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The inhibitory activity of aciclovir for HSV-1, HSV-2, VZV and EBV is highly selective. The enzyme thymidine kinase (TK) of normal, uninfected cells does not use aciclovir effectively as a substrate, hence toxicity to mammalian host cells is low; however, TK encoded by HSV, VZV and EBV converts aciclovir to aciclovir monophosphate, a nucleoside analogue, which is further converted to the diphosphate and finally to the triphosphate by cellular enzymes. Aciclovir triphosphate interferes with the viral DNA polymerase and inhibits viral DNA replication with resultant chain termination following its incorporation into the viral DNA.

#### Pharmacokinetic properties

##### Absorption

Aciclovir is only partially absorbed from the gut. The average oral bioavailability varies between 10 and 20%. Under fasting conditions, mean peak concentrations (C<sub>max</sub>) of 0.4 microgram/ml are achieved at approximately 1.6 hours after a 200 mg dose administered as oral suspension or capsule. Mean peak plasma concentrations (C<sub>ssmax</sub>) increase to 0.7 microgram/ml (3.1 micromoles) at steady state following doses of 200 mg administered every four hours. A less than proportional increase is observed for C<sub>ssmax</sub> concentrations following doses of 400 mg and 800 mg administered four-hourly, with values reaching 1.2 and 1.8 microgram/ml (5.3 and 8 micromoles), respectively.

##### Distribution

The mean volume of distribution of 26 L indicates that aciclovir is distributed within total body water. Apparent values after oral administration (V<sub>d</sub>/F) ranged from 2.3 to 17.8 L/kg. As plasma protein binding is relatively low (9 to 33%), drug interactions involving binding site displacement are not anticipated. Cerebrospinal fluid concentrations are approximately 50% of corresponding plasma concentrations at steady-state.

##### Metabolism

Aciclovir is predominantly excreted unchanged by the kidney. The only significant urinary metabolite is 9-[(carboxymethoxy) methyl]guanine, and accounts for 10-15% of the dose excreted in the urine.

##### Elimination

In adults mean systemic exposure (AUC<sub>0-∞</sub>) to aciclovir ranges between 1.9 and 2.2 microgram\*<sup>h</sup>/mL after a 200 mg dose. At this dose, the mean terminal plasma half-life after oral administration has been shown to vary between 2.8 and 4.1 hours.

In adults, the terminal plasma half-life of aciclovir after administration of Zovirax I.V. is about 2.9 hours. Renal clearance of aciclovir (Cl<sub>r</sub>= 14.3 L/h) is substantially greater than creatinine clearance, indicating that tubular secretion, in addition to glomerular filtration, contributes to the renal elimination of the drug. The half-life and total clearance of aciclovir are dependent on renal function. Therefore, dosage adjustment is recommended for renally impaired patients.

In adults, mean steady state peak plasma concentrations (C<sub>ssmax</sub>) following a one-hour infusion of 2.5 mg/kg, 5 mg/kg and 10 mg/kg were 22.7 micromolar (5.1 microgram/ml), 43.6 micromolar (9.8 microgram/ml) and 92 micromolar (20.7 microgram/ml) respectively. The corresponding trough concentrations (C<sub>ssmin</sub>) 7 hours later were 2.2 micromolar (0.5 microgram/ml), 3.1 micromolar (0.7 microgram/ml) and 10.2 micromolar (2.3 microgram/ml) respectively. In children over 1 year of age similar mean peak (C<sub>ssmax</sub>) and trough (C<sub>ssmin</sub>) concentrations were observed when a dose of 250 mg/m<sup>2</sup> was substituted for 5 mg/kg and a dose of 500 mg/m<sup>2</sup> was substituted for 10 mg/kg.

In neonates (0 to 3 months of age) treated with doses of 10 mg/kg administered by infusion over a one-hour period every 8 hours the C<sub>ssmax</sub> was found to be 61.2 micromolar (13.8 microgram/ml) and the C<sub>ssmin</sub> to be 10.1 micromolar (2.3 microgram/ml). A separate group of neonates treated with 15 mg/kg every 8 hours showed approximate dose proportional increases, with a C<sub>max</sub> of 83.5 micromolar (18.8 microgram/ml) and C<sub>min</sub> of 14.1 micromolar (3.2 microgram/ml). The terminal plasma half-life in these patients was 3.8 hours.

#### Special Patient Populations

##### Elderly

In the elderly patients with normal renal function total clearance falls with increasing age due to decreases in creatinine clearance. However, the possibility of renal impairment in the elderly must be considered and the dosage should be adjusted accordingly.

##### Renal impairment

In patients with chronic renal failure the mean terminal half-life was found to be 19.5 hours. The mean aciclovir half-life during haemodialysis was 5.7 hours. Plasma aciclovir concentrations dropped approximately 60% during dialysis.

##### Weight

In a clinical study in which morbidly obese female patients (n=7) were dosed with intravenous aciclovir based on their actual body weight, plasma concentrations were found to be approximately twice that of normal weight patients (n=5), consistent with the difference in body weight between the two groups.

#### Preclinical safety data

##### Mutagenicity:

The results of a wide range of mutagenicity tests *in vitro* and *in vivo* indicate that aciclovir is unlikely to pose a genetic risk to man.

##### Carcinogenicity:

Aciclovir was not found to be carcinogenic in long-term studies in the rat and the mouse.

##### Teratogenicity:

Systemic administration of aciclovir in internationally accepted standard tests did not produce embryotoxic or teratogenic effects in rabbits, rats or mice.

In a non-standard test in rats, foetal abnormalities were observed but only following such high subcutaneous doses that maternal toxicity was produced. The clinical relevance of these findings is uncertain.

##### Fertility:

Largely reversible adverse effects on spermatogenesis in association with overall toxicity in rats and dogs have been reported only at doses of aciclovir greatly in excess of those employed therapeutically. Two-generation studies in mice did not reveal any effect of aciclovir on fertility.

#### PHARMACEUTICAL PARTICULARS

##### List of excipients

Sodium hydroxide (used to adjust pH)

##### Incompatibilities

The reconstituted concentrate and diluted solution for infusion must not be mixed with other medicinal products except those mentioned in section Special precautions for disposal and other handling.

##### Shelf life

The expiry date is indicated on the packaging.

##### Special precautions for storage

Store below 25°C

##### Nature and contents of container

Neutral, clear Type I glass vial with a synthetic rubber closure secured with an aluminium collar and a plastic flip-top cover.  
17 ml-nominal capacity of vial containing 250 mg aciclovir.

##### Special precautions for disposal and other handling

**Reconstitution:** Zovirax I.V. should be reconstituted using the following volumes of either Water for Injections BP or Sodium Chloride Intravenous Injection BP (0.9% w/v) to provide a solution containing 25 mg aciclovir per ml:

Formulation	Volume of fluid for reconstitution
250 mg vial	10 ml

From the calculated dose, determine the appropriate number and strength of vials to be used. To reconstitute each vial add the recommended volume of infusion fluid and shake gently until the contents of the vial have dissolved completely.

##### Administration:

The required dose of Zovirax I.V. should be administered by slow intravenous infusion over a one-hour period.

After reconstitution Zovirax I.V. may be administered by a controlled-rate infusion pump.

Alternatively, the reconstituted solution may be further diluted to give an aciclovir concentration of not greater than 5 mg/ml (0.5% w/v) for administration by infusion:

Add the required volume of reconstituted solution to the chosen infusion solution, as recommended below, and shake well to ensure adequate mixing occurs.

For children and neonates, where it is advisable to keep the volume of infusion fluid to a minimum, it is recommended that dilution is on the basis of 4 ml reconstituted solution (100 mg aciclovir) added to 20 ml of infusion fluid.

For adults, it is recommended that infusion bags containing 100 ml of infusion fluid are used, even when this would give an aciclovir concentration substantially below 0.5% w/v. Thus one 100 ml infusion bag may be used for any dose between 250 mg and 500 mg aciclovir (10 and 20 ml of reconstituted solution) but a second bag must be used for doses between 500 mg and 1000 mg.

When diluted in accordance with the recommended schedules, Zovirax I.V. is known to be compatible with the following infusion fluids and stable for up to 12 hours at room temperature (15°C to 25°C):

Sodium Chloride Intravenous Infusion BP (0.45% and 0.9% w/v).

Sodium Chloride (0.18% w/v) and Glucose (4% w/v) Intravenous Infusion BP.  
Sodium Chloride (0.45% w/v) and Glucose (2.5% w/v) Intravenous Infusion BP.  
Compound Sodium Lactate Intravenous Infusion BP (Hartmann's Solution).

Zovirax I.V. when diluted in accordance with the above schedule will give an aciclovir concentration not greater than 0.5% w/v.

Since no antimicrobial preservative is included, reconstitution and dilution must be carried out under full aseptic conditions, immediately before use, and any unused solution discarded.

Should any visible turbidity or crystallization appear in the solution before or during infusion, the preparation should be discarded.

##### Manufactured and Packed by:

GlaxoSmithKline Manufacturing S.p.A., Parma, Italy.

##### Marketing Authorisation Holder:

The Wellcome Foundation Ltd., 980 Great West Road, Brentford, Middlesex, United Kingdom trading as GlaxoSmithKline UK.

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#### THIS IS A MEDICAMENT

- Medicament is a product which affects your health and its consumption contrary to instructions is dangerous for you.
- Follow strictly the doctor's prescription, the method of use and the instructions of the pharmacist who sold the medicament.
- The doctor and the pharmacist are the experts in medicines, their benefits and risks.
- Do not by yourself interrupt the period of treatment prescribed.
- Do not repeat the same prescription without consulting your doctor.
- Keep all medicaments out of the reach and sight of children.

Council of Arab Health Ministers, Union of Arab Pharmacists

Version: <b>2</b>		200 mm Measuring Bar
<b>Artwork Information Panel (AIP)</b>		
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## IMPORTANT

GSK LOC is responsible to approve the change documentation, artwork brief and final artwork, ensuring that it is accurate, consistent and complete.

Artwork Studio is responsible for site technical requirements and pre-press suitability.

GSK Market is responsible to advise SDC when changes required impact the following:

**Formulation**  
**Tablet embossing**  
**Storage conditions**  
**Shelf Life**

**NOTE TO MARKET**  
Local approvers must ensure that trade mark and copyright statements included in the brief comply with guidance provided by Legal: Global Trade Marks.

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