

Vector-borne Infectious Diseases in Iran

Dr. Michael K. Faulde

Regierungsdirektor, Zentrales Institut des Sanitätsdienstes der Bundeswehr

Laborgruppe Medizinische Zoologie

Postfach 7340

56065 Koblenz, GERMANY

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Edited by Dr. Richard G. Robbins and Major Sharon L. Spradling, AFPMB, Washington, DC

Vector-borne Disease:	Incubation Period:	Agents:	Mode of Transmission/ Vector:	Epidemiology:	Remarks:
Bunya Fever		<i>Bunyavirus</i> , Bunyaviridae	Transmission: Bite of different species of <i>Haemaphysalis</i> (hard ticks) Primary vector: <i>Haemaphysalis punctata</i> (sheep ticks) Reservoir: Sheep	Transmission period: May-Oct. Incidence and seroprevalence: Disease is probably endemic, but no epidemiological data are available at this time Bite properties: Sheep ticks also afflict humans; they feed at one spot for several days; adults linger near sheep stables, pastures, etc., where they can fast for 2 to 3 years	Preventive measures: - Avoidance of sheep stables, sheep pastures, etc. - Search/removal of hard ticks from self and companions - Use insect repellent and permethrin-treated uniform
Crimean-Congo Hemorrhagic Fever		Crimean-Congo hemorrhagic fever virus,	Transmission: Bite or exposure to hard tick cell material, mostly	Transmission period: Primary transmission (ticks) mainly from May-	Preventive measures: - Avoidance of old animal stables etc.

		<p><i>Nairovirus</i>, Bunyaviridae</p>	<p><i>Hyalomma</i> spp. Primary vector: <i>Hyalomma marginatum</i> Secondary vectors: <i>H. anaticum</i>, <i>H. detritum</i>, <i>H. dromedarii</i>, <i>H. impeltatum</i>, <i>H. schulzei</i>, <i>H. asiaticum</i>; also, the soft tick <i>Ornithodoros lahorensis</i></p>	<p>Oct. Incidence and seroprevalence: Nationwide evidence of CCHF viral antibodies, but reportedly no cases in humans have been diagnosed; it is likely that CCHF in Iran is largely an endemic nonpathogenic strain; even so, at least 15 deaths occurred from May-Nov. 2000 in Baluchistan (Afghanistan) near the Iranian border Habitat: Tick vectors inhabit dry areas, animal stables and trails, and former pastures Bite properties: Hard ticks of the genus <i>Hyalomma</i> feed at one spot for several days on the same host and fall off freely after feeding; larvae and nymphs bite small mammals; adults prefer larger mammals or humans and are not host specific; fasting adult ticks survive up to 4 years; <i>Hyalomma marginatum</i> is</p>	<p>- Use insect repellent and permethrin-treated uniform (for ticks, permethrin is a more effective repellent than DEET) - Search/removal of hard ticks from self and companions - Never crush <i>Hyalomma</i> ticks, even attached ones (contact infection) - During outbreaks, never handle dead animals, especially those with hemorrhages, without protection</p>
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				both a vector and reservoir of CCHF virus, which is transmitted transovarially, transstadially, and venereally	
Dengue Fever		Dengue fever virus, <i>Flavivirus</i> , Flaviviridae	<p>Transmission: Bite of <i>Aedes aegypti</i> or other <i>Aedes</i> species</p> <p>Primary vector: <i>Aedes aegypti</i> (yellow fever mosquito). According to WHO, this species is not endemic in Iran at this time; however, it has been introduced in the extreme southeast of the country</p>	<p>Transmission period: May-Oct.</p> <p>Incidence and seroprevalence: Presence of the disease has been assumed, but never declared officially endemic in Iran; <i>Aedes aegypti</i> has spread from neighboring dengue epidemic regions to the country's southeast</p> <p>Bite properties: <i>Aedes</i> species bite during the day, but only <i>Aedes aegypti</i> bites at dusk and in buildings (endophilic, endophagic); extremely aggressive, urban biter; flight radius approx. 500 meters</p> <p>Breeding properties: <i>Aedes aegypti</i> and <i>Ae. albopictus</i> breed in any available bodies of water, including the drainage basins under flowerpots,</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Larval mosquito control and abatement - Use insect repellent and permethrin-treated uniform

				automobile tires, cans, etc.	
Sand Fly Fever (Papatasi Fever)		Sand fly fever virus, <i>Phlebovirus</i> , Bunyaviridae, Sicilian, Naples, Karimabad and Tehran serotypes	Transmission: Sand fly bite Primary vector: <i>Phlebotomus papatasi</i> (nationwide) Secondary Vector: <i>P. perfiliewi</i> (only in northwestern Iran)	Transmission period: May-Oct. (peaks in early June and in September); transovarial transmission possible Incidence and seroprevalence: Sicilian and Naples serotypes are endemic nationally; Tehran and Karimabad serotypes have been verified in central and northeastern Iran; no further epidemiological data are available at this time Breeding grounds: Same as <i>L. t. major</i> Bite properties: Same as <i>L. t. major</i>	Same as cutaneous leishmaniasis (<i>L. t. minor</i>)
West Nile Fever		West Nile fever virus, <i>Flavivirus</i> , Flaviviridae	Transmission: Bite of house mosquitoes in the genus <i>Culex</i> Primary vector: <i>Culex pipiens</i> (house mosquito) Secondary vectors: <i>Coquilletidia richiardii</i> , <i>Aedes cantans</i> and <i>Anopheles maculipennis</i>	Transmission period: May-Nov. Incidence and seroprevalence: Disease is endemic nationally; in the Caucasus region, which accounts for approx. ¼ (23%) of the "summer flu" arboviruses, 53% of infections were	Preventive measures: - Indoors: Permethrin-treated mosquito net, or insect repellent - Outdoors: Larval mosquito control; insect repellent combined with permethrin-treated uniform

			<p>complex mosquitoes; also, the hard tick <i>Hyalomma marginatum</i></p> <p>Reservoir: Birds</p>	<p>with West Nile virus; further epidemiological data are not available at this time</p> <p>Bite properties: <i>Culex pipiens</i> bites at dawn and dusk as well as indoors (endophilic, endophagic); infectious females overwinter in buildings, cellars, and animal stables, sometimes in large numbers</p> <p>Breeding grounds: With species-dependent variation, <i>Culex pipiens</i> and <i>Cx.modestus</i> thrive in small, stagnant or polluted bodies of water (cisterns, buckets, cans, old tires, etc.) in urban areas</p>	
Sindbis Fever		<p>Sindbis fever virus, <i>Alphavirus</i>, Togaviridae</p>	<p>Transmission: <i>Anopheles</i> mosquito bite</p> <p>Primary vectors: <i>Culex pipiens</i>, <i>Cx. modestus</i></p> <p>Secondary Vectors: <i>Coquilletidia richiardii</i>, <i>Aedes communis</i></p> <p>Reservoirs: Birds, rarely rodents (rats and mice)</p>	<p>Transmission period: May-Sept.</p> <p>Incidence and seroprevalence: At least in the north, but probably endemic nationwide; further epidemiological data are not available at this time</p> <p>Bite properties: <i>Culex</i> mosquitoes bite at</p>	<p>Preventive measures:</p> <p>- Indoors: Permethrin-treated mosquito net, or insect repellent</p> <p>- Outdoors: Larval mosquito control; use insect repellent combined with permethrin-treated uniform</p>

				<p>dawn and dusk and also indoors; females overwinter in basements, etc.</p> <p>Breeding grounds: Vectors thrive in any available small, stagnant or polluted bodies of water (cisterns, buckets, cans, old tires, etc.) in urban areas</p>	
<p>Uukuniemi Virus Encephalitis, neuropathological disturbances</p>		<p>Uukuniemi virus <i>Phlebovirus</i>, Bunyaviridae</p>	<p>Transmission: Infectious hard tick bite Primary vector: <i>Ixodes ricinus</i> (common castor bean tick), only in the country's northern quarter Reservoirs: Small mammals and songbirds</p>	<p>Transmission period: April-Oct. Incidence and seroprevalence: Disease is widely endemic only in the country's northern Caucasus region; the vector is otherwise absent; virus analyses in Armenia, Nagorno Karabakh and Azerbaijan on the Iranian border have been positive; no further epidemiological data are available at this time Bite properties: <i>Ixodes ricinus</i> readily attacks humans; all tick stages are vectors (transovarial and transstadial transmission);</p>	<p>Preventive measures: - Use insect repellent and permethrin-treated uniform - Search for attached ticks on self and companions - <i>Ixodes ricinus</i> does not migrate indoors</p>

				life cycle approx. 3 years; ticks chiefly inhabit forest edges and clearings, and the margins of animal trails, where they quest for hosts from low shrubbery	
Batai (Calovo) Fever		Batai (Calovo) virus, <i>Orthobunyavirus</i> , Bunyaviridae	Transmission: <i>Anopheles</i> mosquito bite Primary vectors: <i>Anopheles maculipennis</i> complex, <i>An. claviger</i> Reservoirs: Various mammals	Transmission period: May-Sept. Incidence and seroprevalence: Disease is endemic in at least the northern part of the country; virus analyses in Armenia, Nagorno Karabakh and Azerbaijan on the Iranian border have been positive; no further epidemiological data are available at this time Bite properties: <i>Anopheles</i> mosquitoes bite at dawn and dusk and also indoors (exophilic, exophagic); females often overwinter in animal stables, basements, etc. Breeding grounds: Urban areas; <i>Anopheles maculipennis</i> is often associated with animal stables and usually breeds in standing or slowly	Preventive measures: - Indoors: Permethrin-treated mosquito net, or insect repellent - Outdoors: Larval mosquito control; use insect repellent combined with permethrin-treated uniform

				flowing, often shaded waters; flight radius 1-2 km	
Tahyna Fever		Tahyna fever virus, <i>Bunyavirus</i> , Bunyaviridae	<p>Transmission: Bite of different species of <i>Aedes</i> mosquitoes</p> <p>Primary vectors: <i>Aedes vexans</i>, <i>Ae. cantans</i>, <i>Ae. caspius</i>, <i>Ae. communis</i>, <i>Ae. sticticus</i> ("forest and meadow mosquito"), <i>Aedes</i> spp.</p> <p>Reservoirs: Small mammals</p>	<p>Transmission period: May-Oct.</p> <p>Incidence and seroprevalence: Disease is endemic, at least in Iran's northern Caucasus region; virus analyses in Armenia, Nagorno Karabakh and Azerbaijan on the Iranian border have been positive; no further epidemiological data are available at this time; 41% of the population in neighboring southern Russia/Armenia was Tahyna/Inkoo Virus positive in 1995</p> <p>Bite properties: Vector <i>Aedes</i> mosquitoes bite outdoors during the day and, to a lesser extent, at dusk, but don't actively migrate indoors (exophilic, exophagic); the bite reaction from <i>Ae. vexans</i> is particularly unpleasant; over 200 human bites per minute have been</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Eliminate breeding grounds in camp areas - Use insect repellent and permethrin-treated uniform

				<p>documented during swarms; the flight radius of this species is up to 20 km</p> <p>Breeding grounds: Vectors are flood water mosquitoes, which hatch in large numbers in forests (where they may breed in the knotholes of trees) and/or in meadows in spring or after heavy rains; overwintering occurs in the egg stage; eggs are capable of hatching year-round</p>	
Dhori Virus Fever		Dhori virus, <i>Thogotovirus</i> , Orthomyxoviridae	<p>Transmission: Bite of various hard ticks</p> <p>Primary vectors: <i>Hyalomma dromedarii</i> (camel tick), <i>H. marginatum</i> (sheep tick)</p> <p>Secondary Vector: <i>Dermacentor marginatus</i> (sheep tick)</p> <p>Reservoirs: Camels, horses, goats</p>	<p>Transmission period: May-Oct.</p> <p>Incidence and seroprevalence: Disease is chiefly endemic in the country's northern Caucasus region; positive virus analyses in Armenia, Nagorno Karabakh and Azerbaijan on the Iranian border; no further epidemiological data are available at this time</p> <p>Habitat: Vectors inhabit dry areas, animal stables and trails,</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Use insect repellent and permethrin-treated uniform - Search for attached ticks on self and companions - For infestations indoors, use an acaricide or barrier spray (e.g., Propoxur=B5)

				and former pastures Bite properties: Hard ticks of the genus <i>Hyalomma</i> feed at one spot for several days on the same host and fall off freely after feeding; larvae and nymphs bite small mammals; nymphs and adults prefer larger mammals or humans and are not host specific; fasting adults survive up to 4 years	
Boutonneuse (Mediterranean) Fever		<i>Rickettsia conorii</i>	Transmission: Bite of various hard ticks Primary vector: <i>Rhipicephalus sanguineus</i> (brown dog tick) Secondary vectors: <i>Dermacentor</i> spp., <i>Haemaphysalis</i> spp., <i>Hyalomma</i> spp., <i>Boophilus</i> spp., <i>Rhipicephalus</i> spp., Reservoirs: Wild rodents, other mammals	Transmission period: May-Oct, year-round in cases of building infestations or chronic infestations in dogs Incidence and seroprevalence: Endemic in the country's northern third; seropositivity rates among the population up to 27.5% (1996) Bite properties: Vector ticks also afflict humans; they feed at one spot for several days; females lay up to 2,000 eggs (depending on	Preventive measures: - Avoid contact with dogs - Use insect repellent and permethrin-treated uniform - For infestations indoors, use an acaricide or barrier spray (e.g., Propoxur=B5)

				species) in residential buildings, where the larvae hatch and attack humans and domestic animals	
Louse-borne Typhus, Epidemic Typhus		<i>Rickettsia prowazekii</i>	<p>Transmission: Intake of infectious body louse material</p> <p>Primary vector: <i>Pediculus humanus</i> (body louse)</p> <p>Reservoir: Humans (Brill-Zinsser disease)</p>	<p>Transmission period: Chiefly during the winter months of Dec.-April</p> <p>Incidence and seroprevalence: Endemic in the country's northern and western regions, especially along the Iraqi border and in the mountains; seropositivity rates up to 15% (1996)</p> <p>Bite properties: Lice live in human clothing and deposit their eggs (nits) there; they reach sexual maturity 2-3 weeks after hatching and require a blood meal at least every 6 days; transmission of the agent occurs via inhalation of louse feces or by scratching infected louse material (crushed louse tissue) into the bite wound; louse-borne typhus is highly dependent on the socio-economic environment</p>	<p>Preventive measures:</p> <p>- In endemic and epidemic regions:</p> <ul style="list-style-type: none"> - Report every case of louse infestation - Since insecticidal powders for the mass control of body lice are no longer available NATO-wide, treatment of clothing is the only available recourse - Never “break off” body lice; this is one of the primary modes of infection (by scratching into the wound infectious louse cells under the fingernails) - Resistance: DDT

				(i.e., refugees, refugee camps)	
Trench Fever, Five-Day Fever, Wolhynia Fever		<i>Bartonella quintana</i>	<p>Transmission: Intake of infectious body louse material</p> <p>Primary vector: <i>Pediculus humanus</i> (body louse)</p> <p>Reservoir: Humans</p>	<p>Transmission period: Chiefly in mountain regions during the winter months of Dec.-April</p> <p>Incidence and seroprevalence: Endemic, at least in the north and along the Iraqi border, but disease incidence is unclear; further epidemiological data are not available at this time</p> <p>Bite properties: Lice live in human clothing and deposit their eggs (nits) there; they reach sexual maturity 2-3 weeks after hatching and require a blood meal at least every 6 days; transmission of the agent occurs via inhalation of louse feces or by scratching of infected louse material (crushed louse tissues) into the bite wound; louse-borne typhus is highly dependent on the socio-economic environment (i.e., refugees, refugee</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - In endemic and epidemic regions: - Report every case of louse infestation - Since insecticidal powders for the mass control of body lice are no longer available NATO-wide, treatment of clothing is the only available recourse - Never “break off” body lice; this is one of the primary modes of infection (by scratching into the wound infectious lice cells under the fingernails) - Resistance: DDT

				camps)	
Murine Typhus, Endemic Typhus Fever		<i>Rickettsia typhi</i> (formerly <i>R. mooseri</i>)	<p>Transmission: Intake of infectious rodent flea material (cellular or fecal)</p> <p>Primary vector: <i>Xenopsylla cheopis</i> (rat flea)</p> <p>Secondary Vectors: <i>Xenopsylla astia</i>, <i>Pulex irritans</i> (human flea)</p> <p>Reservoirs: Rats harboring the enzootic vector <i>Polyplax spinulosa</i> (rat louse), <i>Bdellonyssus bacoti</i> (tropical rat mite)</p>	<p>Transmission period: Year-round in cases of rat infestation</p> <p>Incidence and seroprevalence: Endemic nationally, particularly along the coasts of the Caspian Sea in the north and the Gulf of Hormuz in the south; seropositivity rates of populations in these areas range up to 25% (1996)</p> <p>Bite properties: Rat fleas are nest specific, not host specific; all animal fleas also bite humans; fleas survive approx. 10 days without a blood meal, up to two months in low temperatures; transmission of the agent occurs by inhalation or by scratching of infectious flea material (crushed fleas or flea feces) into wounds</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Indoors: Consistent eradication of rats and cleaning of buildings - Outdoors: Flea control with subsequent rat and rodent control (urban rodent plague)
“S” strain typhus fever (human pathogenicity unclear at this time)		“S” strain rickettsia	<p>Transmission: Hard tick bite (brown dog tick)</p> <p>Primary vector: <i>Rhipicephalus sanguineus</i> (brown dog tick)</p>	<p>Transmission period: April-Oct.</p> <p>Incidence and seroprevalence: Present but at unknown</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Avoidance of old animal stables, etc. - Use insect repellent and permethrin-treated

				<p>epidemiological levels; to date, reported only in the greater Caucasus region; no further epidemiological data are available at this time; probable human pathogen; seropositivity rates for agents of typhoid fever group within the population up to 45% (1996)</p> <p>Bite properties: Brown dog ticks also afflict humans; they feed at one spot for several days; females lay up to 2,000 eggs in residential buildings, where the larvae hatch and attack humans and domestic animals</p>	<p>uniform (permethrin is a more effective repellent than DEET)</p> <ul style="list-style-type: none"> - Search/removal of hard ticks from self and companions - For infestations in lodging: use of treated mosquito nets with simultaneous tick control (1-2% Propoxur (B5))
Astrakan Fever		<i>Rickettsia conorii</i> -like rickettsia	<p>Transmission: Hard tick bite (brown ticks)</p> <p>Primary vector: <i>Rhipicephalus pumilio</i> (brown tick)</p>	<p>Transmission period: April-Oct.</p> <p>Incidence and seroprevalence: Present but at unknown epidemiological levels; to date, reported only in the greater Caucasus region of northern Iran; no further epidemiological data are available at this time; seropositivity rate for the</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Avoidance of old animal stables, etc. - Use insect repellent and permethrin-treated uniform (permethrin is a more effective repellent than DEET) - Search/removal of hard ticks from self and companions - For infestations in

				<p>typhoid fever group within the human population was 45% (1996)</p> <p>Bite properties: Brown ticks also afflict humans; they feed at one spot for several days; the female lays up to 2,000 eggs in residential buildings, where the larvae hatch and attack humans and domestic animals</p>	<p>lodging: use of treated mosquito nets with simultaneous tick control (1-2% Propoxur (=B5))</p>
Epidemic Relapsing Fever		<i>Borrelia recurrentis</i>	<p>Transmission: Intake (via scratching) of infected body louse material</p> <p>Primary vector: <i>Pediculus humanus</i> (body louse)</p>	<p>Transmission period: Chiefly during the winter months of Dec.-April</p> <p>Incidence and seroprevalence: Endemic nationally; no further epidemiological data are available at this time</p> <p>Bite properties: Lice live in human clothing and deposit their eggs (nits) there; they reach sexual maturity 2-3 weeks after hatching and require a blood meal at least every 6 days; transmission of the agent occurs by scratching infected louse material (crushed louse tissue) into</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - In endemic and epidemic regions: - Report every case of louse infestation - Since insecticidal powders for the mass control of body lice are no longer available NATO-wide, treatment of clothing is the only available recourse - Never “break off” body lice; this is one of the primary modes of infection (by scratching into the wound infectious louse cells under the fingernails) - Resistance: DDT

				the bite wound; epidemic louse-borne relapsing fever is extremely dependent on the socio-economic environment (i.e., refugees, refugee camps)	
Plague		<i>Yersinia pestis</i>	<p>Transmission: (only urban rodent plague): fleas Primary vector: <i>Xenopsylla cheopis</i> (rat flea) Secondary vectors: <i>Ctenocephalides canis</i> (dog flea), <i>C. felis</i> (cat flea), <i>Pulex irritans</i> (human flea) Urban reservoir: house rats (<i>Rattus rattus</i>) Sylvatic reservoirs: <i>Meriones persicus</i>, <i>M. libycus</i>, <i>M. vinogradovi</i>, various Dipodidae (gerbils) and Microtinae (voles)</p>	<p>Transmission period: May occur year-round in cases of house rat infestation Incidence and seroprevalence: Enzootic sylvatic rodent plague is endemic along the entire Iraqi border, in the border regions with Armenia and Nagorno Karabakh, and along the Kazakhstani border; isolated cases of human bubonic plague occur, particularly along the Iraqi border (e.g., 1994); further epidemiological data are not available at this time Breeding grounds: Fleas are nest specific, usually remaining in the nests of their hosts Bite properties: Rat fleas are nest specific, not host</p>	<p>Preventive measures: - Indoors: Permethrin-treated mosquito nets; insect repellent, rat control - Outdoors: Use insect repellent and permethrin-treated uniform - In urban plague focus: first, rat flea control with nondispersive insect powder (e.g., Nexion powder, active agent: Bromophos), then rat eradication using rodenticides - Flea monitoring: If more than 5 rat fleas per rat are found in a rodent plague-endemic region (accumulation on the surviving rodents), a rodent plague epidemic is to be assumed</p>

				specific; all animal fleas also bite humans; fleas survive approx. 10 days without a blood meal, up to 2 months in low temperatures; a plague-infested flea lives an average of 3.2 days; since fleas inject adjuvant into the wound when they bite, plague-infected fleas develop a blood thrombus in the esophagus because of the coagulase activity of <i>Y. Pestis</i> ; fleas take a test bite that strongly increases the probability of transmission of the plague agent to humans	
Tick-borne Relapsing Fever		<i>Borrelia persica</i>	<p>Transmission: Bites of soft ticks or fluid from coxal glands of male or female <i>Ornithodoros</i> spp.</p> <p>Primary vectors: <i>Ornithodoros tholozani</i> (nationwide), <i>O. erraticus</i> (western half of the country)</p> <p>Secondary vector: <i>O. asperus</i></p> <p>Reservoirs: Wild rodents</p>	<p>Transmission period: May-Oct., year-round in cases of building infestations</p> <p>Incidence and seroprevalence: Endemic nationally except in the extreme north, the southeast, and a band running across Iran; sporadic cases occur; further epidemiological data are not available at</p>	<p>Preventive measures:</p> <p>- Indoors: Soft tick monitoring and control with acaricide barrier spray. Use treated mosquito nets</p> <p>- Outdoors: Use insect repellent and permethrin-treated uniform; acaricide barrier treatment (Propoxur (=B5)); avoidance of old animal stables, caravansaries, etc.</p>

				<p>this time</p> <p>Habitat: Soft ticks hide in walls, cracks, animal stables, well walls, and other protected areas, often up to 1 m deep</p> <p>Bite properties: Soft ticks usually bite at night for 5-10 min.; due to the release of a neurotoxin, the bite is unnoticed; life cycle may exceed 10 years, depending on species and living conditions; capable of fasting in infectious state for several years</p>	
Lyme Disease		<i>Borrelia burgdorferi</i> , s.l.	<p>Transmission: Hard tick bite</p> <p>Primary vectors: <i>Ixodes ricinus</i> (sheep or pasture tick, castor bean tick), <i>I. persulcatus</i> (taiga tick) (only in the northeast)</p> <p>Secondary vectors: Other <i>Ixodes</i> species</p>	<p>Transmission period: March-Oct.</p> <p>Incidence and seroprevalence: Confirmed incidence of Lyme borreliosis, particularly in northern Iran, where the European primary vector, <i>Ixodes ricinus</i>, is endemic; initially diagnosed in a Tehran hospital in 1998; no current data on incidence and seroprevalence in humans</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Use insect repellent and permethrin-treated uniform - Search for attached ticks on self and companions - Remove feeding hard ticks as quickly and carefully as possible in order to avert an infection with <i>Borrelia</i>

				are available at this time Bite properties: <i>Ixodes</i> species readily attack humans; all tick stages are vectors (transovarial and transstadial transmission); life cycle approx. 3-4 years; live predominantly on forest edges and clearings alongside animal trails, where they quest from low shrubbery; ticks are infective for <i>Borrelia</i> after a minimum of 24 hours on the host	
Leptospirosis		<i>Leptospira icterohaemorrhagiae</i> , <i>Leptospira</i> spp.	Transmission: Via contaminated water through active skin penetration by the bacteria (agrarian mode of transmission), as well as through contact with infectious rodent urine and animal material (rural/urban by rodent infestation or infected livestock) Primary vectors: Brown rat, <i>Rattus norvegicus</i> ; hogs, mice Secondary vectors:	Transmission period: year-round Incidence and seroprevalence: Endemic nationally; seropositivity rates within the population 3.3% (1987); up to 6.8% in livestock Mode of transmission: - Special note: micromicturition of infected synanthropic rodents, such as rats, which constantly emit urine in tiny droplets. Leptospiral reservoirs	Preventive measures: - Avoid contaminated waters - Rat and rodent control over large areas around encampments, with subsequent surface disinfection

			<p>Other mammals</p> <p>Reservoirs: Rats, other mammals</p>	<p>spread the agent very efficiently over large areas; therefore, after rodents have been successfully cleared from an area, disinfection of the entire area must be considered</p>	
Cutaneous Leishmaniasis		<i>Leishmania tropica major</i>	<p>Transmission: Sand fly bite</p> <p>Primary vectors: - <i>Phlebotomus papatasi</i> (human transmission cycle), <i>P. caucasicus</i>, <i>P. papatasi</i> (zoonotic transmission cycle)</p> <p>Secondary vectors: <i>P. andrejevi</i>, <i>P. salehi</i>, <i>P. mongolensis</i>, <i>P. alexandri</i>, <i>P. ansari</i></p> <p>Reservoirs: Wild rodents such as <i>Rhombomys opimus</i> (gerbil), <i>Meriones erythrourus</i>, <i>M. hurricanae</i>, <i>M. meridianus</i></p>	<p>Transmission period: April-Oct. (peaks in June and Sept.)</p> <p>Incidence and seroprevalence: Focally endemic in the northern half of the country, i.e., in Ardestan 1.3% of the population presented with active lesions (1998); 2.74% of 10-14 year-olds were infected; 2-year incidence rate in Bam was 3.3% (1997)</p> <p>Breeding grounds: Sand flies breed in decaying matter; larvae develop in moist, dark places, especially in the nests of reservoir rodents</p> <p>Bite properties: Female sand flies bite at dusk and dawn; poor fliers, only</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Indoors: Use permethrin treated mosquito nets or move to the second floor (out of range) - Outdoors: Use insect repellent and permethrin-treated uniform; don't wear shorts; eliminate breeding grounds through rodent control and the removal of bushes and shrubs in camp areas (greater clearance)

				active when no wind is present; actively migrate indoors to bite (endophilic, endophagic); regularly penetrate mosquito nets due to their small size; generation time 5-7 weeks; prefer to bite in the calf region	
Cutaneous Leishmaniasis		<i>Leishmania tropica minor</i>	<p>Transmission: Sand fly bite</p> <p>Primary vectors: <i>Phlebotomus sergenti</i>, <i>P. papatasi</i></p> <p>Secondary vectors: <i>P. ansarii</i>, <i>P. causicus</i></p> <p>Reservoirs: Canids and humans</p>	<p>Transmission period: Same as <i>L. t. major</i></p> <p>Incidence and seroprevalence: Endemic in the country's northern 2/3; further epidemiological data are not available at this time</p>	As with <i>L. t. major</i> ; do not keep dogs in camp areas
Visceral Leishmaniasis		<i>Leishmania infantum</i> (secondary vectors)	<p>Transmission: Sand fly bite</p> <p>Primary vector: <i>Phlebotomus major</i></p> <p>Secondary vectors: <i>P. argentipes</i>, <i>P. chinensis</i>, <i>P. tobbi</i>, <i>P. kandelakii</i>, <i>P. wenyoni</i></p> <p>Reservoirs: Canidae (jackals, foxes, dogs)</p>	<p>Transmission period: Same as <i>L. t. major</i></p> <p>Incidence and seroprevalence: Endemic nationally, with sporadic cases, except in the extreme southeast; further epidemiological data are not available at this time</p>	As with <i>L. t. major</i> ; do not keep dogs in camp areas
Malaria		<i>Plasmodium vivax</i> , <i>P. falciparum</i>	<p>Transmission: <i>Anopheles</i> mosquito bite</p> <p>Primary vectors:</p>	<p>Transmission period: June-Sept. in northern Iran; May-Sept. in</p>	<p>Preventive measures:</p> <p>- Indoors: Use permethrin-treated</p>

			<p>- <i>An. superpictus</i> (nationwide); <i>An. stephensi</i>, <i>An. fluviatilis</i>, <i>An. dthali</i> (southern Iran); <i>An. saccharovi</i> (western Iran); <i>An. maculipennis</i> (northern Iran)</p> <p>Secondary vectors:</p> <p>- <i>An. apoci</i>, <i>An. multicolor</i>, <i>An. sergenti</i>, <i>An. pulcherrimus</i>, <i>An. hyrcanus</i></p>	<p>southern areas; year-round in the Persian Gulf</p> <p>Incidence and seroprevalence:</p> <p>Endemic nearly nationwide (16% malaria-free) below 1500 m, with continuously increasing case loads; 1986 incidence 69/100,000; 1998 99/100,000; 1990 137/100,000, with increasing tendency particularly in the north as a result of refugees coming from Nagorno Karabakh; 80-85% of cases come from Baluchistan, Sistan, Kerman and Hormozgan; approx. 35% <i>Pl. falciparum</i>, particularly in the country's southeast; mefloquine resistance is increasing; infected refugees are entering northwestern Iran from Nagorno Karabakh (1998: 13,000 cases); immigration of infected refugees in northeastern Iran from southern</p>	<p>mosquito net; do not use ultraviolet lamps</p> <p>- Outdoors: Use insect repellent and permethrin-treated uniform; minimize exposed skin</p> <p>- Continuous larval control and abatement in camp areas; elimination of breeding grounds</p> <p>- Resistance:</p> <p><i>An. stephensi</i>: DDT, dieldrin, malathion; <i>An. maculipennis</i>, <i>An. saccharovi</i>: DDT</p>
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				<p>Turkmenistan and northwestern Afghanistan ($\geq 115,000$ cases there in 1999)</p> <p>Breeding grounds: A variety of standing waters in urban areas (cans, buckets, old tires) (<i>An. stephensi</i>) to large, slowly flowing ponds with water plants (<i>An. superpictus</i>, <i>An. saccharovi</i>)</p> <p>Bite properties: Females bite at dawn and dusk (<i>An. dthali</i> from 21:00 to 24:00 hours); <i>An. dthali</i>, <i>An. superpictus</i> and <i>An. fluviatilis</i> do not bite indoors (exophilic, exophagic); other species actively migrate indoors and bite there (endophilic, endophagic); very small species, such as <i>An. stephensi</i>, penetrate untreated mosquito nets; flight radius 1-2 km</p>	
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Filariasis		<i>Wuchereria bancrofti</i>	<p>Transmission: Bites of <i>Culex</i> and <i>Aedes</i> mosquitoes</p> <p>Primary vectors: <i>Culex pipiens molestus</i>, <i>Cx. bitaeniorhynchus</i></p>	<p>Transmission period: May-Oct.</p> <p>Incidence and seroprevalence: Current epidemiological situation is unclear; focally endemic in Baluchistan Province; primary vector is endemic nationally</p> <p>Breeding grounds: Any small, stagnant or polluted body of water in urban areas</p> <p>Bite properties: Both <i>Culex</i> species bite at dawn and dusk and migrate indoors to bite (endophilic, endophagic); infectious adult females rest and overwinter in houses, animal stables, etc.; flight radius up to 2 km</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Indoors: Use permethrin-treated uniform and mosquito net; do not use ultraviolet lamps - Outdoors: Use insect repellent and permethrin-treated uniform; minimize exposed skin - Continuous larval control in camp areas (urban vectors); eliminate breeding grounds
Schistosomiasis		<i>Schistosoma haematobium</i>	<p>Transmission: Via worm larvae (cercariae), which swim freely in water and penetrate intact skin within 3-4 minutes</p> <p>Reservoirs: Amphibian snails of the genus <i>Bulinus</i>; in Iran, chiefly <i>B. truncatus</i></p>	<p>Transmission period: Year-round with peaks from May-July and Oct.-Dec.</p> <p>Incidence and seroprevalence: Currently focally endemic in Khuzestan Province; mainly in the Dezful, Haft Tappeh, Dasht, Mishan,</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Strict avoidance of cercaria-infected waters - Always wear rubber gloves and boots when in contact with water - Insect repellent offers considerable protection for 1-2 hours (not 100%; studies are incomplete)

				<p>Hamidieh, and Khorranshahr regions, as well as in northern Ahvaz along the Karun river; annual incidence rate is estimated to be less than 0.5%</p> <p>Breeding grounds: Reservoir snails live in slowly flowing or stagnant waters, canals, etc.; they rarely leave the water; may survive dry periods buried in river mud</p>	<p>against cercarial penetration (the active ingredient DEET is an effective cercaricide at 7.5% minimum potency)</p> <ul style="list-style-type: none"> - Uniforms and other fabrics provide only limited protection - Water chlorination kills cercariae (30 min., 1 ppm Cl) - Cercariae can be eliminated from water by heating (50 degrees Celsius for 5 min.) or by storage (> 72 hours) - Begin snail control with Bayluscide (not covered in STANAG 2048 GE) [NATO Standardization Agreement 2048-Chemical Methods of Insect and Rodent Control]
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Endemic Venomous Animals in Iran

Venomous Animal	Name:	Toxicity:	Remarks:
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Group:			
Poisonous Snakes	<i>Agkistrodon halys</i> , pit viper (Crotalidae)	Mildly toxic	Widespread in northern Iran; hides under rocks during the day; rarely bites
	<i>Naja naja oxiana</i> , Indian cobra, spectacled cobra (Elapidae)	Extremely toxic; large quantity of poison injected	Common in northeastern Iran, Khorasan and Gorgan; 0.6 to 0.8 m long, brown with black zigzag stripe; occurs up to 1800 m in mountains, avoids desert areas; specific antivenom available
	<i>Walterinnesia aegyptia</i> , desert black snake (Elapidae)	Extremely toxic	Common in Khuzestan and Fars Provinces; back and belly are colored dark brown or blackish, up to 1.2 m long; prefers gardens or oases; does not make itself noticed when disturbed; quickly moves up to 1 m to bite; specific antivenom available
	<i>Echis carinatus</i> , saw-scaled viper (Viperidae)	Extremely toxic	Widespread throughout Iran and probably the most dangerous poisonous snake there; very aggressive; up to 80 cm long, with brownish base coloring, lateral light and dark zigzag stripe, and black and white marks on back; emits a rattling sound when in danger; mortality rate 36%, severe injury in 30% of all bite cases, specific antivenom available
	<i>Eristocophis macmahoni</i> , Asian sand viper (Viperidae)	Moderately toxic	Common in desert areas of southeastern Iran; up to 1 m long; poisonous bites are seldom reported
	<i>Pseudocerastes persicus persicus</i> , Persian horned viper (Viperidae)	Moderately toxic	Occurs throughout Iran on sandy, rocky subsurfaces; up to 1 m long
	<i>Vipera lebetina</i> , Levantine viper (Viperidae)	Extremely toxic	Common throughout Iran and the most common poisonous snake there; inhabits rocky areas; very aggressive when disturbed; mortality rate 6.6%, severe injury in 28% of bite cases; specific antivenom available
	<i>Vipera ursinii renardi</i> , meadow viper (Viperidae)	Mildly toxic	Common in the Elbrus Mountains in northern and western Iran; occurs in humid valley lowlands;

		moderately aggressive; 25-50 cm long
	<i>Vipera xanthina</i> , Near East viper (Viperidae)	Extremely toxic Common in northwestern Iran; up to 1.2 m long; prefers areas near human settlements; reacts very aggressively when disturbed; mortality rate approx. 5%
	<i>Vipera ammodytes</i> , sand viper (Viperidae)	Extremely toxic Common throughout Iran; has characteristic nasal horn; lives in dry, hilly areas up to 1700 m; moves slowly, but strikes quickly
	<i>Vipera kaznakovi</i> , Caucasus adder (Viperidae)	Moderately toxic Occurs in northwestern Iran; a poorly known, uncommon species
	<i>Enhydrina schistosa</i> (Hydrophidae)	Extremely toxic Sea snake found in coastal areas; prefers mouths of rivers; up to 1.2 m long; usually slightly aggressive; most dangerous of Iran's sea snakes
	<i>Hydrophis cyanocinctus</i> (Hydrophidae)	Extremely toxic Sea snake found in coastal areas; up to 1.8 m long; can swim up to 30 km from the coast
	<i>Hydrophis ornatus</i> (Hydrophidae)	Moderately toxic Sea snake found in coastal areas; up to 90 cm long; distinguishable by its large head
	<i>Hydrophis spiralis</i> (Hydrophidae)	Mildly toxic Sea snake found in coastal areas; colored gold-yellow or yellow-green with black rings; up to 1.8 m long; often occurs in deep water
	<i>Pelamis platurus</i> (Hydrophidae)	Mildly toxic Sea snake found in coastal areas; eel-like appearance; up to 75 cm long; does not inhabit rivers; very few envenomizations reported
Arachnids	<i>Latrodectus mactans</i> , black widow (web) spider	Moderately toxic Lives in dry badlands; immobile web spider; does not actively move indoors; very seldomly causes lethal systemic poisoning; specific antivenom available
	<i>Lycosa tarantula</i> , as well as other species of wolf spider	Mildly toxic Mobile predator with a wasp-like bite; usually only localized symptoms
	Sun spiders (Solifugae)	Nontoxic Very large (up to 10cm) spider-like animals with crablike jaws but without poison glands; display

			pedipalps (pincers) when endangered, and emit a hissing sound by rubbing the jaws; actively jump at humans from up to 30 cm away; bite painfully, bite has cruciform appearance and high secondary infection rate
	Several species of scorpion; the most common are: <ul style="list-style-type: none"> - <i>Androctonus crassicauda</i> - <i>Buthotus saulcyi</i> - <i>Compsobuthus matheisseni</i> - <i>Hemiscorpius lepturus</i> - <i>Mesobuthus eupeus</i> - <i>Odontobuthus doriae</i> - <i>Scorpio maurus</i> 	Mildly toxic	Most scorpion venom in Iranian species acts hemolytically, with local pain, swelling, and necrosis; systemic poisoning is generally acute; fatalities in Iran have been reported only occasionally; the extremely toxic Saharan wide-tailed scorpion (<i>Androctonus australis</i>) does not occur in Iran
Centipedes	<i>Scolopendra cingulata</i> , megarian banded centipede, as well as other large species	Mildly toxic	An aggressive predator common in populated places, living among humans; up to 10 cm long, some endemic species even longer, front pair of legs transformed into jaws with poison glands; systemic symptoms are generally acute, rarely last longer than a day; a bite mark from a large centipede can be almost indistinguishable from that of a mid-sized viper