



## TRAVELLING WITH CHILDREN AND BABIES

### GENERAL

Children in good health – although more sensitive than adults to all sorts of infections – present no additional problems, on condition that maximum care is taken beforehand to estimate the risks of a stay in the (sub) tropics and suitable precautionary measures are taken. Parents are strongly advised to follow a first aid course in preparation of an adventurous or long-term journey.

After your arrival, a few basic principles should be observed. The most important of which are:

- Adapt the pace of travelling in accordance with the adaptability of the children
- Basic vaccinations: These should preferably be updated before departure. Special attention must be given to polio and measles, as these still occur in developing countries. The immunization schedules can be adapted to babies and children under 1 year old if you are travelling to a developing country. More information can be found in the paragraph entitled “Basic vaccinations”.
- Malaria: It is a good idea to check first whether a trip with young children to highly endemic areas is really necessary, as malaria is more serious in young children (and become life-threatening within a few hours). In addition to a suitable chemoprophylaxis, in some cases an impregnated mosquito net is required, as children are more easily exposed to mosquito bites. You will find more information on this in the "Malaria" section.
- Diarrhoea: Children are particularly susceptible to diarrhoea, hence the great importance of good hygiene and clear instructions for possible treatment. Dehydration and acidosis from diarrhoea is mainly a problem with children under 2 years old. They get diarrhoea more frequently and for longer periods than older children. An oral salt-sugar solution is the only, but fortunately very effective, remedy. Your general practitioner should provide you with written instructions, the correct directions for use and a description of the first signs of dehydration. It is best that the mother continues breastfeeding the baby for as long as possible while travelling, as this offers the best protection against diarrhoea. In hot climates extra (pure) water can spoon-feed. If the child has fever or vomits, it is imperative to find a reliable doctor as soon as possible, but this is not always possible when travelling. For the problem of traveller's diarrhoea we refer to the separate leaflet.
- General preventive measures based on a good knowledge of the local health problems are essential. Safe behaviour should be adopted in connection with drinking water, food, swimming (is there schistosomiasis?), animals (stray cats and dogs, monkeys, etc.), and so on. Pay special attention to sunburn, prickly heat, walking barefoot. Overexposure to the sun during childhood is best avoided, as its cumulative effect increases the risk of skin cancer (especially melanoma).
- Air travel: Babies are usually not permitted to travel by air until they are 7 days old (air travel is discouraged for premature babies; emergency transport in an incubator, with medical supervision, can be arranged from 48 hours after birth). Approximately 15% of children get earache when travelling by air (especially during the descent and landing). If in doubt, it is advisable to have their ears examined before departure. During ascent and descent earache problems can be prevented by giving them a bottle (or breastfeeding).
- Be alert with children in the traffic; use adapted car seats and safety belt. Be attentive with young children when they are around water. Drowning is a frequent cause of lethal accidents. Keep an eye on the children's playing area. When they play outside, make sure they do not touch all kinds of animals (see “rabies vaccination”). When playing inside, contact with dangerous objects and products has to be avoided (traveller's pharmacy, repellents, insecticides, pesticides, etc.)
- Acute altitude sickness occurs with approximately the same frequency in children as in adults. Symptoms are sometimes more difficult to recognise in young children, because they can be confused with other ailments. Classic symptoms of acute altitude sickness are headache, nausea, vomiting, weakness and sleeping disorders. Immediate descent is recommended when a child feels unwell above the altitude of 2500m. In general it is advisable not to stay overnight above 2000 m with children under 2 years old and above 3000 m with children under 10 years old. Too little is known about the use of acetazolamide in children, but it can be used in certain circumstances. (5mg/kg per dose, to be divided into one or more intakes a day).
- In case of illness a good self-help handbook and a medical travel kit prove very useful, as they show you how to treat diarrhoea, fever, minor wounds, etc. It is not always easy to find a doctor.

## VACCINATIONS

### Basic vaccination scheme (Belgium – 2008):

Yearly update: see National Health Council Vaccination calendar for children

[www.health.belgium.be](http://www.health.belgium.be) –click: EN; search term: “vaccine”.

<b>At 8 weeks</b>	- <b>Hexavalent</b> vaccine (*) Di-Te-Pa & POLIO (IPV**) & H. INFLUENZAE type b & HEPATITIS B - ROTA VIRUS (oral) - PNEUMOCOCCAL vaccine	1 <sup>st</sup> dose  1 <sup>st</sup> dose 1 <sup>st</sup> dose	The polio vaccine is obligatory.
<b>At 12 weeks</b>	- <b>Hexavalent</b> vaccine (*) Di-Te-Pa & POLIO (IPV**) & H. INFLUENZAE type b & HEPATITIS B - ROTA VIRUS (oral)	2 <sup>nd</sup> dose  2 <sup>nd</sup> dose	
<b>At 16 weeks</b>	- <b>Hexavalent</b> vaccine (*) Di-Te-Pa & POLIO (IPV**) & H. INFLUENZAE type b & HEPATITIS B - (ROTA VIRUS) (oral) - PNEUMOCOCCAL vaccine	3 <sup>rd</sup> dose  (3 <sup>rd</sup> dose) 2 <sup>nd</sup> dose	The polio vaccine is obligatory.
<b>12 months</b>	- MEASLES-MUMPS-RUBELLA Priorix® - PNEUMOCOCCAL vaccine	1 <sup>st</sup> dose – may be given earlier if necessary – see section 1 “basic vaccinations” point (4). 3 <sup>rd</sup> dose	
<b>15 months</b> (13 to 18 months)	- <b>Hexavalent</b> vaccine (*) Di-Te-Pa & POLIO (IPV**) & H. INFLUENZAE type b & HEPATITIS B - conjugated MENINGOCOCCAL – C vaccine	4 <sup>th</sup> dose  1 <sup>st</sup> dose	The polio vaccine is obligatory.
<b>5-7 years</b>	- <b>Tetavalent</b> vaccine Di-Te-Pa & POLIO (IPV)	5 <sup>th</sup> dose	Infanrix-IPV® Tetravac®
<b>10-13 years</b>	- MEASLES-MUMPS-RUBELLA Priorix® / MMR VAX II®  - (HEPATITIS B)  - HPV		- Repeat vaccination. Also given to children who have already had one of these diseases. - For Hepatitis B it is no repeat vaccination – only a possible start when there were no previous vaccinations. Basic vaccination for as yet unvaccinated individuals. - see section 1 “basic vaccinations” point (9)
<b>15 years</b> (14 – 16 years)	dTpa (Boostrix®)		-See section 1 “basic vaccinations” point (1) or see chapter 6. -Repeat (booster) every 10 years with dT (Tedivax® pro adulto)

(\*) At present mainly the **hexavalent** vaccine is used: diphtheria-, tetanus-, acellular whooping cough (pertussis), polio, haemophilus influenzae type b and hepatitis B (Infanrix Hexa<sup>®</sup> = Di-Te-Pa-Pol-Hib-HB).

(\*\*) IPV = inactivated injectable polio vaccine (*the oral vaccine is no longer used in Belgium but is still used in some developing countries*).

N.B. IM injections with infants = in the anterolateral thigh muscle

1. In risk groups: hepatitis B and BCG **from birth**, influenza **from 6 months**. For information on the new pneumococcal vaccine: see text below A.7.
2. It is best to start from the beginning with children whose **vaccination status is unknown** (e.g. in adopted children). Consult the “catch-up vaccinations” tab from the National Health Council via [www.health.belgium.be](http://www.health.belgium.be) –click: EN; search term: “vaccine”. (The acellular whooping cough vaccine can be used. No full dose of diphtheria should be given to children older than 7 years. For these older children, Tedivax<sup>®</sup> pro Adulto (from 7 years old), Revaxis<sup>®</sup> (from 6 years old) and Boostrix<sup>®</sup> (for adolescents) can be used as it contains a lower dose of diphtheria-toxoid).
3. If the **vaccination schedule is interrupted**, proceed with the remaining doses, without repeating the complete schedule. The effect of one or more previous doses is maintained.

**Child vaccination programmes** for all countries in the world can be consulted on the WHO website:

<http://www.who.int/vaccines/globalsummary/immunization/countryprofileselect.cfm>

Just choose the country in the “country list” and scroll down until you see the vaccination schedule.

## A. BASIC VACCINATIONS

### 1. TETANUS-DIPHTHERIA-PERTUSSIS-POLIO

In Belgium and most of the other European countries only the injectable polio vaccine is used in **a-paediatric combined vaccines**. Before travelling, the child should have received 3 doses of the **hexavalent** vaccine if possible. It is recommended to start with the paediatric DTPa-vaccine for young infants at the age of 8 weeks (valid also for prematures). In children who travel to the tropics at a very young age, basic vaccination can be started earlier, i.e., at 6 weeks. The next 2 doses may be given after that with a minimum interval of 4 weeks.

Please remember that in Belgium polio vaccination has to be registered at least in the 18<sup>th</sup> month, after complete vaccination (at least 3 doses, the last one in the 15<sup>th</sup> month).

**Oral POLIO vaccine (Sabin<sup>®</sup>)** is no longer given in Belgium but is still used in some of the destination countries. Children going to the tropics at a very young age can possibly take the oral vaccine upon arrival, before the age of 6 weeks.

The National Health Council has recently revised their recommendations concerning the **vaccination against pertussis**. From today a booster injection against pertussis is recommended for all adolescents (at the age of 14 to 16 years). This vaccination will be given together with the booster vaccination against tetanus and diphtheria, which are already provided at that age. The special vaccine “**Boostrix<sup>®</sup>**” will be used. (contains ½ Tetanusantoxine + 1/15 Difterieantoxine + 1/3 acellular Pertussis-antigen in paediatric dose).

The complete recommendation can be found at “vaccination against pertussis”, see: [www.health.belgium.be](http://www.health.belgium.be) –click: EN; search term “pertussis”

**2. HAEMOPHILUS INFLUENZAE** type b carries a high risk of inducing bacterial meningitis in children under the age of 5 years. Currently several vaccines are available (separately or in combination with other paediatric vaccines). For more information please consult the scientific instruction leaflets.

#### Vaccination scheme:

- **Less than 6 months** of age: 3 injections at 2, 3 and 4 months of age, and a repeat booster vaccination in the 15<sup>th</sup> month (in the form of the hexavalent vaccine = together with Di-Te-Pa-IPV-HB). It is best to administer 2 doses before departure; if there is not enough time left, administration may be started from the age of 6 weeks.
- **From 6 to 12 months**: 2 injections with an interval of 1 to 2 months between injections, and a repeat booster vaccination in the 15<sup>th</sup> month.
- **From 1 up to and including 5 years**: 1 single injection is enough.

### 3. HEPATITIS B

Since September 1999 the Hepatitis B vaccination has been included in the free basic vaccination package (1) for infants as part of the hexavalent vaccine (for infants born from 1 May 1999) and (2) for children 11- 12 years (first started for the first year of secondary school in the school year 1999-2000, children born in 1987-88), with free booster vaccinations for those who were entitled to the free vaccines but missed their chance. The paediatric vaccine can be requested from the provincial health inspection teams of the Flemish Community Care and Health – Public Health Inspection department (the ancient Health inspection of the Flemish Community) and the Inspections d'Hygiène of the French Community for vaccination of babies and youngsters in the first year of secondary school (Flemish Community) or the last year of primary school (French Community). Since February 2002 the reimbursement requirements for the junior type of the Hepatitis-B vaccine have changed: reimbursement of the standard prescription is currently possible for category Bf (75% reimbursement, permission from advisory physician required) for ages 0-1 and 11 tot 12 years, i.e., the same as for children aged 13 to 18 years (permission from advisory physician required).

(Info January 2004: Gecommentarieerd geneesmiddelen Repertorium <http://www.bcfi.be>

Répertoire Commenté des Médicament <http://www.cbip.be>)

#### Vaccination schedule

- For babies 4 intramuscular injections (in the anterolateral thigh muscle) are recommended, together with the other basic vaccinations (hexavalent vaccine) at 2, 3, 4, and 15 months. This will give life long protection. Currently, experts see no need for a repeat (booster) vaccination.
- For children over 1 year, 3 intramuscular injections (in the anterolateral thigh muscle) are recommended at months 0-1-4 (6), the same as for adults. Protection is probably lifelong.
- If departure to the tropics cannot be postponed, and there is a real risk of infection, the accelerated scheme can also be used: 3 injections at intervals of 1 month (or with 2 weeks of interval, and if really necessary, even with 1 week interval).
- If really necessary, one can start the hepatitis B vaccination from birth: months 0 and 1.

Vaccination is strongly recommended for children who are going to live in developing countries and who will have continuous close contact with local children (who easily have open wounds). Vaccination is strongly recommended for unvaccinated children who will be staying for longer than 3-6 months in an area where hepatitis B is highly endemic. Vaccination should generally be considered for children who are going to stay for longer than 3 to 6 months in an area where hepatitis B is highly endemic. Children of parents who are carriers of the hepatitis B virus must of course also be vaccinated. As hepatitis B vaccination is part of the basic vaccination schedule for children in general (and babies and adolescents in particular) it is clear that any long-distance trip with children is an opportunity to bring the vaccination up to date. Twinrix<sup>®</sup>Paediatric, a combined vaccine against hepatitis A and B, is available for the age category 1-15 years. However, there is no reimbursement for this vaccine.

### 4. MEASLES

The risk of measles is very high in less developed countries. The morbidity (viral pneumonia, encephalitis), mortality and late consequences are considerable. Children on a journey need to be protected.

Usually measles vaccination is administered to children from the age of 12 months.

For children staying in developing countries (or countries with low vaccination degree) who come in contact with the local population, the vaccination can be given from the age of 6 months on (measles-mumps-rubella combination vaccine, there is no separate measles vaccine available in Belgium) This initial vaccination provides an immediate, but not an indefinite protection ensured for some months. It has to be followed by a 2<sup>nd</sup> injection, in practice from the age of 12-15 months on. A vaccine administered before the age of 12 months does not count in the vaccination scheme; the child still needs two vaccines after the age of 12 months.

#### Remarks:

- After vaccination the child is best kept under observation for at least 15 minutes.
- The measles vaccine may be given together with any other vaccine. Yellow fever and measles vaccination are best either combined, or with a 4-week interval.
- Parents should be aware that the child may show mild measles symptoms 1 week to 10 days after administration of the vaccine.
- Contra-indications are hypersensitivity to neomycin or other components of the vaccine. A non-anaphylactic allergy to eggs is no contra-indication. For other contra-indications we refer to the scientific information sheet.

## 5. MEASLES-MUMPS-RUBELLA

Since 1985 the trivalent measles-mumps-rubella vaccine has been available free of charge for children up to the age of 2 years. A first vaccination is normally given at the age of 12 months (or from the age of 6-9 months if indicated – see (4)); and a booster vaccination is given at the age of 10-13 years (routinely administered after 1994 and also free of charge), as seroconversion after a first vaccination does not occur in 5 to 10% of cases (primary failure) and in a further 5% the antibodies have disappeared after ten years (secondary failure).

Individuals born before 1960 almost certainly have antibodies to measles and mumps as a result of natural exposure to the virus.

In individuals born after 1960 the following options are available to anyone going to stay in or go on a long trip to developing countries:

1. Vaccination with the trivalent measles-mumps-rubella vaccine - 2 injections with a minimum interval of 1 month - strongly recommended if there has been no earlier vaccination or past infection. The chance of acquiring immunity via natural exposure has become smaller.
2. An earlier booster vaccination may be administered to young children, from the age of 5-6 years on. Administration of the vaccine harbours no risk in itself when the individual already has antibodies to one or more of these diseases e.g. as a result of an infection that has proceeded subclinically or as a result of a previous vaccination. A booster vaccination can therefore be administered safely even to individuals over 18 years old whose immune status is dubious. It is generally economically unfeasible to determine the antibodies to any of these infectious diseases beforehand.

NB. The objective to eliminate measles in Europe (was expected for 2010; but this hasn't been reached so far) will only be achieved when the vaccination degree for both MMR-doses are at least 95 %.

## 6. CONJUGATED MONOVALENT MENINGOCOCCUS-C VACCINE

Since January 2001 a monovalent conjugated vaccine against Meningococcus C has been available on the Belgian market (Meningitec<sup>®</sup> - Menjugate<sup>®</sup> - Neisvac-C<sup>®</sup>). This vaccine is recommended at the age of 15 months, together with the hexavalent DTPa-HBV-IPV-Hib-vaccine, but at different injection sites.

The High Commission for Health recommends this vaccination for all children older than 1 year and adolescents up to and including 18, for whom one dose is enough.

Children younger than 1 can be vaccinated if so desired with 3 doses of conjugated vaccine at intervals of one month (at the earliest from the age of 2 months). These guidelines may change in the coming years. Update: High Commission for Health: vaccination calendar for children and adolescents.

[www.health.belgium.be](http://www.health.belgium.be) – click: EN; search terms: “vaccine” & “basic vaccine”.

## 7. CONJUGATED SEPTUPLE PNEUMOCOCCAL VACCINE (n7)

Since September 2004 a conjugated septuple pneumococcal vaccine is available on the Belgian market - Prevenar<sup>®</sup>. Pneumococcus cause a.o. bacterial meningitis, severe pneumonia and blood contagion. In Belgium all infants up to 2 years are systematically vaccinated (for free). From the age of 24 months until the age of 59 months, only children with high susceptibility for invasive pneumococcal infection will be vaccinated (the vaccine is expensive and not always reimbursed completely).

The schedule varies depending on the age of starting the vaccination schedule:

- from 2-6 months: 2 doses with an interval of 2 months (month 2 & 4 together with the other basic vaccinations) and a booster at month 12 (3 injections in total)
- from 7-11 months: 2 doses with an interval of 1-2 months and a booster in the first year of life (3 injections in total)
- from 12-23 months : 2 doses with an interval of 1-2 months (2 injections in total)
- from 2 – 4 years 1 dose is sufficient.
- beyond the age of 5 the vaccine will not be administered anymore.

Update: High Commission for Health: vaccination calendar for children and adolescents

[www.health.belgium.be](http://www.health.belgium.be) – click: EN; search terms “publications – vaccination”.

## 8. ROTA VIRUS VACCINE

The oral vaccine against the rotavirus is advised for all children under the age of 6 months. Depending on the kind of used vaccine, the schedule consists of 2 doses (Rotarix<sup>®</sup>) or 3 doses (Rotateq<sup>®</sup>; not yet commercialised in Belgium) with an interval of 1 month (to be administered in a medical setting).

The first dose has to be administered as early as possible, from the age of 6 weeks on. The entire vaccination schedule has to be finished before the age of 6 months; beyond this age the vaccine against the rotavirus will not be administered anymore.

Update: See Vaccination calendar for children and adolescents from the Higher Council for Public Health. [www.health.belgium.be](http://www.health.belgium.be) – click: EN; search terms “vaccine” & “basic vaccination”.

## 9. HUMAN PAPILLOMA VIRUS VACCINE (HPV)

2 vaccines for the prevention of HPV-related diseases have recently appeared on the Belgium market.

- o **Cervarix**<sup>®</sup> is a recombinant vaccine consisting of the capsid proteins of HPV types 16 and 18 (responsible for 70% of the cases of cervical cancer) and is registered for the prevention of high- grade cervical intra-epithelial neoplasm and of cervical cancer.

- o **Gardasil**<sup>®</sup> is a recombinant vaccine consisting of the capsid proteins of HPV types 6, 11, 16 and 18. Infection with HPV types 6 and 11 are responsible for about 90% of the genital warts. The vaccine is registered for the prevention of high-grade dysplasia of the cervix and the vulva, and for cervical cancer and the prevention of external genital warts.

These vaccines are approved for administration to girls from the age of 9 years onwards. In order to gain maximum protection from the vaccine, they should be vaccinated before they become sexually active.

The general vaccination against human papillomavirus (HPV) is at present recommended by the National Health Council for the cohort of **girls** between 10-13 years and consists of 3 doses at 0, 1, 6 months (Cervarix<sup>®</sup>) or 0, 2, 6 months (Gardasil<sup>®</sup>).

The price per dose is the same for the two vaccines (137,40 €). Gardasil<sup>®</sup> and shortly also Cervarix<sup>®</sup> are reimbursed for the greater part (situation at 1 April 2008).

The vaccine is only reimbursed (category b) for girls who are at least 12 years old (but younger than 19 years) at the moment of the first administration. The maximum number of reimbursed vaccines is limited to 3 vaccines per claimant and “first administration”, “second administration” and “third administration” must be mentioned on the prescription, for the 2<sup>nd</sup> and 3<sup>rd</sup> administration the date of the first, respectively the second administration should also be mentioned.

Fever and local reactions at the site of injection are the most frequent side effects. Other reported side effects are allergic reactions, nausea and dizziness.

A protective effect until 5 years after the vaccination is currently acknowledged; no further long-term facts are known, it is not clear, whether a booster vaccination will be necessary or not. Because these vaccines offer protection to only 70% of the HPV types that cause uterine cancer, systematic screening remains necessary.

The vaccination should always fit in health encouraging initiatives regarding sexuality and safe sexual contact. Simultaneous administration of a HPV vaccine and other vaccines are under study and can only be confirmed for Gardasil<sup>®</sup> and the hepatitis B vaccine HBVAXPRO<sup>®</sup> (separate injection places).

Source: [www.cbip.be](http://www.cbip.be) (Fr), [www.bcfi.be](http://www.bcfi.be) (Dutch). For further information (also about vaccination in other age groups) and later updates, see: National Health Council:

[www.health.belgium.be](http://www.health.belgium.be) – click: EN; search terms: “vaccine” & “HPV”.

## 10. VARICELLA VACCINE

At this moment this live-attenuated vaccine is generally not being used. The indication is not travel related. On the other hand questions about preventive or post-exposition vaccination rise before a planned trip by airplane (active disease means a prohibition to get in the plane): the varicella vaccine is 70 to 100% effective in the prevention of illness or a decrease in the seriousness of the symptoms when it is being administered within 3 days after possible contagion – more than 5 days after exposure, the vaccine loses its prophylactic effect (but will obviously increase immunity if the person was not infected).

In the near future a combination vaccine for measles-mumps-rubella-varicella will be available and possibly be introduced in the basic vaccination scheme.

To be followed on the website of the National Health Council – vaccination calendar for child and adolescent: [www.health.belgium.be](http://www.health.belgium.be) – click: EN; search term: “vaccination”.

## 11. INFLUENZA (FLU)

In the Northern hemisphere flu epidemics appear between November and March, in the southern hemisphere between April and September. In the tropics flu can be seen the whole year through.

Vaccination is recommended for children (6 months and older) with a chronic disorder of bronchial tubes, heart, kidneys or liver, with an impaired lower immunity or with daily aspirin intake.

Children younger than 9 years, who are being vaccinated against influenza for the first time, should receive 2 doses of the vaccine with an interval of at least 1 month. Half a dose is given to children under the age of 3 years, after the age of 3 years a full dose can be administered.

## **B. OTHER VACCINATIONS**

### **1. YELLOW FEVER**

Normally the vaccine is not administered to children under 12 months (WHO 2010: not recommended for children under 9 months). The few cases of post vaccination encephalitis mainly occurred in children younger than 6 months. In a high-risk situation, it can be administered to children of 6 months or older (never younger than 6 months!). The only real contraindications are an allergy to chicken and egg proteins (“anaphylactic type”), or a state of immunosuppression. If a measles vaccination is indicated, it will – for theoretical reasons only - be administered preferably at the same time as the yellow fever vaccination, or with an interval of 4 weeks.

### **2. HEPATITIS A**

Opinion differs about prevention of hepatitis A in children. The disease usually proceeds much more mildly and more frequently asymptotically in children - certainly in those under 5 years old - than in adults. Fulminant hepatitis can occur, although extremely rare, and clinically manifest hepatitis A can spoil the trip. Children with hepatitis A, even if this is subclinical, can moreover be a major source of infection for their environment after returning home (family, relatives, kindergarten, school) and cause local epidemics with important morbidity within the group of secondary cases in older children and adults. It is therefore advisable to vaccinate all children of migrants visiting their country of origin. In the United States vaccination is recommended for all children from the age of 1 year. The individual indications for vaccination should be discussed with the parents.

For this reason, it is sensible to vaccinate children of immigrants who return to their country of origin for their annual holidays.

The vaccine is easily administered from the age of 1 year. The vaccination scheme consists of 1 intramuscular injection of 0.5 ml followed by a second injection 6 months, but preferably 1 year, later.

- Havrix<sup>®</sup> junior: an adapted vaccine for the age category from 1 to 15 years (regardless of the body weight).
- Epaxal<sup>®</sup>: from the age of 1 year - the same dose for both children and adults.
- In the age category from 1 to 15 years, Twinrix<sup>®</sup> Paediatric, a combined vaccine against hepatitis A and B, is available. More information is given in chapter 7 “recommended vaccinations for travellers”.

It is possible to administer the vaccine to children between 6 and 12 months (like with a hepatitis A epidemic in a day-care centre). When the vaccine is administered before the age of 1 year, the complete vaccination against hepatitis A will require 2 additional doses after the age of 1 year (advice National Health Council, September 2003). Full vaccination gives protection for more than 25 years and as a principle, lifelong.

### **3. TYPHOID**

- Parenteral vaccines (Typherix<sup>®</sup> and Typhim Vi<sup>®</sup>) are not administered to children under the age of 2 years, as the immune response under this age (as with polysaccharide vaccines in general) is too low. Typhoid is in any case exceptional under the age of 2 years. A conjugated vaccine that works below the age of 2 can be expected on the market in the future.

It has not yet been proven that the oral vaccine Vivotif<sup>®</sup> is efficient and harmless in children under 5 years of age. This does not mean that it must not be administered to younger children when there is a real risk of typhoid while travelling. The child must be able to swallow the entire capsule without biting it, which is normally only possible from the age of 5 years.

### **4. BACTERIAL MENINGITIS**

A non-conjugated tetravalent polysaccharide-vaccine Mencevax<sup>®</sup> A, C, W-135, Y, against bacterial meningitis may be administered to children from the age of 2. Children from 3 to 12 months of age are the principal victims of meningococcal sepsis and/or -meningitis. The immune response to vaccination is, however, very low in these children.

**The meningococcus A component** of this quadrivalent vaccine is 85 to 95% effective for approximately 3 years in children of 4 years of age and older.

The production of antibodies after vaccination is very low in children under the age of 3 months and gradually increases between the ages of 3 months and 4 years. The protection time is however a lot shorter than in adults (i.e., 3 to 5 years).

**Meningococcus C-component** of this quadrivalent vaccine is not active in children under 2 years of age, and the same is true for the **meningococcus WY-component**. Currently there are a number of conjugated monovalent meningococcus C vaccines on the Belgian market (Meningitec<sup>®</sup>, Menjugate<sup>®</sup>, Neisvac-C<sup>®</sup>) which are effective in children under the age of 2.

The new conjugated meningococcal vaccine gives protection only against the C-serogroup, and is therefore of limited use in travel medicine. If a child has already been vaccinated with this vaccine, there should be no problem when subsequently giving a further vaccination with the quadrivalent vaccine provided that there is a minimum interval of two weeks.

According to an international recommendation of the WHO, if necessary, the **quadrivalent mixed vaccine** (Mencevax<sup>®</sup> ACWY) may be administered to small children (from the age of 3), when travelling to a country with high incidence (epidemics mainly occurring in Africa).

- **From 3 months of age:** A booster should be given after 3 months, then a booster shot every year until the age of 4 years. In case of immunity during that period, injections have to be given every 3 years.
- For children **from 2 to 4 years old** a dose is given one year after the previous one. Repetition injections have to be given every 3 years.  
NB. Vaccination for travellers to Mecca is compulsory, but only from the age of 2 years on. Children between 3 months to 2 years that go along to Mecca can get 2 injections with an interval of 3 months.

In the near future a conjugated quadrivalent meningococcal vaccine is expected. Although it is also very effective with young children, it is only administered between the age of 2-55 years (studies about the other age categories are still going on); a booster vaccination is recommended by WHO in the US after 3-5 years (it is very likely that one booster will suffice).

## 5. BACTERIAL PNEUMONIA

The common pneumococcal vaccine (Pneumo 23<sup>®</sup>) is administered only after the age of two years. The indication remains strictly limited to certain risk groups (including asplenia).

Since September 2004 a conjugated pneumococcal vaccine effective in children under two years of age is available on the Belgian market, and can be administered until the age of 5 years (see text below A.7).

## 6. RABIES

Children who play outside in third world countries run a real risk of rabies. They are more likely to get bitten in the face or neck (with big risk of more serious injuries), which can greatly shorten the incubation period for rabies. The advice not to stroke any unfamiliar animals in the street or "tame" animals living in the wild is especially applicable to children. Vaccination should in any case be considered for a prolonged stay in a remote rural area. The vaccine may even be administered to infants under the age of 6 months, (there is no age limit) though in practice vaccination is usually given only from the age of 1 year, the age at which the child begins to walk. The risk of rabies should be non-existent at this age.

## 7. TUBERCULOSIS

The number of tuberculosis cases has strongly decreased in Belgium during the second half of the twentieth century. Since 1993 this decrease has slowed down. This is especially due to the higher prevalence of tuberculosis in migrants. In many developing countries and countries of the former Eastern Bloc, TB is however one of the major health problems and is mainly due to its association with HIV and the emergence of multiresistant bacteria.

In Belgium attention must be paid to prevention and treatment of general (miliary) tuberculosis and tubercular meningitis, which occur mostly in young children (the frequency diminishes significantly after the age of 14). On the other hand the policy should also be focused on multiresistance and at the association with HIV, which can considerably complicate detection and treatment of TB.

In case of infection, the risk for adults to develop the disease is estimated to be 5% in the first 2 years after infection, and another 5% spread over the rest of one's life (10% "lifetime risk" in case of normal immune response). The risk may however increase up to 40 % in children up to 2 years old.

*A study in the Netherlands of the incidence of tuberculin conversion (measure for the risk of contagiousity) in several hundred travellers who spent between 3 and 12 months in one or more countries of high incidence, showed a risk of 3,5 per 1000 travel months or an annual risk of approximately 4%. These travellers came into relatively close contact with the local population: 55% were travelling for work or as part of their training and almost all had used local public transport or stayed in "local guesthouses".*

*The risk of tuberculin infection was established by tuberculin conversion (CTT; Mantoux intradermal testing). For people who had worked in the healthcare sector during their stay this was 7.9/1000 travel months compared to 2.8/1000 for the others (annual risk appeared to be about 3% per year). The risk of infection also increased with the length of stay. For this category of travellers, the risk is comparable with the risk of TB infection among the local population, estimated at 1.0-2.5% per year. People who take organised holidays in tourist areas probably have hardly any of the types of contact necessary for infection and their TB risk is considerably lower. (Cobelens, Lancet 05/08/2000).*

## **Vaccination**

The BCG vaccine is a live, attenuated bovine tuberculosis bacillus-based vaccine. It is administered intradermally, thus producing a local infection. This induces cellular immunity (no protective antibodies), which attenuate a virulent infection (it does not prevent the actual infection). It produces a certain degree of protection against tuberculous-induced pathology, but mainly to severe post-primary complications like general tuberculosis and tubercular meningitis. This protective effect has clearly been proven in children and not in adults.

It is a controversial vaccine, that does not reduce the infection risk and only offers an incomplete protection against the development of tuberculosis. The study results of BCG vaccination in children less than 2 years old, vary greatly. Currently, a mean protective effect of 50% is assumed for respiratory TB. Protection against tubercular meningitis and miliary TB is probably around 80%. The maximum protection period is estimated at 10 to 15 years; although a recent study in Alaska suspects that the (only partial!) protection can last much longer. Vaccination or repeat vaccinations of adults are not considered to be effective. The disadvantage of the tuberculin cutaneous test (Mantoux) is that it is more difficult to interpret in the years to come and that it is less usable as a diagnostic remedy after (until ten years) vaccination. In the future the blood tests measuring the T-cell reaction on specific antigens of ‘*Mycobacterium tuberculosis*’ will be used (‘interferon-gamma release assays’ (IGRA)). These tests are not influenced by former BCG-vaccination.

The vaccine may be administered from birth, in the postero-external side of the upper arm, preferably 6 to 8 weeks before departure to a risk area. The immunity will thus have reached its maximum (takes 5-10 weeks) and any local abscesses or inflammation of the armpit and/or neck glands resulting from vaccination can still be treated in Belgium. BCG may be given together with other live vaccines or with an interval of at least 3 weeks. The normal paediatric basic vaccination schedule can continue unchanged.

Contraindications include extensive dermatoses, immunosuppressive disorders, immunosuppressive medication and pregnancy. Persons with previous positive tuberculin cutaneous test, will not be vaccinated.

The vaccine can be ordered abroad by the pharmacist (it is no longer on the market in Belgium). Only a few university hospitals (Pediatric Department and/or Occupational Health Department) keep the vaccine in stock and can administer it when necessary.

## **Indications for vaccination as part of travel health:**

- a) There is no indication for BCG-vaccination for ordinary tourists.
- b) BCG-vaccination for migrants’s children to 5 years who travel (yearly) to relatives in the country of origine is to be considered seriously – at least 8 weeks before departure.
- c) The WHO advises vaccination for children and young adults originating from countries where TB is quite rare and who are going to live in an endemic area for a long time (at least a few months). Administration of BCG is justified (or at any rate not to be discouraged) in children in the age group up to 5 years, if there is a substantial risk of exposure (prolonged stay in a third world country, regular close contact with the local population, using public transport, staying in “local guesthouses”, in an area with high TB prevalence) and the local medical infrastructure is of a very low standard. This is also recommended for aid workers (especially those working in the health sector). Vaccination is also required by some French high schools in overseas areas.
- d) For other people the following applies:
  - Tuberculin cutaneous test negative before departure + stay of a minimum of 6 months in a third-world country: **tuberculin cutaneous test 2 months after returning home.**
  - Tuberculin cutaneous test negative before departure + high risk stay in a third-world country (e.g. medical personnel, social workers, in certain cases also children under 5 years of age, etc.): consider **BCG** – at least 8 weeks before departure.

The advice to vaccinate a child for an extend stay in risk areas is a complex process where one should take into account the costs, the inconveniences of vaccination and the risk of side effects in function of a very incomplete and uncertain protection. You can contact the Flemish “Respiratory Healthcare and Anti-Tuberculosis Association” (VRGT - have no BCG-vaccine) or the French “Fonds des Affections Respiratoires” (FARES) on telephone number 02/512.54.55 or 02/512.29.36 for additional advice and information on the indications for vaccination.

**Regular intradermal cutaneous tuberculin testing (to be replaced by interferongamma-test in the future) before departure, then annually or once every two years; two months after finally returning home is still an excellent alternative. When this test appears to be positive, a radiology of the thorax is indicated; if this result is normal, a treatment with one anti tubercular medicine during 6-9 months will be applied.**

Furthermore it is important to diminish the risk of exposure by avoiding dark, small and crowded rooms with poor fresh oxygen supply. Persons having a nasty cough with sputum for more than 3 weeks may have contagious tuberculosis.

## **8. JAPANESE ENCEPHALITIS**

A new inactivated vaccine, **Ixiaro**<sup>®</sup> (2 injections with an interval of 28 days) is used for adults (**from the age of 18 years**). The vaccine will not be administered to children under the age of 1 year. Half a dose of Ixiaro<sup>®</sup> is administered to children from **1-3 years** (not yet registered for the moment, but this may change quickly).

**For children from 4-17 years** the new vaccine is still in a test phase, but temporary results are very encouraging: in this age category one dose of Ixiaro<sup>®</sup> is administered.

A first booster injection will be given after 12 to 24 months. No data are available about further boosters. For the moment the vaccine against Japanese encephalitis is only available in the international yellow fever vaccination centers.

## **9. FRUHSOMMER MENINGO-ENZEPHALITIS OR EUROPEAN TICK BORNE ENCEPHALITIS**

This vaccine is preferably not administered to children under 1 year. It avoids giving too many vaccinations and the risk to this age group is thought to be very low.

Children between 1 and 16 years old: **FSME-IMMUN** <sup>®</sup> **Junior 0,25 ml** (=half of the adult dose) is used. A protection of at least 98% is acquired after two injections.

## **C. MALARIA**

### **1. External protective measures against mosquito bites**

External protective measures against mosquito bites are also very important preventive measures for children.

DEET-based repellents are useful, but as there is a chance of slight absorption through the skin and, in exceptional cases, side effects have been reported (mainly with the use of large quantities), this product should be applied to children with the necessary caution. Irritation of the skin is a frequent side effect. Its concentration should be between 20-30% (the higher the concentration, the longer the action time; when the concentration is too low the action time is too short). A supplementary measure is to apply the product to the clothing, though the efficiency of this is considerably lower. Avoid contact with lips, mouth, eyes and mucous membranes. Avoid rubbing the hands with the product in order to prevent unintentional contact with eyes and mouth. The product acts for at most a few hours, so the use of a repellent alone does not guarantee sufficient protection for the whole night! Avoid prolonged use! To limit contact with the product as much as possible it is advisable to rinse off the residue from the skin when further protection is no longer needed. A bath can be given before putting the child to bed under a mosquito net.

The principal preventive measures for children, and in particular for babies, is the correct use of a mosquito net that has been checked for holes and has been impregnated. For further details please refer to the section entitled "Impregnation of mosquito nets" in the malaria brochure.

### **2. Chemoprophylaxis**

The tablets for adults can easily be divided into 2 or 4 parts with a handy gadget such as **Pilomat**<sup>®</sup> by **Wolfs**

(1) For children over 5 kg the daily dose of **Malarone®** or **Malarone Junior®** is adapted as follows:

<b>Malarone®</b>	
<b>Bodyweight (Kg)</b>	<b>Daily dose in tablets</b>
5 – 7,9 kg	½ tablet Malarone® Junior
8 – 10,9 kg	¾ tablet Malarone® Junior
11 – 20 kg	¼ tablet of Malarone® for adults or 1 tablet of Malarone® Junior
21 – 30 kg	½ tablet of Malarone® for adults or 2 tablets of Malarone® Junior
31 – 40 kg	¾ tablet of Malarone® for adults or 3 tablets of Malarone® Junior
From 40 kg	1 tablet of Malarone for adults

You can ask the pharmacist to make up capsules with the correct dose of Malarone®.

(2) For children from 5 kg the weekly **Lariam®** dose (4-5 mg/kg) is adapted as follows:

<b>Lariam®</b>	
<b>Bodyweight (kg)</b>	<b>Weekly dose in 250 mg tablets</b>
<5	Not applicable
5 - 10	1/8
11 – 20	¼
21 – 30	½
31 – 45	¾
>45	1(*)

You can ask the pharmacist to make up capsules containing the correct dosage of Lariam®. On average, children suffer less from side effects, though a tolerance test before departure is recommended, as it is for adults. If the child vomits within 30 minutes after taking the tablet, it is sufficient to simply give a fresh dose.

(\*) Experience tells us that slender girls/women, up to 50 – 55 kg, run a higher risk of side effects if they take an adult dose: a careful 3-week tolerance test is recommended. It is probably best to keep taking a lower dose of Lariam.

Lariam is not contra-indicated for children who in the past suffered febrile convulsions or for children with ADHD.

(3) For **Nivaquine®**:

<b>Nivaquine®</b>	
<b>Bodyweight (kg)</b>	<b>Weekly dose in 100mg tablets</b>
5-6	1/4
7-10	1/2
11-14	3/4
15-18	1
19-24	1.25
25-35	2
36-50	2.5
>50	3
Zone A = 5 mg/kg per week	

All medicines, especially Nivaquine<sup>®</sup>, have to be kept out of the reach of children as an overdose can prove fatal. In order to reduce the bitter taste of Nivaquine, you can ask the pharmacist to prepare gelatine capsules containing the correct quantity of Nivaquine<sup>®</sup> per kg bodyweight. As an alternative you can crush the tablets and mix them with something more eatable (a spoonful of jam, grenadine syrup, chocolate or mashed fruit).

Paludrine<sup>®</sup> (proguanil) is no longer available in Belgium since the beginning of 2010.

**(4) Doxycycline** as prevention is allowed from the age of 8 years: (1,5 mg/kg/day without exceeding 100 mg/day).

Breastfeeding mothers: the prophylactic medication does not cross into the milk in sufficient quantities to protect the baby and should therefore be administered to the baby. Chloroquine means no risk for the baby; Doxycycline is not recommended; for theoretical reasons, the use of Mefloquine and Malarone<sup>®</sup> is not recommended for children under 5 kg.

### 3. Treatment

Fever in a child in an endemic area (and up to 3 months after leaving that area) must always be considered as malaria in the first instance. You are advised to rapidly seek adequate medical assistance (in order to be able to make a correct diagnosis, as the condition is often not malaria).

Fever itself may be absent in babies, but malaria must be considered if there are other symptoms of illness.

In principle the same medication used in adults can be used in children

**1) Malarone<sup>®</sup>** (250 mg of atovaquone and 100 mg of proguanil) is the first choice and can be used when bodyweight is above 5 kg; always with some food (crushed and mixed with a spoon of nice food). The intake can sometimes induce vomiting.

5 – 8 kg	2 paediatric tablets/day, in one intake, for 3 consecutive days
9 – 10 kg	3 paediatric tablets/day, in one intake, for 3 consecutive days
11 – 20 kg	1 tablet for adults/day, in one intake, for 3 consecutive days
21 – 30 kg	2 tablets for adults/day, in one intake, for 3 consecutive days
31 – 40 kg	3 tablets for adults/day, in one intake, for 3 consecutive days
From 40 kg	4 tablets for adults/day, in one intake, for 3 consecutive days = adult dose

1 paediatric tablet Malarone Junior<sup>®</sup> contains 62,5 mg of atovaquone and 25 mg of proguanil.

**2) Quinine** can be given for 3 to 7 days (10 mg/kg 3x per day for 5 days) combined with **clindamycine** (5 mg/kg 4 x day during 5 days). Doxycycline is contraindicated for children younger than 8.

**3) Artemisinin** derivatives may be given to children. **Riamet<sup>®</sup>** (a combination of 20 mg of artemether and 120 mg of lumefantrine) is now available in Belgium. It is an effective oral medicine that can be used in the treatment of uncomplicated malaria. At present it is only given to children older than 12 years and with a body weight superior to 35 kgs. According to the current guidelines it should not be administered without medical supervision.

**4) Lariam<sup>®</sup>** in a dose of 15 mg/kg, followed by 10 mg/kg after 8 to 12 hours).

Lariam can never be used without medical supervision.

Lariam<sup>®</sup> must not be administered to children younger than 3 months and/or weighing less than 5 kg.

Infants will, however, often have to be treated with quinine intravenously first!