Preparations

Ph. Eur.: Tetanus Vaccine (Adsorbed);
USP 31: Tetanus Toxoid; Tetanus Toxoid Adsorbed.

Proprietary Preparations (details are given in Part 3)
Arg.: Tetanol; Tetavax; ***Austral.:*** Tet-Tox; ***Austria:*** Tetanol; ***Belg.:*** Tevax†; ***Braz.:*** Tetavax†; ***Chile:*** Tetavax; ***Cz.:*** Alteana; Tetavax; ***Ger.:*** Tetamun SSW†; Tetanol; ***Gr.:*** Anatoxal-TE-Berna†; ***Hong Kong:*** Te Anatoxal; Tetavax; ***Hung.:*** Tetanol; ***Ital.:*** Anatetall; Imovax Tetano; Tanrix†; Tetatox†; ***Malaysia:*** Te Anatoxal†; Tetavax†; TT Vaccine; ***Mex.:*** Tetamyn; Tetanol; Tetinox; ***Neth.:*** Tetavax†; ***Norw.:*** Tetavax; ***NZ:*** Te Anatoxal; Tet-Tox; ***Philipp.:*** Te Anatoxal; Tetavax; ***Port.:*** Anatoxal Te†; ***S.Afr.:*** Tetavax; ***Singapore:*** Te Anatoxal†; ***Spain:*** Anatoxal Te; ***Switz.:*** Anatoxal Te; ***Thai.:*** Anatetall†; Bio-TT; Te Anatoxal; Tetavax; TT Vaccine; ***Turk.:*** Anatetall; Tetavax; ***UK:*** Clostet†; ***USA:*** Te Anatoxal.

Tetanus and Influenza Vaccines

Vacunas del tétanos y la gripe.

Profile

Tetanus and influenza vaccines are available in some countries for active immunisation.

Preparations

Proprietary Preparations (details are given in Part 3)
Fr.: Tetagrip.

Tetanus and Poliomyelitis Vaccines

Vacunas del tétanos y la poliomielitis.

Profile

Tetanus and poliomyelitis (inactivated) vaccines have been used in some countries for active immunisation against tetanus and poliomyelitis.

Preparations

Proprietary Preparations (details are given in Part 3)
Fr.: T. Polio†; Vaccin TP†.

Tick Venom Antisera

Antisuero contra el veneno de garrapata; Tick Antivenins; Tick Antivenoms.

Profile

An antiserum is available in Australia for treatment of the neurotoxic effects of envenomation by the tick *Ixodes holocyclus*. The antiserum is prepared from the serum of dogs that have been immunised with tick venom.

Tick venom antiserum is given by slow intravenous infusion.

Tick-borne Encephalitis Immunoglobulins

Inmunoglobulinas de la encefalitis transmitida por garrapatas.
ATC — J06BB12.

Profile

Preparations containing antibodies against tick-borne encephalitis are available in some countries for passive immunisation against the disease.

Preparations

Proprietary Preparations (details are given in Part 3)
Austria: FSME-Bulin†; ***Cz.:*** FSME-Bulin†; ***Ger.:*** FSME-Bulin†.

Tick-borne Encephalitis Vaccines

Vacunas de la encefalitis transmitida por garrapatas.
ATC — J07BA01.

Pharmacopoeias. Many pharmacopoeias, including *Eur.* (see p.vii), have monographs.
Ph. Eur. 6.2 (Tick-borne Encephalitis Vaccine (Inactivated); Vaccinum Encephalitidis Ixodibus Advectae Inactivatum). A liquid preparation of a suitable strain of tick-borne encephalitis virus grown in cultures of chick-embryo cells or other suitable cell cultures and inactivated by a suitable method. It should be stored at 2° to 8°, not be allowed to freeze, and be protected from light.
The BP 2008 states that Tic/enceph may be used on the label.

Adverse Effects and Precautions

As for vaccines in general, p.2201.

Effects on the nervous system. Severe progressive sensorimotor spastic paralysis occurred in a 54-year-old man after a second booster dose of tick-borne encephalitis vaccine.[1] Partial recovery was noted after about 6 months.

1. Bohus M, *et al.* Myelitis after immunisation against tick-borne encephalitis. *Lancet* 1993; **342:** 239–40.

Interactions

As for vaccines in general, p.2202.

Uses and Administration

A vaccine is available in some countries for active immunisation against tick-borne viral encephalitis.

In the UK, vaccination against tick-borne encephalitis is recommended for those who anticipate prolonged exposure to the infective agent, for example persons visiting or working in the warm forested parts of Europe and Scandinavia. The vaccine is given by intramuscular injection in adult doses of 0.5 mL. The primary course consists of three doses, the second being given 4 to 12 weeks after the initial dose, and a third dose 5 to 12 months later. In children over 1 year of age and below 16 years of age, 3 doses of 0.25 mL of the junior formulation of the vaccine are given; the intervals between each dose are the same as for the adult schedule. To achieve rapid short-term protection in adults and children, the second dose may be given 2 weeks after the first dose. Booster doses for adults and children at continued risk should be given within 3 years of the last primary vaccination or booster dose.

Preparations

Ph. Eur.: Tick-borne Encephalitis Vaccine (Inactivated).

Proprietary Preparations (details are given in Part 3)
Austria: Encepur; FSME-Immun; ***Belg.:*** FSME-Immun; ***Canad.:*** FSME-Immun; ***Cz.:*** Encepur; FSME-Immun; ***Denm.:*** TicoVac; ***Fin.:*** Encepur; TicoVac; ***Fr.:*** TicoVac; ***Ger.:*** Encepur; FSME-Immun; ***Hung.:*** Encepur; FSME-Immun; ***Ital.:*** TicoVac; ***Norw.:*** TicoVac; ***Pol.:*** Encepur; FSME-Immun; ***Rus.:*** Encevir (Энцевир); ***Swed.:*** Encepur; FSME-Immun; ***Switz.:*** Encepur; FSME-Immun; ***UK:*** TicoVac.

Trichomoniasis Vaccines

Vacunas de la tricomoniasis.

Profile

A trichomoniasis vaccine containing inactivated *Lactobacillus* spp. is available in some countries for the prophylaxis of recurrent vaginal trichomoniasis. The vaccine is reported to stimulate production of antibodies against the aberrant coccoid forms of the lactobacilli associated with trichomoniasis and also, by cross-reaction, against the trichomonads themselves.

Preparations

Proprietary Preparations (details are given in Part 3)
Ger.: Gynatren.

Tularaemia Vaccines

Vacunas de la tularemia.

Profile

A tularaemia vaccine prepared from a live attenuated strain of *Francisella tularensis* has been used for active immunisation against tularaemia in persons at high risk of contracting the disease.

◊ References.

1. Titball R, Oyston P. A vaccine for tularaemia. *Expert Opin Biol Ther* 2003; **3:** 645–53.
2. Conlan JW. Vaccines against Francisella tularensis: past, present and future. *Expert Rev Vaccines* 2004; **3:** 307–14.

Typhoid Vaccines

Vacunas de la fiebre tifoidea.
ATC — J07AP01; J07AP02; J07AP03.

Pharmacopoeias. Many pharmacopoeias, including *Eur.* (see p.vii), have monographs.
Ph. Eur. 6.2 (Typhoid Vaccine; Vaccinum Febris Typhoidi). A sterile suspension of inactivated *Salmonella typhi* containing not less than 500 million and not more than 1000 million bacteria per dose which does not exceed 1 mL. It is prepared from a suitable strain of *S. typhi* such as Ty 2. The bacteria are inactivated by heat, or by treatment with acetone, formaldehyde, or phenol, or by phenol and heat. The vaccine should be stored at 2° to 8°, and be protected from light.
The BP 2008 states that Typhoid may be used on the label.
Ph. Eur. 6.2 (Typhoid Vaccine, Freeze-dried; Vaccinum Febris Typhoidi Cryodesiccatum). A freeze-dried preparation of inactivated *Salmonella typhi* containing not less than 500 million and not more than 1000 million bacteria per dose which does not exceed 1 mL. It is prepared from a suitable strain of *S. typhi* such as Ty 2. The bacteria are inactivated by heat, or by treatment with acetone or formaldehyde. Phenol may not be used in the preparation. The vaccine should be stored at 2° to 8°, and be protected from light. It is reconstituted by the addition of suitable sterile liquid and should be used within 8 hours.
The BP 2008 states that Typhoid may be used on the label.
Ph. Eur. 6.2 (Typhoid Vaccine (Live, Oral, Strain Ty 21a); Vaccinum Febris Typhoidis Vivum Perorale (Stirpe Ty 21a)). A freeze-dried preparation of live *S. typhi* strain Ty 21a grown in a suitable medium. It contains not less than 2×10^9 bacteria per dose. It should be stored at 2° to 8°, and be protected from light.
The BP 2008 states that Typhoid(live,oral) may be used on the label.
Ph. Eur. 6.2 (Typhoid Polysaccharide Vaccine; Vaccinum Febris Typhoidis Polysaccharidicum). A preparation of purified Vi capsular polysaccharide obtained from *S. typhi* Ty2 strain or some other suitable strain that has the capacity to produce Vi polysaccharide. It contains 25 micrograms of polysaccharide per dose. It should be stored at 2° to 8° and be protected from light.
The BP 2008 states that Typhoid may be used on the label.

Adverse Effects and Precautions

As for vaccines in general, p.2201.

Oral live typhoid and parenteral polysaccharide vaccines have been associated with fewer adverse effects than parenteral killed typhoid vaccines and have replaced them in many countries.

Interactions

As for vaccines in general, p.2202.

Conflicting advice has been issued about the use of live oral typhoid vaccines with antibacterials or antimalarials (particularly mefloquine or proguanil). WHO has stated that all these drugs should be stopped from 3 days before until 3 days after receiving the Ty 21a live oral vaccine. The UK licensed product information advises a separation of 3 days for antibacterials, 12 hours for mefloquine, and 3 days for other antimalarials (but the fixed-dose combination of atovaquone and proguanil may be given with the vaccine). The US product information has indicated that mefloquine (and chloroquine) can be given with the vaccine but that proguanil should only be taken 10 days after the vaccine.

Uses and Administration

Typhoid vaccines are used for active immunisation against typhoid fever. As with many vaccines, the efficacy of typhoid vaccine is not complete and the importance of maintaining attention to hygiene should be emphasised to those travelling to endemic areas.

Typhoid vaccination is advised for laboratory workers handling specimens which may contain typhoid organisms and for persons travelling to areas where typhoid fever is endemic. In the UK, vaccination of contacts of a known typhoid carrier is not recommended; in the USA such persons are advised to receive the vaccine. Typhoid vaccine is not useful in controlling outbreaks of the disease in non-endemic areas.

In the UK, two vaccines are used: a capsular polysaccharide vaccine for parenteral use, and a live oral vaccine.

The capsular polysaccharide typhoid vaccine contains 25 micrograms of the Vi polysaccharide antigen per dose. A single dose of 0.5 mL is given by deep subcutaneous or intramuscular injection. Booster doses may be given every 3 years to those who remain at risk. The response in children under 18 months of age may be suboptimal, and the decision to vaccinate will be governed by the risk of exposure to infection.

The live oral typhoid vaccine contains an attenuated strain of *Salmonella typhi*, Ty 21a, and is given as enteric-coated capsules containing not less than 2×10^9 bacteria per dose. A primary immunisation schedule of one capsule every other day for 3 doses is given.

In the USA, the Vi capsular polysaccharide vaccine and the live oral Ty 21a vaccine are available. The capsular polysaccharide vaccine is given intramuscularly similarly to that in the UK, with a booster dose suggested every 2 years. For the oral vaccine, 4 doses on alternate days are recommended for both primary immunisation and boosters, which are given every 5 years if exposure continues.

In areas where typhoid is endemic WHO advises that immunisation should be considered as part of the routine schedules; either the Vi capsular polysaccharide vaccine or the Ty 21a live oral vaccine should be given to schoolchildren over the age of 2 years. Immunisation of the whole community should also be considered during an outbreak of typhoid; if this is not possible, persons aged 2 to 19 years should be the target group.

Immunisation for travellers. In most developed countries where typhoid is not endemic, the major use for typhoid vaccine is for non-immune travellers visiting endemic areas. The highest incidence of the disease is associated with travel to the Indian subcontinent and parts of tropical South America, although immunisation is also recommended for travellers to lower risk areas of Africa, Asia, and south-east Europe. By far the most important form of protection against gastrointestinal infection is strict attention to personal, food, and water hygiene, although in practice this advice is often difficult to follow.[1]

None of the vaccines used has been 100% effective in preventing disease. The effectiveness of the vaccines has generally been assessed in field trials in the populations of endemic areas. Such populations acquire a degree of natural immunity due to continued exposure and it may not be possible to equate protection rates in these populations to non-immune travellers. The live oral vaccine has been shown to confer a useful degree of immunity in field trials but the dose used may have been insufficient to protect non-immune individuals. The degree of immunity induced may be increased by the use of higher inocula or liquid preparations. In addition, compliance with dosing and storage requirements may further limit the effectiveness of this dosage form.

Large field studies have verified the effectiveness of the capsular polysaccharide vaccine but its efficacy has not been assessed in