PRECAUTIONS and ADVERSE EFFECTS).

NAME OF THE MEDICINE:

TRIZIVIR® tablets are a fixed combination product containing abacavir sulfate 300mg, lamivudine 150 mg and zidovudine 300 mg in each tablet. Product information for ZIAGEN® (abacavir sulfate tablets and oral solution), 3TC® (lamivudine tablets and oral solution) and RETROVIR® (zidovudine capsules and syrup) contain additional information.

The chemical name of abacavir sulfate is [4R-(2-Amino-6-cyclopropylamino-purin-9-yl)-cyclopent-2-en-1S-yl]-methanol sulfate (2:1), and has the following structural formula:

\[
\begin{array}{c}
\text{HN} \\
\text{H}_2\text{N} \\
\text{N} \\
\text{N} \\
\text{N} \\
\text{N} \\
\text{CH}_2\text{OH}
\end{array}
\]

\[
\text{CAS REGISTRY NUMBER: 188062-50-2}
\]

Lamivudine is the free base of (2R-cis)-4-amino-1-(2-hydroxymethyl-1,3-oxathiolan-5-yl)-(1H)-pyrimidin-2-one. The structural formula is shown below:

\[
\begin{array}{c}
\text{OH} \\
\text{NH}_2 \\
\text{O}
\end{array}
\]
The chemical name of zidovudine (formerly called azidothymidine (AZT)) is 3'-azido-3'-deoxythymidine. The structural formula is shown below:

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CAS REGISTRY NUMBER: 30516-87-1

DESCRIPTION:
The molecular formula of abacavir sulfate is (C_{14}H_{18}N_{6}O)_{2}.H_{2}SO_{4} and it has a relative molecular mass of 670.76. Abacavir sulfate is a white to off-white crystalline powder with a solubility of approximately 77 mg/mL in water at 25°C.

Lamivudine is a white to off-white crystalline solid which is highly soluble in water with a molecular weight of 229.3 and molecular formula C_{8}H_{11}N_{3}O_{3}S.

Zidovudine is a white to off-white, odourless, crystalline solid with a molecular weight of 267.24 and molecular formula C_{10}H_{13}N_{5}O_{4}.

The tablets also contain microcrystalline cellulose (E460), sodium starch glycollate, magnesium stearate (E572), hypromellose (E464), titanium dioxide CI77891 (E171), macrogol 400, indigo carmine CI73015 (E132) aluminium lake and iron oxide yellow CI77492 (E172).

PHARMACOLOGY:

Mechanism of Action and Resistance:

Abacavir, lamivudine and zidovudine are all nucleoside analogue reverse transcriptase inhibitors.

Abacavir is a selective antiretroviral agent against HIV-1 and HIV-2, including HIV-1 isolates that are resistant to zidovudine, lamivudine, zalcitabine, didanosine or nevirapine. Zidovudine is an inhibitor of the *in vitro* replication of some retroviruses including HIV, whereas lamivudine is a potent, selective inhibitor of HIV-1 and HIV-2 replication *in vitro*. Lamivudine has been shown to be usually synergistic with zidovudine at inhibiting the replication of HIV in cell culture. All three drugs are metabolised sequentially by intracellular kinases to their 5'-triphosphate (TP) derivatives. Abacavir 5'-triphosphate, lamivudine 5'-triphosphate and zidovudine 5'-triphosphate are substrates for and competitive inhibitors of HIV reverse transcriptase. However, their main antiviral activity is through incorporation of the monophosphate (MP) form into the viral DNA chain, resulting in chain termination. Abacavir, lamivudine and zidovudine triphosphates show significantly less affinity for host cell DNA polymerases.
Abacavir shows synergy in vitro in combination with nevirapine and zidovudine. It has been shown to be additive in combination with didanosine, zalcitabine, lamivudine and stavudine. The relationships between in vitro susceptibility of HIV to lamivudine and zidovudine and the clinical response to therapy remain under investigation. In vitro sensitivity testing has not been standardised and results may vary according to methodological factors.

In vitro selection of abacavir-resistant isolates of HIV-1 is associated with specific genotypic changes in the reverse transcriptase (RT) codon region (codons M184V, K65R, L74V and Y115F). Viral resistance to abacavir develops relatively slowly in vitro and in vivo, requiring multiple mutations to reach an eight fold increase in IC50 of the wild-type virus. Isolates resistant to abacavir may also show reduced sensitivity to lamivudine, zalcitabine and/or didanosine, but remain sensitive to zidovudine and stavudine. Treatment failure following initial therapy with abacavir, lamivudine and zidovudine is mainly associated with the M184V alone, thus maintaining many therapeutic options for a second line regimen.

Cross-resistance between abacavir, zidovudine or lamivudine and protease inhibitors or non nucleoside reverse transcriptase inhibitors is unlikely. Reduced susceptibility to abacavir has been demonstrated in clinical isolates of patients with uncontrolled viral replication, who have been pre-treated with and are resistant to other nucleoside inhibitors.

Individually, lamivudine and zidovudine therapy has resulted in HIV clinical isolates which show reduced sensitivity in vitro to the nucleoside analogue to which they have been exposed. However in vitro studies also indicate that zidovudine-resistant virus isolates may become sensitive again to zidovudine when they simultaneously acquire resistance to lamivudine. Furthermore in-vivo there is clinical evidence that lamivudine plus zidovudine delays the emergence of zidovudine resistance in anti-retroviral naive patients.

**Pharmacokinetics:**

**Absorption:**
Abacavir, lamivudine and zidovudine are rapidly and well absorbed from the gastrointestinal tract following oral administration. The absolute bioavailability of oral abacavir, lamivudine and zidovudine in adults is about 83%, 80 – 85% and 60 – 70% respectively.

In a pharmacokinetic study in HIV-1 infected patients, the steady state pharmacokinetic parameters of abacavir, lamivudine and zidovudine were similar when either TRIZIVIR alone or ZIAGEN (abacavir) and COMBIVIR (lamivudine and zidovudine) in combination were administered. The steady state parameters were also similar to the values obtained in the bioequivalence study of TRIZIVIR in healthy volunteers.

A bioequivalence study compared TRIZIVIR with lamivudine 150mg, zidovudine 300mg and abacavir 300mg taken together. The effect of food on the rate and extent of absorption was also studied. TRIZIVIR was shown to be bioequivalent to abacavir 300mg, lamivudine 150mg and zidovudine 300mg given as separate tablets for AUC and Cmax. Food decreased the rate of absorption of all three components of TRIZIVIR (slight decrease in Cmax (mean 18 – 32 %) and increased Tmax (approximately 1 hour)), but not the extent of absorption (AUC). The changes observed with food are not considered to be clinically significant

**Distribution:**
Intravenous studies with lamivudine, abacavir and zidovudine showed that the mean apparent volume of distribution is 1.3, 0.8 and 1.6 L/kg respectively. Lamivudine exhibits
linear pharmacokinetics over the therapeutic dose range and displays limited binding to the major plasma protein albumin (< 36 % serum albumin in vitro). Zidovudine plasma protein binding is 34 % to 38 %. Plasma protein binding studies in vitro indicate that abacavir binds only low to moderately (~49 %) to human plasma proteins at therapeutic concentrations. This indicates a low likelihood for interactions with other medicinal products through plasma protein binding displacement. Drug interactions involving binding site displacement are therefore not anticipated with TRIZIVIR.

Data show that lamivudine, abacavir and zidovudine penetrate the central nervous system (CNS) and reach the cerebrospinal fluid (CSF). The mean ratios of CSF/serum lamivudine and zidovudine concentrations 2 - 4 hours after oral administration were approximately 0.12 and 0.5 respectively. The true extent of CNS penetration of lamivudine and its relationship with any clinical efficacy is unknown.

Studies in HIV infected patients have shown good penetration of abacavir into the cerebrospinal fluid (CSF), with a CSF to plasma AUC ratio of between 30 to 44%. In a Phase I pharmacokinetic study, the penetration of abacavir into the CSF was investigated following administration of abacavir 300 mg twice a day. The mean concentration of abacavir achieved in the CSF 1.5 hours post dose was 0.14 µg/mL. In a further pharmacokinetic study of 600 mg twice a day, the CSF concentration of abacavir increased over time, from approximately 0.13 µg/mL at 0.5 to 1 hour after dosing, to approximately 0.74 µg/mL after 3 to 4 hours. While peak concentrations may not have been attained by 4 hours, the observed values are 9 fold greater than the IC50 of abacavir of 0.08 µg/mL or 0.26µM.

**Metabolism:**
Abacavir is primarily metabolised by the liver with less than 2% of the administered dose being renally excreted, as unchanged compound. The primary pathways of metabolism in man are by alcohol dehydrogenase and by glucuronidation to produce the 5'-carboxylic acid and 5'-glucuronide which account for about 66% of the dose in the urine.

The likelihood of adverse drug interactions with lamivudine is low due to limited metabolism (<10% hepatic) and plasma protein binding and almost complete renal elimination.

Zidovudine is rapidly metabolised during first pass to 3'-azido-3'-deoxy-5'-O-β-D-glucopyranuronosylthymidine (GAZT) which has an apparent elimination half-life of 1 hour (range 0.61 to 1.73 hours). Following oral administration, urinary recoveries of zidovudine and GAZT accounted for 14 and 74% of the dose, respectively, and the total urinary recovery averaged 90% (range 63 to 95%), indicating a high degree of absorption.

Limited data has identified 3'-amino-3'deoxythymidine (AMT) as a metabolite of zidovudine following intravenous and oral dosing. A small in vitro study showed that AMT reduced the growth of haemopoietic progenitor cells; the clinical significance of this finding is unknown.

**Excretion:**
The mean half-life of abacavir is about 1.5 hours. Following multiple oral doses of abacavir 300 mg twice a day there is no significant drug accumulation. Elimination of abacavir is via hepatic metabolism with subsequent excretion of metabolites primarily in the urine. The metabolites and unchanged abacavir account for about 83% of the administered abacavir dose in the urine; the remainder is eliminated in the faeces.
Mean terminal half-life of elimination of lamivudine is 5 to 7 hours and mean systemic clearance is approximately 0.32 L/h/kg, with predominantly renal clearance (>70%) via the organic cationic transport system, but little (<10%) hepatic metabolism.

Studies in patients with renal impairment show lamivudine elimination is affected by renal dysfunction. Dose reduction is required for patients with creatinine clearance < 50 mL/min (see DOSAGE AND ADMINISTRATION). Lamivudine crosses the placenta in rats and rabbits.

From studies with intravenous zidovudine, the mean terminal plasma half-life was 1.1 hours and the mean systemic clearance was 1.6 L/h/kg. Renal clearance of zidovudine is estimated to be 0.34 L/h/kg, indicating glomerular filtration and active tubular secretion by the kidneys. Zidovudine concentrations are increased in patients with advanced renal failure. Limited data indicate that zidovudine crosses the placenta and is found in amniotic fluid and foetal blood. Zidovudine has also been detected in semen.

**Special populations:**

*Hepatically impaired:* There are no data available on the use of TRIZIVIR in hepatically impaired patients. Limited data in patients with cirrhosis suggest that accumulation of zidovudine may occur, because of decreased glucuronidation. Dosage adjustment of zidovudine is required in patients with severe hepatic impairment. Data obtained in patients with moderate to severe hepatic impairment show that lamivudine pharmacokinetics are not significantly affected by hepatic dysfunction. TRIZIVIR is contraindicated in for use in hepatically impaired patients.

*Renally impaired:* Abacavir is primarily metabolised by the liver with less than 2% of abacavir excreted unchanged in the urine. The pharmacokinetics of abacavir in patients with end-stage renal disease is similar to patients with normal renal function. Therefore, no dose reduction is required in patients with renal impairment.

A single dose pharmacokinetic study of lamivudine (n=16) in HIV-infected patients with normal renal function and with moderate (creatinine clearance <30 mL/min and >10 mL/min) or end stage renal impairment (creatinine clearance <10 mL/min) showed there was a linear relationship between lamivudine clearance and renal function.

Zidovudine concentrations have also been shown to be increased in patients with advanced renal failure. Dosage adjustment of zidovudine is required in patients with advanced renal failure.

As dosage reduction of lamivudine and zidovudine may be necessary in renally impaired patients it is recommended that separate preparations of zidovudine, lamivudine and abacavir be administered to patients with reduced renal function (creatinine clearance ≤ 50 mL/min).

*Elderly:* The pharmacokinetics of TRIZIVIR have not been studied in patients over 65 years of age. When treating elderly patients consideration needs to be given to the greater frequency of decreased hepatic, renal and cardiac function, and concomittant disease or other drug therapy.

**CLINICAL TRIALS:**

Antiretroviral-naïve adults: CNAAB3005 is a randomised, double-blind, multicentre study in which 562 HIV-infected antiretroviral-naïve adults were randomised to receive either
300mg abacavir sulfate (ABC) tablets, twice daily and a COMBIVIR tablet (containing 150mg lamivudine (3TC) and 300mg zidovudine (ZDV)) twice daily or 800mg indinavir (IDV) every 8 hours plus a COMBIVIR tablet twice daily. The duration of treatment was 48 weeks. Approximately 87% of study participants in each group were male with a total of 73% white, 15% black, 9% American Hispanics and 2% Asians. The median age was 36 years. The median baseline CD4+ cell counts were 359 and 360 cells/mm³ for the ABC/3TC/ZDV and IDV/3TC/ZDV treatment groups respectively while median baseline plasma HIV-1 RNA concentrations were 4.85 and 4.82 log₁₀ copies/mL respectively. The proportion of patients with plasma HIV-1 RNA ≤400 copies/mL (using Roche Amplicor HIV-1 Monitor® test) through 48 weeks of treatment are summarised in Figure 1.

Figure 1: Proportion of Subjects with Undetectable Viral Load (≤400 copies/mL) by Study Week

In Intent To Treat (ITT) analysis at 48 weeks the combination of abacavir, lamivudine and zidovudine showed an equivalent anti-viral effect (plasma HIV-1 RNA ≤400 copies/mL) to a combination of indinavir, lamivudine and zidovudine (47% vs 49% respectively; 95%CI of difference in proportions (-10%, 7%)). Overall, the proportion of ITT subjects with plasma HIV-1 RNA ≤50 copies/mL were comparable between the two groups at week 48 (37% vs 43% respectively; 95% CI of difference in proportions (-15, 2)).

Subjects with baseline HIV-1 RNA >100,000 copies/mL demonstrated comparable antiretroviral activity between the abacavir, lamivudine and zidovudine (ABC/LAM/ZDV) treatment group and the indinavir, lamivudine and zidovudine (IND/LAM/ZDV) treatment group (as measured by ≤400 copies/mL assay). Although a difference in favour of IND/LAM/ZDV was observed at 48 weeks using a ≤50 copies/mL assay (ITT 29% ABC/LAM/ZDV vs 44% IND/LAM/ZDV; 95% CI –27, -1) this did not translate into a difference in time to viral rebound between the two groups.

In antiretroviral-naïve patients the triple combination of abacavir, lamivudine and zidovudine was superior in terms of durability of viral load response over 48 weeks to lamivudine and zidovudine (study CNAAB3003). In a similar antiretroviral-naïve patient population durability of antiviral response over 120 weeks was demonstrated in approximately 70% of subjects (study CNAB2002).
In antiretroviral-naïve patients treated with a combination of abacavir, lamivudine, zidovudine and efavirenz, the proportion of patients with undetectable viral load (<400 copies/mL) was approximately 90% with 80% having < 50 copies/mL after 24 weeks of treatment (study CNAF3008).

In another clinical study over 16 weeks in antiretroviral-naïve patients, the combination of abacavir, lamivudine and zidovudine showed a similar antiviral effect to the combination with nelfinavir, lamivudine and zidovudine (study CNAF3007).

Virological suppression (< 50 copies/mL) was maintained over 24 weeks in antiretroviral experienced patients receiving therapy with highly active antiretroviral therapy including a protease inhibitor, who changed to therapy with abacavir, lamivudine and zidovudine (study CH 96 06 – Swiss Maintenance Study).

In moderately antiretroviral experienced patients with a low baseline viral load (< 50,000 copies/mL), treatment intensification with abacavir, lamivudine and zidovudine provided significant therapeutic benefit with an undetectable viral load (< 400 copies/mL) achieved in approximately 50% of patients at 48 weeks (study NZTA4005 – Target study).

In heavily NRTI experienced patients, the degree of benefit of this nucleoside combination will depend on the nature and duration of prior therapy that may have selected for HIV-1 variants with cross-resistance to abacavir, zidovudine or lamivudine.

INDICATIONS:

TRIZIVIR is indicated in antiretroviral therapy for the treatment of Human Immunodeficiency Virus (HIV) infected adults and adolescents over the age of 12 years. TRIZIVIR should not be administered to adults and adolescents who weigh less than 40 kg because it is a fixed-dose tablet, and the dose cannot be adjusted for this patient population.

CONTRAINDICATIONS:

TRIZIVIR is contraindicated in patients with known hypersensitivity to TRIZIVIR or any of its components (abacavir, lamivudine or zidovudine), or to any of the excipients of TRIZIVIR tablets.

TRIZIVIR is contraindicated in patients with hepatic impairment.

Due to the active ingredient zidovudine, TRIZIVIR is contraindicated in patients with abnormally low neutrophil counts (<0.75 x 10^9/L), or abnormally low haemoglobin levels (<7.5g/dL or 4.65 mmol/L) (see PRECAUTIONS).

PRECAUTIONS:

HYPERSENSITIVITY TO ABACAVIR– SPECIAL WARNING (see also ADVERSE EFFECTS)

In clinical studies approximately 5% of subjects given abacavir (KIVEXA®, ZIAGEN®) developed a hypersensitivity reaction, which in rare cases has proved fatal. Over 28,000
patients received ZIAGEN® in clinical trials up to 30 June 2000. In this period there were 7 cases in which the fatal outcome may have been due to hypersensitivity.

- **Risk Factors**

In a prospective, randomised, controlled clinical trial, 3.4% of subjects with a negative HLA-B*5701 status receiving abacavir developed a hypersensitivity reaction.

Studies have shown that carriage of the HLA-B*5701 allele is associated with a significantly increased risk of a hypersensitivity reaction to abacavir. In the prospective study CNA106030 (PREDICT-1), use of pre-therapy screening for the HLA-B*5701 allele and subsequently avoiding abacavir in patients with this allele reduced the incidence of clinically suspected abacavir hypersensitivity reactions from 7.8% (66 of 847) to 3.4% (27 of 803) (p<0.0001) and the incidence of hypersensitivity reactions confirmed by skin patch testing from 2.7% (23 of 842) to 0.0% (0 of 802) (p<0.0001). Based on this study, it is estimated that 48% to 61% of patients with the HLA-B*5701 allele will develop a hypersensitivity reaction during the course of abacavir treatment compared with 0% to 4% of patients who do not have the HLA-B*5701 allele.

Clinicians should consider screening for carriage of the HLA-B*5701 allele in any HIV-infected patient without prior exposure to abacavir. Screening is recommended prior to re-initiation of abacavir in patients of unknown HLA-B*5701 status who have previously tolerated abacavir (see “Special considerations following an interruption of TRIZIVIR therapy”). Use of abacavir in patients known to carry the HLA-B*5701 allele is not recommended and should be considered only under exceptional circumstances where potential benefit outweighs the risk and with close medical supervision.

In any patient treated with abacavir, the clinical diagnosis of suspected hypersensitivity reaction must remain the basis of clinical decision-making. Even in the absence of the HLA-B*5701 allele, it is important to permanently discontinue abacavir and not rechallenge with abacavir if a hypersensitivity reaction cannot be ruled out on clinical grounds, due to the potential for a severe or even fatal reaction.

- **Clinical Description**

The hypersensitivity reaction is characterised by the appearance of symptoms indicating multi-organ involvement. The majority of patients have fever and/or rash as part of the syndrome. Other symptoms occurring in more than 10% of patients with the hypersensitivity reaction were: fatigue, malaise, headache, myalgia, gastrointestinal symptoms such as, nausea, and respiratory signs and symptoms which include dyspnoea, sore throat, cough and abnormal chest X-ray findings (predominantly infiltrates, which can be localised). The symptoms of this hypersensitivity reaction can occur at any time during treatment with abacavir, but usually occur within the first 6 weeks of therapy. The symptoms worsen with continued therapy and can be life threatening. These symptoms usually resolve upon discontinuation of abacavir. Other frequently observed signs or symptoms of the hypersensitivity reaction may include pruritus, chills and musculoskeletal symptoms (rarely myolysis, arthralgia). (see ADVERSE EFFECTS, Table 4).
Clinical Management

Regardless of their HLA-B*5701 status, any patient developing signs or symptoms of hypersensitivity MUST contact their doctor immediately for advice. If a hypersensitivity reaction is suspected therapy with TRIZIVIR MUST cease immediately. TRIZIVIR, OR ANY OTHER MEDICINAL PRODUCT CONTAINING ABACAVIR (e.g. KIVEXA, ZIAGEN), MUST NEVER BE RESTARTED FOLLOWING A HYPERSENSITIVITY REACTION, AS MORE SEVERE SYMPTOMS WILL RECUR WITHIN HOURS AND MAY INCLUDE LIFE-THREATENING HYPOTENSION AND DEATH.

To avoid a delay in diagnosis of hypersensitivity and to minimise the risk of a life-threatening hypersensitivity reaction, TRIZIVIR must be discontinued if hypersensitivity cannot be ruled out, even when other diagnoses are possible (respiratory diseases, flu-like illness, gastroenteritis or reactions to other medications). TRIZIVIR or any other medicinal products containing abacavir (e.g. KIVEXA®, ZIAGEN®) should not be restarted even if a recurrence of symptoms occurs following rechallenge with alternative medications.

An Alert Card with information for the patient about this hypersensitivity reaction is included in the TRIZIVIR pack.

Special considerations following an interruption of TRIZIVIR therapy

Regardless of a patient’s HLA-B*5701 status, if therapy with TRIZIVIR has been discontinued and restarting therapy is under consideration, the reason for discontinuation should be evaluated to ensure that the patient did not have symptoms of a hypersensitivity reaction. If a hypersensitivity reaction cannot be ruled out TRIZIVIR, or any other medicinal product containing abacavir (e.g. KIVEXA®, ZIAGEN®), should not be restarted.

There have been infrequent reports of hypersensitivity reactions with a rapid onset, including life threatening reactions, following reintroduction of abacavir in patients who had only one of the key symptoms of a hypersensitivity reaction (i.e. rash, fever, gastrointestinal, respiratory or constitutional symptoms such as fatigue or malaise). When patients who have discontinued TRIZIVIR present with an indeterminate diagnosis of hypersensitivity (single symptom), the doctor should:

- Assess the probability that hypersensitivity preceded the interruption
- Assess the risk:benefit of reinitiating TRIZIVIR
- Select a medical setting in which medical care can be accessed readily, if a decision is made to reintroduce TRIZIVIR.

On very rare occasions hypersensitivity reactions have been reported in patients who have re-started therapy, and who had no apparent preceding symptoms of a hypersensitivity reaction. Some of these cases were poorly documented. The clinical significance of these reports is unclear. If a decision is made to re-start TRIZIVIR, this must be done only if medical care can be accessed readily by the patient or others.

Screening for carriage of the HLA-B*5701 allele is recommended prior to re-initiation of abacavir in patients of unknown HLA-B*5701 status who have previously tolerated abacavir. Re-initiation of abacavir in such patients who test positive for the HLA-B*5701 allele is not
recommended and should be considered only under exceptional circumstances where potential benefit outweighs the risk and with close medical supervision.

- **Essential patient information**

  **Prescribers must ensure that patients are fully informed regarding the following information on the hypersensitivity reaction:**

  - Patients must be made aware of the possibility of a hypersensitivity reaction to abacavir that may result in a life threatening reaction or death and that the risk of a hypersensitivity reaction is increased if they are HLA-B*5701 positive.

  - Patients must also be informed that HLA-B*5701 negative patients can also experience abacavir hypersensitivity reaction. Therefore, ANY patient who develops signs or symptoms consistent with a possible hypersensitivity reaction to abacavir **MUST CONTACT their doctor IMMEDIATELY.**

  - Patients who are hypersensitive to abacavir should be reminded that they must never take TRIZIVIR or any other abacavir containing medicinal product (e.g. KIVEXA®, ZIAGEN®) again, regardless of their HLA-B*5701 status.

  - In order to avoid restarting TRIZIVIR, patients who have experienced a hypersensitivity reaction should be asked to return the remaining TRIZIVIR tablets to the pharmacy.

  - Patients who have stopped TRIZIVIR for any reason, and particularly due to possible adverse reactions or illness, must be advised to contact their doctor before restarting.

  - Each patient should be reminded to read the Package Leaflet included in the TRIZIVIR pack. They should also be reminded of the importance of removing the Alert Card included in the pack, and keeping it with them at all times.

Patients receiving TRIZIVIR 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 infection.

Patients should be advised that current antiretroviral therapy, including TRIZIVIR has not been proven to prevent the risk of transmission of HIV to others through sexual contact or blood contamination. Appropriate precautions should continue to be employed.

Sensitisation reactions, including anaphylaxis in one patient, have been reported in individuals receiving zidovudine therapy. Patients experiencing a rash should undergo medical evaluation.

**Fat redistribution:**

Redistribution/accumulation of body fat, including central obesity, dorsocervical fat enlargement (buffalo hump), peripheral wasting, facial wasting, breast enlargement, elevated serum lipid and blood glucose levels have been observed either separately or together in some patients receiving combination antiretroviral therapy (see ADVERSE EFFECTS).
Whilst all members of the PI and NRTI classes of medicinal products have been associated with one or more of these specific adverse events, linked to a general syndrome commonly referred to as lipodystrophy, data indicate that there are differences in the risk between individual members of the respective therapeutic classes.

In addition, the lipodystrophy syndrome has a multi-factorial aetiology; with for example HIV disease status, older age and duration of antiretroviral treatment all playing important, possibly synergistic roles.

The long-term consequences of these events are currently unknown. Clinical examination should include evaluation for physical signs of fat redistribution. Consideration should be given to the measurement of serum lipids and blood glucose. Lipid disorders should be managed as clinically appropriate.

**Lactic acidosis and severe hepatomegaly with steatosis:**

Lactic acidosis and severe hepatomegaly with steatosis, including fatal cases, have been reported with the use of antiretroviral nucleoside analogues either alone or in combination, including abacavir, lamivudine and zidovudine. A majority of these cases have been in women.

Clinical features which may be indicative of the development of lactic acidosis include generalised weakness, anorexia, and sudden unexplained weight loss, gastrointestinal symptoms and respiratory symptoms (dyspnoea and tachypnoea).

Caution should be exercised when administering TRIZIVIR to any patient, and particularly to those with known risk factors for liver disease. Treatment with TRIZIVIR should be suspended in any patient who develops clinical or laboratory findings suggestive of lactic acidosis or hepatotoxicity (which may include hepatomegaly and steatosis even in the absence of marked transaminase elevations).

**Immune Reconstitution Syndrome:**

In HIV-infected patients with severe immune deficiency at the time of initiation of antiretroviral therapy (ART), an inflammatory reaction to asymptomatic or residual opportunistic infections 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 ART. Relevant examples are cytomegalovirus retinitis, generalised and/or focal mycobacterial infections and *Pneumocystis jiroveci* (*P. carinii*) pneumonia. Any inflammatory symptoms must be evaluated without delay and treatment initiated when necessary. Autoimmune disorders (such as Graves’ disease, polymyositis and Guillain-Barre syndrome) have also been reported to occur in the setting of immune reconstitution, however, the time to onset is more variable, and can occur many months after initiation of treatment and sometimes can be an atypical presentation.

**Myocardial Infarction**

In a large prospective, observational, epidemiological study designed to investigate the rate of myocardial infarction in patients on combination antiretroviral therapy, a total of 33,347 HIV-infected patients were followed for 157,912 person-years. The use of abacavir within the previous six months was correlated with a significantly increased risk of myocardial infarction (relative risk: 1.94, 95% CI: 1.48 – 2.55). In a pooled analysis of GSK sponsored clinical trials no excess risk of myocardial infarction was observed with abacavir use. There is no known biological mechanism to explain a potential increase. In totality the available data from
observational cohorts and from controlled clinical trials are inconclusive in regard to the relationship between abacavir treatment and the risk of myocardial infarction.

As a precaution the underlying risk of coronary heart disease should be considered when prescribing antiretroviral therapies, including abacavir, and action taken to minimize all modifiable risk factors (e.g. hypertension, hyperlipidaemia, diabetes mellitus and smoking).

Patients co-infected with hepatitis C virus

Exacerbation of anaemia due to ribavirin has been reported when zidovudine is part of the regimen used to treat HIV although the exact mechanism remains to be elucidated. Therefore, the co-administration of ribavirin and zidovudine is not advised and consideration should be given to replacing zidovudine in a combination ART regimen if this is already established. This is particularly important in patients with a known history of zidovudine induced anaemia.

Haematological Effects:

Therapy with zidovudine preparations is commonly associated with haematologic toxicity including granulocytopenia and severe anaemia requiring transfusions particularly in patients with advanced HIV disease (see ADVERSE EFFECTS).

There have been reports of pancytopenia associated with the use of zidovudine, which was reversible in most instances after discontinuation of the drug.

Because anaemia, neutropenia and leucopenia (usually secondary to neutropenia) can be expected to occur in patients with advanced symptomatic HIV disease receiving zidovudine, haematological parameters should be carefully monitored in patients receiving TRIZIVIR (see CONTRAINDICATIONS). These haematological effects are not usually observed before four to six weeks of therapy. For patients with advanced symptomatic HIV disease, it is generally recommended that blood tests are performed at least every two weeks for the first three months of therapy and at least monthly thereafter.

In patients with early HIV disease haematological adverse reactions are infrequent. Depending on the overall condition of the patient blood tests may be performed less often, for example every one to three months. Decreases in the haemoglobin level of more than 25% from baseline and falls in the neutrophil count of more than 50% from baseline may require more frequent monitoring.

Additionally, dosage adjustment of zidovudine may be required if severe anaemia or myelosuppression occurs during treatment with TRIZIVIR or in patients with pre-existing bone marrow compromise eg haemoglobin <9 g/dL or granulocyte count <1000 cells/mm$^3$ (see DOSAGE AND ADMINISTRATION). Separate preparations of abacavir, lamivudine and zidovudine should therefore be administered to these patients. Physicians should refer to the individual product information for these drugs.

Pancreatitis:

Cases of pancreatitis have occurred rarely in patients treated with abacavir, lamivudine and zidovudine. However it is not clear whether these cases were due to the medicinal products or to the underlying HIV disease. Treatment with TRIZIVIR should be stopped immediately if clinical signs, symptoms or laboratory abnormalities suggestive of pancreatitis occur.
Renal Impairment:

In patients with moderate to severe renal impairment, the terminal plasma half-life of lamivudine exposure is increased due to decreased clearance. Dosage adjustment in these patients is better controlled using individual abacavir, lamivudine and zidovudine preparations as the dose frequency of lamivudine may need to be reduced (see DOSAGE AND ADMINISTRATION).

Hepatic impairment or disease:

TRIZIVIR should be used with caution in patients with HIV and chronic hepatitis B virus infection. Clinical trial and marketed use of lamivudine have shown that some patients with chronic hepatitis B virus (HBV) disease may experience clinical or laboratory evidence of recurrent hepatitis upon discontinuation of lamivudine, which may have more severe consequences in patients with decompensated liver disease. If TRIZIVIR is discontinued in a patient with HIV and HBV co-infection, periodic monitoring of both liver function tests and markers of HBV replication should be considered.

TRIZIVIR is contraindicated in patients with hepatic impairment.

Special precautions for use:

It is recommended that separate preparations of abacavir, lamivudine and zidovudine should be administered in cases where dosage adjustment is necessary (see DOSAGE AND ADMINISTRATION). Physicians should refer to the individual product information for these drugs.

Use of other medicines:

If TRIZIVIR is co-administered with other drugs metabolised by glucuronidation, careful thought should be given to the possibilities of interactions with zidovudine, because the toxicity of either drug may be potentiated (see INTERACTIONS WITH OTHER MEDICINES).

Patients should be cautioned about the concomitant use of self-administered medications (see INTERACTIONS WITH OTHER MEDICINES).

Use in the elderly:

See DOSAGE AND ADMINISTRATION

Paediatric use:

TRIZIVIR should not be administered to children and adolescents who weigh less than 40kg because it is a fixed-dose combination that cannot be adjusted for this patient population. Physicians should therefore refer to the individual prescribing information for abacavir, lamivudine and zidovudine.

Carcinogenicity:

The carcinogenic potential of a combination of abacavir, lamivudine and zidovudine has not been tested.
Long term carcinogenicity studies in rodents have not yet been completed for abacavir.

Zidovudine was administered orally to separate groups of mice and rats at doses up to 40 and 300 mg/kg/day, respectively. In mice, seven late-appearing (after 19 months) vaginal neoplasms (5 non-metastasising squamous cell carcinomas, one squamous cell papilloma, and one squamous polyp) occurred in animals given the highest dose. One late-appearing squamous cell papilloma occurred in the vagina of a middle dose animal. No vaginal tumours were found at the lowest dose. In rats, two late-appearing (after 20 months), non-metastasising vaginal squamous cell carcinomas occurred in animals given the highest dose. No vaginal tumours occurred at the low or middle dose in rats. No other drug related tumours were observed in either sex of either species. At doses that produced tumours in mice and rats, the estimated drug exposure (as measured by AUC) was approximately 4 times (mouse) and 27 times (rat) the estimated human exposure at the recommended therapeutic dose of one tablet twice daily.

When lamivudine was administered orally to separate groups of rodents at doses up to 2000 times (mice and males rats) and 3000 (female rats) mg/kg/day, there was no evidence of a carcinogenic effect due to lamivudine in the mouse study. In the rat study there was an increased incidence of endometrial tumours at the highest dose (approximately 70 times the estimated human exposure at the recommended therapeutic dose of one tablet twice daily, based on AUC). However, the relationship of this increase to treatment is uncertain.

Genotoxicity:

Abacavir was inactive in in vitro tests for gene mutation in bacteria but it showed clastogenic activity against human lymphocytes in vitro and in an in vivo mouse micronucleus test. Abacavir was mutagenic in the absence of metabolic activation, although it was not mutagenic in the presence of metabolic activation in an L5178Y mouse lymphoma assay. Abacavir was not mutagenic in bacterial mutagenicity assays.

With zidovudine no evidence of mutagenicity (with or without metabolic activation) was observed in the Salmonella mutagenicity assay. In a mutagenicity assay conducted in L5178Y/TK+/- mouse lymphoma cells, zidovudine was weakly mutagenic in the presence and absence of metabolic activation. In an in vitro cytogenetic study performed in cultured human lymphocytes, zidovudine induced dose-related structural chromosomal abnormalities. Zidovudine was clastogenic in in vivo micronucleus tests in rats and mice. Zidovudine gave positive results in an in vitro mammalian cell transformation assay.

Lamivudine was not active in a microbial mutagenicity screen but did induce mutations at the thymidine kinase locus of mouse lymphoma L5178Y cells without metabolic activation. Lamivudine was clastogenic in human peripheral blood lymphocytes in vitro, with or without metabolic activation. In rats, lamivudine did not cause chromosomal damage in bone marrow cells in vivo or cause DNA damage in primary hepatocytes.

Effects on Fertility:

Abacavir had no adverse effects on the mating performance or fertility of male and female rats at oral doses of up to 427 mg/kg per day, a dose expected to produce exposures approximately 30 fold higher than that in humans at the therapeutic dose based on AUC.

Neither orally administered zidovudine (225mg/kg BID) nor lamivudine (up to 70 times anticipated clinical exposure based on C_max) have shown evidence of impairment of
fertility in male and female rats. There are no data on the affect of abacavir, lamivudine or zidovudine on human female fertility. In men zidovudine has not been shown to affect sperm count, morphology or motility.

**Use in Pregnancy:** Category B3.

There is no data available on the treatment with a combination of abacavir, lamivudine and zidovudine in animals. In reproductive studies in animals, abacavir, lamivudine and zidovudine were all shown to cross the placenta.

Studies in pregnant rats showed that abacavir is transferred to the foetus through the placenta. Developmental toxicity (depressed foetal body weight and reduced crown-rump length) and increased incidences of foetal anasarca and skeletal malformations were observed when rats were treated with abacavir at doses of 648 mg/kg during organogenesis (approximately 35 times the human exposure at the recommended dose, based on AUC). In a fertility study, evidence of toxicity to the developing embryo and foetuses (increased resorptions, decreased foetal body weights) occurred only at 427 mg/kg per day. The offspring of female rats treated with abacavir at 427 mg/kg (beginning at embryo implantation and ending at weaning) showed increased incidence of stillbirth and lower body weights throughout life. In the rabbit, there was no evidence of drug-related developmental toxicity and no increases in foetal malformations at doses up to 453 mg/kg (8.5 times the human exposure at the recommended dose, based on AUC).

There are limited data regarding the use of zidovudine in human pregnancy. It is not known whether zidovudine can cause foetal harm when administered to a pregnant woman or can affect reproductive capacity.

The safety of lamivudine in human pregnancy has not been established. Lamivudine caused an increase in early embryonic deaths in the rabbit at exposures (based on C\text{max} and AUC) less than the maximum anticipated clinical exposure. Oral zidovudine caused an increase in foetal resorptions in the rat (75 mg/kg BID) and rabbit (250 mg/kg BID). Lamivudine was not teratogenic in rats and rabbits with exposure (based on C\text{max}) up to 40 and 36 times respectively those observed in humans at the clinical dosage. At maternally toxic doses, zidovudine (3000 mg/kg/day) given to rats during organogenesis resulted in an increased incidence of malformations. No evidence of foetal abnormalities were observed at lower doses.

Vaginal tumours have been seen in rodents following 19-month daily oral dosing with zidovudine at exposures (based on AUC) more than 4 times (mouse) and more than 27 times (rat) the estimated clinical exposure (see PRECAUTIONS, Carcinogenicity, Mutagenicity;). The relevance of these findings to either infected or uninfected infants exposed to zidovudine is unknown. However, pregnant women considering using TRIZIVIR during pregnancy should be made aware of these findings.

There are no adequate and well-controlled studies in pregnant women and TRIZIVIR is not recommended for use in pregnant women.

There have been reports of mild, transient elevations in serum lactate levels, which may be due to mitochondrial dysfunction, in neonates and infants exposed in utero or peri-partum to nucleoside reverse transcriptase inhibitors (NRTIs). The clinical relevance of transient elevations in serum lactate is unknown. There have also been very rare reports of developmental delay, seizures and other neurological disease. However, a causal relationship between these events and NRTI exposure in utero or peri-partum has not been established.
These findings do not affect current recommendations to use antiretroviral therapy in pregnant women to prevent vertical transmission of HIV.

**Use in Lactation:**

Abacavir and its metabolites are secreted into the milk of lactating rats. Although not confirmed, it is expected that abacavir and its metabolites will also be secreted into human milk. There are no data available on the safety of abacavir when administered to babies less than three months old.

Some health experts recommend that HIV infected women do not breast feed their infants under any circumstances in order to avoid transmission of HIV.

Following oral administration of lamivudine or zidovudine to lactating rats, the respective drug was excreted in the milk. Both lamivudine and zidovudine are excreted in human milk at similar concentrations to those found in serum. It is expected that abacavir will also be secreted into human milk, although this has not been confirmed. It is recommended that mothers taking TRIZIVIR do not breast feed.

**INTERACTIONS WITH OTHER MEDICINES:**

Clinical studies have shown that there are no clinically significant interactions between abacavir, zidovudine, and lamivudine. As TRIZIVIR contains abacavir, lamivudine and zidovudine, any interactions that have been identified with these agents individually may occur with TRIZIVIR. Based on the results of in vitro experiments and the known major metabolic pathways of abacavir, the potential for P450 mediated interactions with other medicinal products involving abacavir is low. The likelihood of interactions with lamivudine is low due to limited metabolism and plasma protein binding and almost complete renal clearance. Similarly zidovudine has limited protein binding but is eliminated primarily by hepatic conjugation to an inactive glucuronidated metabolite. The interactions listed below should not be considered exhaustive but are representative of the classes of medicinal products where caution should be exercised.

**Interactions relevant to abacavir**

Based on the results of *in vitro* experiments and the known major metabolic pathways of abacavir, the potential for drug interactions involving abacavir is low. Abacavir shows no potential to inhibit metabolism mediated by the cytochrome P<sub>450</sub> 3A4 enzyme. It has also been shown *in vitro* not to interact with drugs that are metabolised by CYP 3A4, CYP 2C9 or CYP 2D6 enzymes. Induction of hepatic metabolism has not been observed in clinical studies. Therefore, there is little potential for drug interactions with antiretroviral protease inhibitors and other drugs metabolised by major P<sub>450</sub> enzymes.

**Ethanol:** - The metabolism of abacavir is altered by concomitant ethanol resulting in an increase in AUC of abacavir of about 41%. Given the safety profile of abacavir these findings are not considered clinically significant. Abacavir has no effect on the metabolism of ethanol.

**Methadone:** - In a pharmacokinetic study, coadministration of 600 mg abacavir twice daily with methadone showed a 35 % reduction in abacavir C<sub>max</sub> and a one hour delay in t<sub>max</sub>, but AUC was unchanged. The changes in abacavir pharmacokinetics are not considered clinically relevant. In this study, abacavir increased the mean methadone systemic...
clearance by 22%. This change is not considered clinically relevant for the majority of patients, however occasionally methadone dose re-titration may be required.

*Retinoids:* Retinoid compounds such as isotretinoin, are eliminated via alcohol dehydrogenase. Interaction with abacavir is possible but has not been studied.

**Interactions relevant to lamivudine:**

The possibility of interaction with other medicinal products administered concurrently with lamivudine should be considered, particularly when the main route of elimination is active renal secretion especially via the cationic system e.g. trimethoprim.

*Trimethoprim:* An interaction with trimethoprim, a constituent of trimethoprim with sulphamethoxazole causes a 40% increase in lamivudine exposure following administration of one trimethoprim 160mg / sulfamethoxazole 800mg tablet once daily for 5 days. The effects of higher doses of trimethoprim on lamivudine plasma levels have not been investigated. However, unless the patient already has renal impairment, no dosage adjustment of lamivudine is necessary. Lamivudine has no effect on the pharmacokinetics of trimethoprim/sulfamethoxazole. Administration of lamivudine in patients with renal impairment should be assessed carefully. The effect of co-administration of lamivudine with higher doses of trimethoprim/sulfamethoxazole used for the treatment of *Pneumocystis carinii* pneumonia and toxoplasmosis has not been studied.

*Zalcitabine:* Lamivudine may inhibit the intracellular phosphorylation of zalcitabine when the two medicinal products are used concurrently. TRIZIVIR is therefore not recommended to be used in combination with zalcitabine.

In *in vitro* studies, ciprofloxacin, pentamidine and ganciclovir reduced the anti-HIV activity of lamivudine. The clinical significance of this is not known.

**Interactions relevant to zidovudine:**

*Atovaquone:* Zidovudine does not appear to affect the pharmacokinetics of atovaquone. However, pharmacokinetic data have shown that atovaquone appears to decrease the rate of metabolism of zidovudine to its glucuronide metabolite (steady state AUC of zidovudine was increased by 33% and peak plasma concentration of the glucuronide was decreased by 19%). At zidovudine dosages of 500 or 600 mg/day it would seem unlikely that a three week, concomitant course of atovaquone for the treatment of acute PCP would result in an increased incidence of adverse reactions attributable to higher plasma concentrations of zidovudine. Extra care should be taken in monitoring patients receiving prolonged atovaquone therapy.

*Clarithromycin:* Clarithromycin tablets reduce the absorption of zidovudine. This can be avoided by separating the administration of zidovudine and clarithromycin by at least two hours.

*Lamivudine:* Co-administration of zidovudine with lamivudine results in a 13% increase in zidovudine exposure and a 28% increase in peak plasma levels. However overall exposure (AUC) is not significantly altered. This increase is not considered to be of significance to patient safety and therefore no dosage adjustments are necessary. Zidovudine has no effect on the pharmacokinetics of lamivudine. (see Pharmacokinetics).

*Phenytoin:* Phenytoin blood levels have been reported to be low in some patients receiving zidovudine, while in one case a high level was documented. These
observations suggest that phenytoin levels should be carefully monitored in patients receiving TRIZIVIR and phenytoin since many patients with advanced HIV infections have CNS conditions which may predispose them to seizure activity.

**Probenecid:** Probenecid may reduce renal excretion of glucuronide and zidovudine and in addition, may alter the metabolism of zidovudine by competitively inhibiting glucuronidation or directly inhibiting hepatic microsomal metabolism (see PRECAUTIONS). Limited data suggest that probenecid increases the mean half-life and area under the plasma concentration curve of zidovudine by decreasing glucuronidation. Careful thought should be given to the possibilities of drug interactions before using such drugs, particularly for chronic therapy, in combination with TRIZIVIR.

**Ribavirin:** The nucleoside analogue ribavirin antagonises the *in vitro* antiviral activity of zidovudine and so concomitant use of TRIZIVIR with this medicinal product should be avoided.

**Rifampicin:** Limited data suggests that co-administration of zidovudine and rifampicin decreases the AUC of zidovudine by 48% ± 34%. However the clinical significance of this is unknown.

**Stavudine:** Zidovudine may inhibit the intracellular phosphorylation of stavudine when the two medicinal products are used concurrently. Stavudine is therefore not recommended for use in combination with TRIZIVIR.

Other medicinal products, including but not limited to, aspirin, codeine, morphine, methadone, paracetamol, indomethacin, ketoprofen, naproxen, oxazepam, lorazepam, cimetidine, clofibrate, dapsone and inosine pranobex, may alter the metabolism of zidovudine by competitively inhibiting glucuronidation or directly inhibiting hepatic microsomal metabolism. Careful thought should be given to the possibilities of interactions before using such medicinal products particularly for chronic therapy, in combination with TRIZIVIR.

Coadministration of zidovudine with medicinal products that are potentially nephrotoxic or myelosuppressive or cytotoxic, or which interfere with RBC/WBC number or function (such as pyrimethamine, sulfamethoxazole and trimethoprim, doxorubicin, dapsone, systemic pentamidine, ganciclovir, amphotericin B, flucytosine, vincristine, vinblastine, adriamycin, or interferon) may increase the risk of adverse reactions to zidovudine. If concomitant therapy with TRIZIVIR and any of these medicinal products is necessary then extra care should be taken in monitoring renal function and haematological parameters and, if required, the dosage of one or more agents should be reduced.

Some experimental nucleoside analogues affecting DNA replication antagonise the *in vitro* antiviral activity of zidovudine against HIV and thus, concomitant use of such medicinal products should be avoided.

Some medicinal products such as trimethoprim and sulfamethoxazole, aerosolised pentamidine, pyrimethamine, and aciclovir may be necessary for the management or prevention of opportunistic infections. In the controlled trial in patients with advanced HIV disease, increased toxicity was not detected with limited exposure to these medicinal products. However, there is one published report of neurotoxicity (profound lethargy) associated with concomitant use of zidovudine and aciclovir (see PRECAUTIONS - Interactions relevant to lamivudine).
Effects on the Ability to Drive and Operate Machinery:

There have been no studies to investigate the effect of TRIZIVIR, or the active components (abacavir, lamivudine and zidovudine) on driving performance or the ability to operate machinery. Further, a detrimental effect on such activities cannot be predicted from the pharmacology of the active substances. Nevertheless, the clinical status of the patient and the adverse event TRIZIVIR should be borne in mind when considering the patient’s ability to drive or operate machinery.

ADVERSE EFFECTS:

Adverse events have been reported during therapy for HIV disease with abacavir, lamivudine and zidovudine, administered separately or in combination. For many of these adverse events it is unclear whether they are related to abacavir, lamivudine, zidovudine, or to the wide range of medicinal products used in the management of HIV disease or are as a result of the underlying disease process.

Information regarding the safety of TRIZIVIR, abacavir, zidovudine or lamivudine in combination with other antiretroviral drugs is limited. Physicians should refer to the complete product information for the respective antiretroviral therapy for a description of the known associated adverse reactions.

As TRIZIVIR contains abacavir, lamivudine and zidovudine, the type and severity of adverse reactions associated with each of the compounds may be expected. There is no evidence of added toxicity following concurrent administration of the three compounds.

Adverse Reactions with TRIZIVIR:

Clinical Trial Data:

Table 2 lists all adverse reactions, considered possibly related to study medication occurring at an incidence of 5% or more, reported in a controlled pivotal clinical trial (CNAAB3005) in adults.

<table>
<thead>
<tr>
<th>Drug Related Adverse Reaction</th>
<th>ABC/3TC/ZDV N = 262</th>
<th>IDV/3TC/ZDV N = 264</th>
<th>Total N = 526</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Drug-Related Adverse Reaction</td>
<td>206 (79)</td>
<td>225 (85)</td>
<td>431 (82)</td>
</tr>
<tr>
<td>GASTROINTESTINAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nausea</td>
<td>137 (52)</td>
<td>144 (55)</td>
<td>281 (53)</td>
</tr>
<tr>
<td>Nausea &amp; vomiting</td>
<td>58 (22)</td>
<td>57 (22)</td>
<td>115 (22)</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>40 (15)</td>
<td>38 (14)</td>
<td>78 (15)</td>
</tr>
<tr>
<td>Abdominal discomfort &amp; pain</td>
<td>21 (8)</td>
<td>25 (9)</td>
<td>46 (9)</td>
</tr>
<tr>
<td>Gaseous symptoms</td>
<td>20 (8)</td>
<td>21 (8)</td>
<td>41 (8)</td>
</tr>
<tr>
<td>Abdominal distension</td>
<td>23 (9)</td>
<td>13 (5)</td>
<td>36 (7)</td>
</tr>
<tr>
<td>Dyspeptic symptoms</td>
<td>11 (4)</td>
<td>12 (5)</td>
<td>23 (4)</td>
</tr>
<tr>
<td>Abnormal liver function tests</td>
<td>13 (5)</td>
<td>9 (3)</td>
<td>22 (4)</td>
</tr>
</tbody>
</table>
### Adverse Reactions Reported with the Individual Components of TRIZIVIR:

The following adverse events have been reported with the individual components of TRIZIVIR. Adverse events occurring in at least 5% of patients are listed in bold typeface in Table 3 below.

**IMPORTANT:** For information on abacavir hypersensitivity refer to the section below.

#### Table 3 - Adverse Reactions Reported with the Individual Components of TRIZIVIR

<table>
<thead>
<tr>
<th></th>
<th>Abacavir</th>
<th>Lamivudine</th>
<th>Zidovudine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiovascular</strong></td>
<td></td>
<td></td>
<td>Cardiomyopathy</td>
</tr>
<tr>
<td><strong>Gastrointestinal tract</strong></td>
<td><strong>Nausea, vomiting, diarrhoea, anorexia.</strong></td>
<td><strong>Nausea, vomiting, diarrhoea, upper abdominal pain</strong></td>
<td><strong>Nausea, vomiting, anorexia, diarrhoea, abdominal pain, oral mucosa pigmentation, dyspepsia and flatulence.</strong></td>
</tr>
<tr>
<td><strong>Haematological</strong></td>
<td></td>
<td>Anaemia, neutropenia, thrombocytopenia</td>
<td>Anaemia, neutropenia and leucopenia and aplastic anaemia (see below for</td>
</tr>
<tr>
<td>Abacavir</td>
<td>Lamivudine</td>
<td>Zidovudine</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>------------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>Pure red cell aplasia</td>
<td></td>
<td>further details*), thrombocytopenia, and pancytopenia with marrow hypoplasia and pure red cell aplasia.</td>
<td></td>
</tr>
</tbody>
</table>

### Liver/pancreas
- Pancreatitis.
- Transient rises in liver enzymes (AST, ALT), rises in serum amylase, pancreatitis.
- Liver disorders such as severe hepatomegaly with steatosis, rises in blood levels of liver enzymes and bilirubin, pancreatitis.

### Metabolic/endocrine
- Lactic acidosis in the absence of hypoxaemia.
- Redistribution/accumulation of body fat
- Redistribution/accumulation of body fat

### Musculoskeletal
- Muscle disorders, rarely rhabdomyolysis arthralgia
- Myalgia, myopathy.

### Neurological/psychiatry
- Headache.
- Headache, peripheral neuropathy, paraesthesia
- Headache, insomnia, paraesthesia, dizziness, somnolence, loss of mental acuity, convulsions, anxiety, depression.

### Respiratory tract
- Cough, dyspnoea.

### Skin
- Rash without systemic symptoms. Very rarely erythema multiforme, Stevens-Johnson Syndrome and toxic epidermal necrolysis.
- Rash, alopecia.
- Rash, nail and skin pigmentation, urticaria, pruritus, sweating.

### Miscellaneous
- Fever, lethargy, fatigue.
- Fever, malaise, fatigue.
- Malaise, fever, urinary frequency, taste perversion, generalised pain, chills, chest pain, influenza-like syndrome, gynaecomastia, asthenia.
Redistribution/accumulation of body fat (see Special warnings and special precautions for use). The incidence of this event is dependent on multiple factors including the particular antiretroviral drug combination.

**Adverse events with abacavir:**
Many of the adverse events listed above for abacavir (nausea, vomiting, diarrhoea, fever, fatigue, rash) occur commonly as part of abacavir hypersensitivity. Therefore, patients with any of these symptoms should be carefully evaluated for the presence of this hypersensitivity reaction. If TRIZIVIR has been discontinued in patients due to experiencing any one of these symptoms and a decision is made to restart TRIZIVIR, this should be done only under direct medical supervision (see Special considerations following an interruption of TRIZIVIR therapy).

**Haematological adverse events with zidovudine:**
Anaemia (which may require transfusions), neutropenia and leucopenia occurred more frequently at higher dosages (1200-1500 mg/day) and in patients with advanced HIV disease (especially when there is poor bone marrow reserve prior to treatment) and particularly in patients with CD4 cell counts less than 100/mm³. Dosage reduction or cessation of therapy may become necessary (see DOSAGE AND ADMINISTRATION). The anaemia appeared to be the result of impaired erythrocyte maturation as evidenced by increasing macrocytosis (MCV) while on drug.

The incidence of neutropenia was also increased in those patients whose neutrophil counts, haemoglobin levels and serum vitamin B₁₂ levels were low at the start of zidovudine therapy.

**Hypersensitivity to abacavir:** (see PRECAUTIONS)

**Clinical trial data**

In clinical studies approximately 5% of subjects receiving abacavir developed a hypersensitivity reaction (HSR), which in rare cases has proven fatal. Over 28,000 patients received ZIAGEN in clinical trials up to 30 June 2000. In this period there were 7 cases in which the fatal outcome may have been due to hypersensitivity.

Screening for the HLA-B*5701 status, in a prospective, randomised, controlled clinical trial showed that 3.4% of subjects with a negative HLA-B*5701 status receiving abacavir developed a hypersensitivity reaction.

Following detailed analyses of the first 406/636 patients, the HSR is characterised by the appearance of symptoms indicating multi-organ/body-system involvement. Table 4 lists the symptoms occurring in more than 10% of the first 406 patients with the hypersensitivity reaction (HSR).

<table>
<thead>
<tr>
<th>Symptom in HSR</th>
<th>% of HSR cases with a symptom#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>83%</td>
</tr>
<tr>
<td>Rash</td>
<td>68%</td>
</tr>
<tr>
<td>Nausea</td>
<td>38%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>25%</td>
</tr>
<tr>
<td>Malaise</td>
<td>19%</td>
</tr>
<tr>
<td>Fatigue</td>
<td>15%</td>
</tr>
<tr>
<td>Symptom</td>
<td>Incidence</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>18%</td>
</tr>
<tr>
<td>Pruritus</td>
<td>17%</td>
</tr>
<tr>
<td>Headache</td>
<td>17%</td>
</tr>
<tr>
<td>Myalgia</td>
<td>13%</td>
</tr>
<tr>
<td>Chills</td>
<td>12%</td>
</tr>
<tr>
<td>Mouth and throat involvement</td>
<td>11%</td>
</tr>
</tbody>
</table>

* Approximately 5% of HSR are reported from all patients in clinical studies

# Incidence of symptoms recorded for HSR as of 30/09/98.

Symptoms of HSR can occur at any time while being treated with abacavir but usually appear within the first six weeks of initiation of treatment with abacavir (median time to onset was 11 days). The majority of patients developing hypersensitivity reactions will have fever and/or rash (usually maculopapular or urticarial) as part of the syndrome, however reactions have occurred without rash or fever. Further hypersensitivity reactions reported in at least 10% of patients were dyspnoea, cough, abdominal pain, and elevated liver function tests. Other signs and symptoms may include, rarely myolysis, arthralgia, oedema, sore throat, headache, paraesthesia, reports of adult respiratory distress syndrome and respiratory failure.

Physical findings may include lymphadenopathy and, occasionally mucous membrane lesions (conjunctivitis and mouth ulceration) and hypotension. Laboratory abnormalities that may accompany abacavir hypersensitivity include elevated liver function tests, creatine phosphokinase, creatinine or lymphopenia. Renal and hepatic failure and anaphylaxis have been reported in association with this hypersensitivity reactions.

Some patients with hypersensitivity reactions were initially thought to have respiratory disease (pneumonia, bronchitis, pharyngitis), a flu-like illness, gastroenteritis or reactions to other medications. This delay in diagnosis of hypersensitivity has resulted in abacavir being continued or re-introduced, leading to more hypersensitivity reactions or death. Therefore, the diagnosis of hypersensitivity reaction should be carefully considered for patients presenting with symptoms of these diseases. If a hypersensitivity reaction cannot be ruled out, TRIZIVIR or any other medicinal product containing abacavir (e.g. KIVEXA, ZIAGEN) should not be restarted.

The symptoms related to this hypersensitivity reaction worsen with continued therapy, and usually resolve upon discontinuation of abacavir. Risk factors that may predict the occurrence or severity of hypersensitivity to abacavir have not been identified.

Restarting TRIZIVIR, following a hypersensitivity reaction results in a prompt return of symptoms within hours. This recurrence of the hypersensitivity reaction may be more severe than on initial presentation, and may include life-threatening hypotension and death. Regardless of their HLA-B*5701 status, patients who develop this hypersensitivity reaction must discontinue TRIZIVIR and must never be rechallenged, with TRIZIVIR or any other medicinal products containing abacavir (e.g. KIVEXA, ZIAGEN). (see PRECAUTIONS)

There have been infrequent reports of hypersensitivity reactions with a rapid onset, including life threatening reactions, following reintroduction of abacavir, in patients who had only one of the key symptoms of a hypersensitivity reaction (ie rash, fever, gastrointestinal, respiratory or constitutional symptoms such as fatigue or malaise).

On very rare occasions hypersensitivity reactions have been reported in patients who have re-started therapy, and who had no apparent preceding symptoms of a
hypersensitivity reaction. Some of these cases were poorly documented. The clinical significance of these reports is unclear.

**Post marketing data:**
**Metabolism and nutrition disorders**
Hyperlactataemia (common)

Lactic acidosis (rare, see PRECAUTIONS)

**Abacavir**
World-wide patient exposure to marketed abacavir (ie ZIAGEN) is approximately 353,000 patient years up to 31 December 2003. The HSR reporting rate in these patients is approximately 2.5 per 1000 patient years of exposure. A total of 17 patients may have died due to HSR following exposure to marketed ZIAGEN in this period.

**DOSAGE AND ADMINISTRATION:**

**Dosage in adults:**
The recommended dose of TRIZIVIR in adults is one tablet twice daily, giving a total daily dose of 600mg abacavir, 300mg lamivudine and 600mg zidovudine.

Food reduces the $C_{\text{max}}$ and extends the $T_{\text{max}}$ of lamivudine but the amount of drug absorbed is not reduced. The clinical significance of this is not known (see Pharmacokinetics).

Therapy should be initiated by a physician experienced in the management of HIV infection.

For situations where discontinuation of therapy with one of the active constituents of TRIZIVIR (abacavir, lamivudine or zidovudine), or dose reduction is necessary, separate preparations of abacavir (ZIAGEN® tablets and oral solution), lamivudine (3TC® tablets and oral solution) and zidovudine (RETROVIR® capsules and syrup) are available.

**Monitoring of Patients:**
Haematologic toxicities appear to be related to pretreatment bone marrow reserve and to dose and duration of therapy. In patients with poor bone marrow reserve, particularly in patients with advanced symptomatic HIV disease, frequent monitoring of haematologic indices is recommended to detect serious anaemia or granulocytopenia (see PRECAUTIONS). In patients who experience haematologic toxicity, reduction in haemoglobin may occur as early as 2 to 4 weeks, and granulocytopenia usually occurs after 6 to 8 weeks.

**Dose Adjustment:**
Significant anaemia (haemoglobin of <7.5 g/dL or reduction of >25% of baseline) and/or significant granulocytopenia (granulocyte count of <750 cells/mm$^3$ or reduction of >50% from baseline) require a dose interruption until evidence of marrow recovery is observed (see PRECAUTIONS). For less severe anaemia or granulocytopenia, a reduction in daily dose may be adequate. In patients who develop significant anaemia, dose modification does not necessarily eliminate the need for transfusion. If marrow recovery occurs following dose modification, gradual increases in dose may be appropriate depending on haematologic indices and patient tolerance. As dosage adjustment of TRIZIVIR is not possible, separate preparations of abacavir, zidovudine and lamivudine should be used. Physicians should refer to the complete prescribing information for these drugs.
Dosage in the elderly:
No specific pharmacokinetic data are available in patients over 65 years of age; however, special care is advised in this age group due to age-associated changes such as the decrease in renal function and alterations in haematological parameters.

Dosage in renal impairment:
Whilst no dosage adjustment of abacavir is necessary in patients with renal dysfunction, lamivudine and zidovudine concentrations are increased in patients with renal impairment due to decreased clearance. Therefore as dosage adjustment of these may be necessary, it is recommended that separate preparations of abacavir, lamivudine and zidovudine be administered to patients with reduced renal function (creatinine clearance ≤ 50 mL/min) (see PRECAUTIONS).

Dosage in hepatic impairment:
TRIZIVIR is contraindicated for use in hepatically impaired patients.

OVERDOSE:
There is no experience of overdosage with TRIZIVIR. However, there are limited data available on the consequences of ingestion of acute overdoses of either lamivudine or zidovudine in humans. No fatalities occurred, and all patients recovered. No specific signs or symptoms have been identified following such overdosage apart from those listed in ADVERSE EFFECTS. Single doses up to 1200 mg and daily doses up to 1800 mg of abacavir have been administered to patients in clinical studies. No unexpected adverse reactions were reported. The effects of higher doses are not known.

Treatment: Patients should be observed closely for evidence of toxicity (see ADVERSE EFFECTS) and given the necessary supportive therapy.

Since lamivudine is dialysable, continuous haemodialysis could be used in the treatment of overdosage, although this has not been studied. Haemodialysis and peritoneal dialysis appear to have a negligible effect on the removal of zidovudine. The primary metabolite, GAZT, appears to be more efficiently removed by haemodialysis than peritoneal dialysis. It is not known whether abacavir can be removed by peritoneal dialysis or haemodialysis.

For more details, physicians should refer to the individual product information for abacavir, lamivudine and zidovudine.

Contact the Poisons Information Centre (telephone 131126) for advice on overdose management.

PRESENTATION AND STORAGE CONDITIONS:
TRIZIVIR tablets are blue/green capsule-shaped film-coated tablets, engraved with “GX LL1” on one tablet face. Each tablet contains abacavir 300mg, lamivudine 150mg and zidovudine 300mg.

Tablets are available in blister packs or plastic HDPE bottles with a child resistant closure. Each pack type contains 60 tablets. Store below 30°C in a dry place.
NAME AND ADDRESS OF THE SPONSOR:

ViiV Healthcare Pty Ltd
Level 4, 436 Johnston Street
Abbotsford, Victoria 3067

POISON SCHEDULE OF THE MEDICINE: S4

DATE OF FIRST INCLUSION IN THE AUSTRALIAN REGISTER OF THERAPEUTIC GOODS (THE ARTG): 06 June 2001

DATE OF MOST RECENT AMENDMENT: 06 September 2012

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