Chronic infections – Transmission within Families and Consequences

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Transmission

Microbes and disease

- **Pathogen**: Micro-organism that has the potential to cause disease
- **Infection**: Invasion and multiplication of pathogenic microbes in an individual or population
- **Disease**: Infection causes damage to the individual's vital functions or systems
- An infection **does not** always result in disease
- Microbes must enter our bodies. The site at which they enter is "the portal of entry".

To make us ill, microbes have to

- Reach their target site in the body
- Attach to the target site they are trying to infect so that they are not dislodged
- Multiply rapidly
- Obtain their nutrients from the host
- Avoid and survive attack by the host's immune system

How microbes can be transmitted (1/2)

Person-to-person

- Touch: A cold can be caught by shaking the hand of a person who has a cold and who has just used their hand to wipe their dripping nose.
- Contaminated blood or other bodily fluids
- Hepatitis B and HIV, for example, can be spread through sexual intercourse or sharing used syringe needles contaminated with infected blood.
- Saliva: A cold or flu can be caught from the saliva of an infected person via kissing
- Measles, mumps and tuberculosis can be spread by coughing or sneezing.

Food

- Microbes need nutrients for growth and like to consume the same foods as humans. They can get into our food at any point along the food chain from 'plough to plate'. Symptoms of food poisoning are sickness and diarrhoea, when the contaminated food is eaten.
- Microbes can be spread from one food to another during the preparation process, for example by unclean hands, or dirty kitchen utensils, and cause illness when those foods are eaten. This is known as cross-contamination.

How microbes can be transmitted (2/2)

Water

- Some diseases are caused by drinking water that is contaminated by human or animal faeces, which may contain disease-causing microbes.

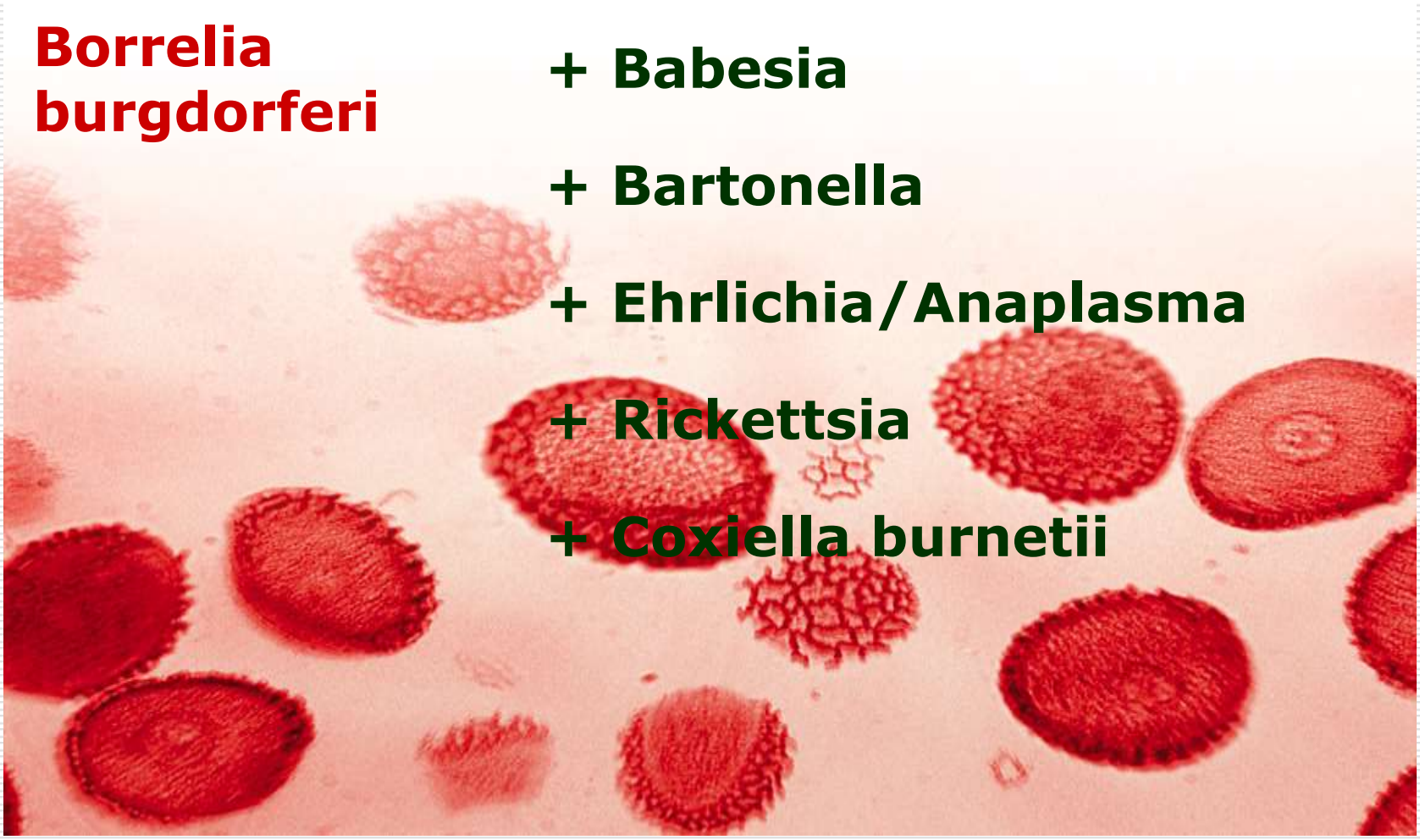
Insects

- *Borrelia burgdorferi* for instance is spread from deer to person by ticks that are carrying it. *Borrelia burgdorferi* enters the human host when an infected tick takes a blood meal.
- Insects can also transmit pathogens to food; house flies are very good at spreading *Salmonella* or *H. pylori*. They feed on faecal waste and transfer microbes from their feet and other body parts to food.

Fomites

- Non-living objects such as bedding, towels, toys and barbed wire can carry disease-causing organisms. The fungus *Trichophyton* that causes athlete's foot can be spread indirectly through towels and changing room floors.

Lyme disease + Co-infections



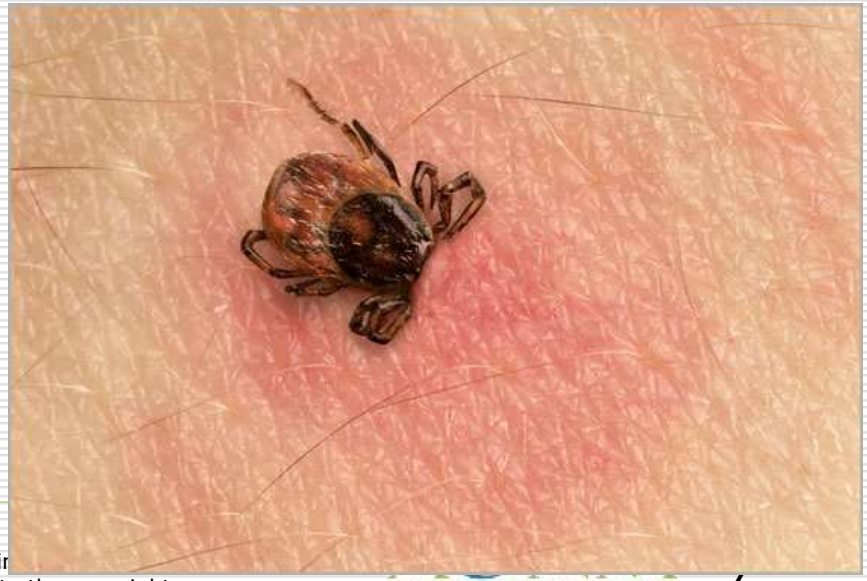
Borrelia burgdorferi transmission

- Forests, gardens, parks, houses etc.

Natural reservoirs of ticks and Borrelia burgdorferi:

- **Mice, rats**
- **Birds**
- **Foxes**
- **Deer**
- **Rabbits**
- **Hedgehogs**
- **Snakes**

- **<u>Domestics</u>: Dogs**
  Cows
  Goat
  Cats
  Horses
  Guinea pigs



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DIAGNOSING TICK-BORNE DISEASES

ACADEMY of NUTRITIONAL MEDICINE

Possible transmission of Borrelia by other biting insects (1/2)

Occurrence of Borrelia burgdorferi s.l. in different genera of mosquitoes (Culicidae) in Central Europe

Melaun, C., et al., Occurrence of Borrelia burgdorferi s.l. in different genera of mosquitoes (Culicidae) in Central Europe. Ticks Tick-borne Dis. (2015), http://dx.doi.org/10.1016/j.ttbdis.2015.10.018

"… German mosquitoes were analyzed for the presence of Borrelia spp. … the results show that DNA of Borrelia afzelii, Borrelia bavariensis and Borrelia garinii could be detected in ten Culicidae species comprising four distinct genera (Aedes, Culiseta, Culex,and Ochlerotatus). Positive samples also include adult specimens raised in the laboratory from wild-caught larvae indicating that transstadial and/or transovarial transmission might occur within a given mosquito population."

The Etiologic Agent of Lyme Disease in Deer Flies, Horse Flies, and Mosquitoes

Louis A. Magnarelli, John F. Anderson and Alan G. Barbour, *Journal of Infectious Diseases* Vol. 154, No. 2 (Aug., 1986), pp. 355-358

Possible transmission of Borrelia by other biting insects (1/2)

Flea and mosquito-borne diseases

King, M. Banfield Journal 2010 Vol. 6 No. 2 pp. 7-9, 12-14

"This article discusses the flea- (**Bartonellosis, *Haemobartonella*, Rickettsial infections, Yersiniosis** and feline viral infections) and mosquito- (heartworm disease) borne diseases, their transmission, clinical signs ……."

BORRELIA BURGDORFERI SHOWN BY PCR FROM SKIN BIOPSY SPECIMEN AFTER A FLY BITE

by Jarmo Oksi (and his Finnish colleagues) from 1992

CASE REPORT

The patient, 41-year-old physician, had previously been healthy. He recalled no tick bites in his life. After jogging on August 17, 1992, he was bitten by a deer fly. Erythema migrans like lesion developed around the bite in right lower leg slowly in two weeks. No fever or other symptoms developed. Examination on September 2 disclosed 5 x 12 cm homogenous erythema.

Transmission via blood transfusion?

Transfusion. 2015 Mar;55(3):593-7. doi: 10.1111/trf.12879. Epub 2014 Sep 23.

Blood transfusion transmission of the tick-borne relapsing fever spirochete Borrelia miyamotoi in mice.

Krause PJ[1], Hendrickson JE, Steeves TK, Fish D.

Author information

Abstract

BACKGROUND: Borrelia miyamotoi, a recently discovered relapsing fever spirochete, occurs in hard-bodied ticks wherever Lyme disease is endemic. Human infection is associated with relapsing fever and can cause meningoencephalitis in immunocompromised patients. A few cases of transfusion transmission of other relapsing fever spirochete species have been reported but none for B. miyamotoi. Our objective was to determine whether B. miyamotoi transfusion transmission could occur in a murine transfusion model. Herein, we report transfusion transmission of B. miyamotoi through fresh or stored red blood cells (RBCs) in a mouse model.

STUDY DESIGN AND METHODS: Inbred mice were transfused with B. miyamotoi-infected murine blood that was either freshly collected or stored for 7 days before transfusion. Recipient blood was then longitudinally examined after transfusion by smear and wet mount for evidence of spirochetemia.

RESULTS: Motile spirochetes were observed in immunocompromised (SCID) mouse recipients for 28 days after transfusion of both fresh and stored murine B. miyamotoi-infected RBCs. Transient spirochetemia was observed in immunocompetent DBA/2 and C57BL/6 mice, with spirochete clearance occurring within 5 days after

CONCLUSION: These data demonstrat

humans.

CONCLUSION:
These data demonstrate that transfusion transmission of B. miyamotoi can occur in mice and suggest that it also may occur in humans.

Sexual transmission?

Studies do show Borrelia burgdorferi in vaginal fluid and male ejaculate of those who have tested positive for Lyme disease, f.e. Journal of Investigative Medicine 2014;62:280-281.
Isolation and Detection of Borrelia Burgdorferi from Human Vaginal and Seminal Secretions
Middelveen MJ Bandoski C, Burke J, Sapi E, Mayne PJ, Stricker RB:

In this study, 13 patient with Lyme, 3 were sexual partners. All 13 had evidence of Lyme in their genital secretions. The sexual partners in each of these studies had identical strains of Borrelia burgdorferi detected in the male ejaculate and vaginal fluid.

CONS:
The authors did not clarify the length of time between sexual activity of each couple and when the specimens were obtained.
There is not yet any scientific evidence indicating how long Borrelia can persist in the vaginal fluid after male ejaculation. So the detection of identical strains in the female partner could be from male secretions in the vaginal fluid rather than her own vaginal secretions.
It is of course always possible the each person in the couple were independently bitten by ticks which carried the same strain.
The studies of Moody and Barthold (1991) and Woodrum and Oliver (1999) are often cited, where it was not possible to transmit Borreliosis to uninfected hamsters with urine or feces from infected hamsters in well-characterized animal models of Borreliosis.

PROS:
Borrelia burgdorferi is a spirochete like Treponema pallidum (Syphilis), which is well known to be sexually transmissible.
Why should it be not sexually transmitted? Further studies are definitely needed.

In utero transmission? (1/3)

Weber et al. reported the first case of transplacental transmission despite antibiotic treatment of first trimester maternal infection in 1988 (Teratogen Update: Lyme Disease, TERATOLOGY 64:276–281 (2001)

Mc Donald et al. reported transplacental transmission in a human in 1987: A stillborn fetus whose mother was found to have positive antibody titers at two of three laboratories after being retrospectively diagnosed with untreated first trimester Lyme disease (A.B. MacDonald, J.L. Benach, W. Burgdorfer *Still birth following maternal Lyme disease* N Y State J Med, 87 (1987), pp. 615–616

1985 Jul;103(1):67-8.
Maternal-fetal transmission of the Lyme disease spirochete, Borrelia burgdorferi.
Schlesinger PA, Duray PH, Burke BA, Steere AC, Stillman MT.
"At approximately 35 weeks she gave birth to an infant who died 39 hr after delivery. An autopsy revealed severe cardiovascular defects, including patent ductus arteriosus, coarctation of the aorta, tubular hypoplasia of the aorta and aortic arch, and marked endocardial fibroelastosis. On histologic examination, rare spirochetes compatible with *B. burgdorferi* were found in the fetal spleen, renal tubules, and bone marrow ... they were later demonstrated in cardiac tissue by immunohistochemical techniques."

K. Weber, H.J. Bratzke, U. Neubert, D. Wilske, P.K. Duray*Borrelia burgdorferi* in a newborn despite oral penicillin for Lyme borreliosis during pregnancyPediatr Infect Dis J, 7 (1988), pp. 286–289

In utero transmission? (2/3)

Am J Vet Res. 1993 Jun;54(6):882-90.

Intrauterine transmission of Borrelia burgdorferi in dogs.

Gustafson JM[1], Burgess EC, Wachal MD, Steinberg H.

Author information

Abstract

To determine whether intrauterine transmission of Borrelia burgdorferi could exist in dogs, 10 female Beagles were inoculated intradermally with approximately 1,000 B burgdorferi on day 1 of proestrus; inoculation was repeated every 2 weeks during the gestation period. Ten female control Beagles were similarly inoculated with phosphate-buffered saline solution. Prior to the start of the study, all females and 3 males used for breeding were seronegative for B burgdorferi on the basis of results of the indirect fluorescent antibody test and immunoblot (western analysis. Similarly, results of culture of blood for B burgdorferi were negative. All 20 of the females were bred naturally. Blood samples were collected weekly for serologic testing and culture. Blood samples were obtained from live pups on day 1 of life, then weekly until pups were 6 weeks old when they were euthanized. Tissues were obtained for culture and testing by use of polymerase chain reaction (PCR). Of 10 spirochete-inoculated (SI) females, 8 became infected with B burgdorferi as evidenced by spirochete culture results and/or PCR-detected B burgdorferi DNA in the tissues of females or their pups. Of the 10 SI females, 8 delivered litters (3 to 7 pups) that had at least 1 neonatal or 6-week-old pup with B burgdorferi DNA-positive tissues (by PCR), and spiroch ORDS)

PMID: 8323057 [PubMed - indexed

80% of infected mothers gave birth to litters with at least one infected puppy. Physical presence of spirochetes detected in several

In utero transmission? (3/3)

Fetal outcome in murine Lyme disease.
Silver RM; Yang L; Daynes RA; Branch DW; Salafia CM; Weis JJ, Infect Immun 1995 Jan;63(1):66-72. "Fetal death occurred in 33 of 280 gestational sacs (12%) in 39 C3H/HeN female mice infected by intradermal injection of B. burgdorferi 4 days after mating (acute infection), compared with 0 of 191 sacs in 25 control mice (P = 0.0001)."

On the other hand, there are studies that have not evidenced in utero transmission:

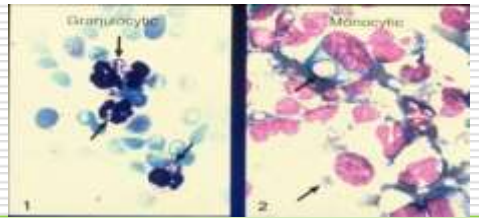
1991 Feb;44(2):135-9.
Relative infectivity of Borrelia burgdorferi in Lewis rats by various routes of inoculation.
Moody KD[1], Barthold SW.

To examine the issue of in utero transmission of infection, Moody and Barthold inoculated pregnant female Lewis rats with viable B. burgdorferi during gestation. All of the inoculated pregnant females became seropositive, and B. burgdorferi could be cultured from their spleens at 20 days of gestation. However their placentas and foetuses were culture negative, indicting a lack of in utero transmission.

In another study with 1,500 subjects including controls, no increased risk of giving birth to a child with a congenital heart defect was noted in women who had either been bitten by a tick or had been treated for Lyme disease during or before pregnancy.

So the situation is not entirely clear: further studies are needed !

Ehrlichia / Anaplasma



Source: CDC

Bacteria: Ehrlichia chaffeensis, Anaplasma phagocytophilum (gram-negative, obligatory intracellular in granulocytes or monocytes)

Human Granulocytic Ehrlichiosis (HGE) or

Human Monocytic Ehrlichiosis (HME)

Vectors: Ixodes ricinus

Spectrum of hosts: game (e.g. deer), domestic animals, humans

Symptoms (incubation time: days up to 4 weeks): rapid onset of beginning illness with fever, headache and prostration, headaches are "sharp, knife-like and often located behind the eyes", muscle pain, not joint pain, neurological symptoms, psychiatric symptoms, rarely: diffuse vasculitic rash, including palms and soles (<10%)

Associations: Myelodysplastic syndromes, leukaemia

Myelodysplastic syndromes / Leukemia

Myelodysplastic diseases and Ehrlichia: Consideration of a possible etiologic connection and mechanisms of pathogenesis

12th annual symposium on myelodysplastic syndromes (Abstract #238), Berlin, 2013

Could Ehrlichia infection cause some of the changes associated with leukemia, myelodysplastic diseases and autoimmune disorders, and offer antibiotic treatment options?

Kallick, C.A.; Friedman, D.A., Nyindo, M.; Medical hypotheses (2015) 891-893, Elsevier Ltd.:

"…We reference here 3 leukemia patients with direct or indirect evidence of Ehrlichia/Anaplasma infection….Though they did not survive, their condition improved dramatically for a time, suggesting Rifampin provided some therapeutic benefit…"

Bartonella

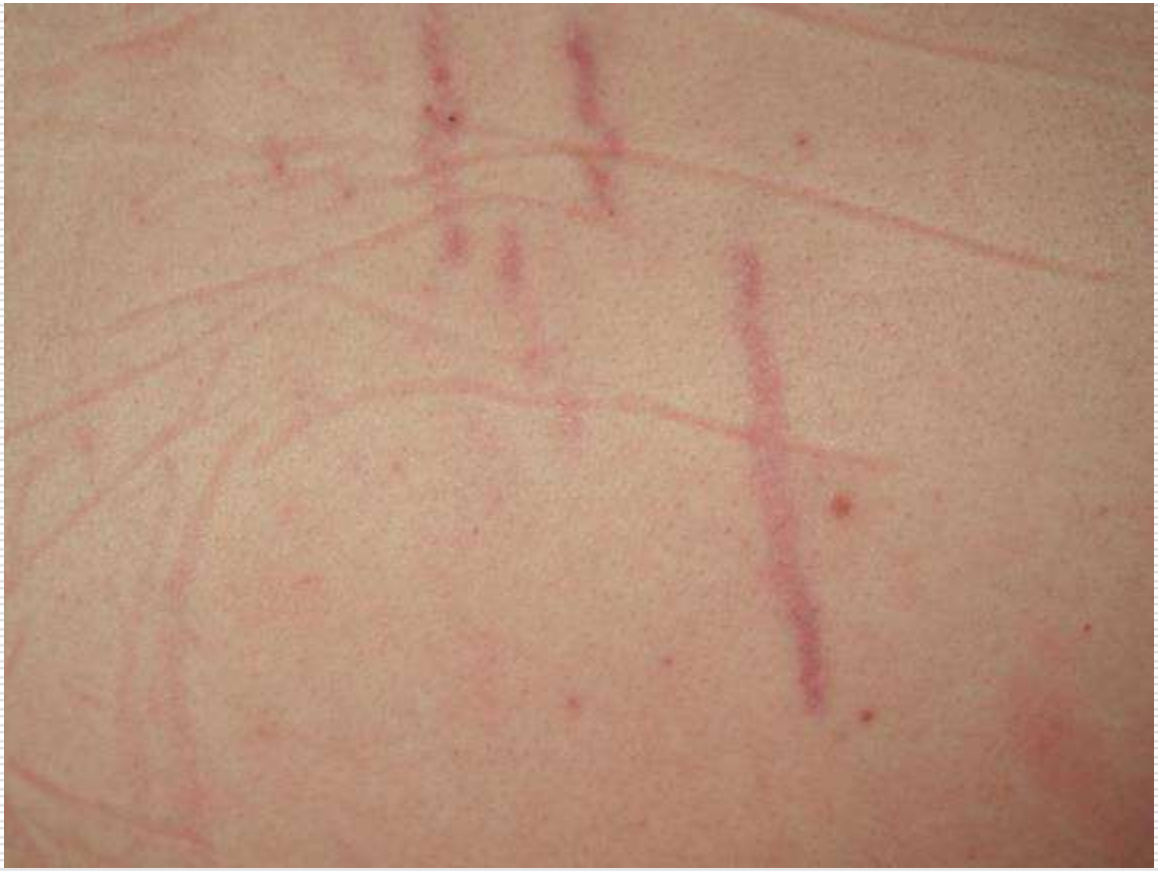
Bacteria: B. henselae (cat scratch disease), B. quintana (Trench fever, bacillary angiomatosis), B. bacilliformis (Carrion´s disease/Oroya fever), 5 other subspecies known to be pathogens for humans (gram-negative, facultative intracellular bacterium in endothelial cells/erythrocytes)

Vectors/transmission: cat-scratch surface wounds, Ixodes ricinus (Germany/Europe: up to 40% of ticks are contaminated), fleas, mosquitoes, sand flies

Symptoms (incubation time 3 - 38 days): tiredness (100%), headache (80%), muscle twitches, tremors, seizures, fever in the mornings (30%, in spates of up to 6 weeks, otherwise 1 - 3 weeks), swollen lymph nodes, arthralgia (often), myalgia, insomnia, depression, agitation, severe mood swings, amentia, lack of concentration and alertness, dizziness, anxiety, outbursts, antisocial behaviour, restlessness, gastritis, intestinal symptoms, sore soles (especially in the morning), tender subcutaneous nodules along the extremities, occasional lymphadenopathy and light sweats, striae; Complications: endocarditis, retinitis, epilepsy, aseptic meningitis, hepatosplenomegaly

Association: MGUS (Monoclonal Gammopathy of Undetermined Significance)

Bartonella striae



Babesia

Bacteria: Babesia microti, Babesia divergens, Babesia duncani

Vectors/transmission: Ixodes ricinus, Dermacentor reticulatus, blood transfusions

Hosts: game (e.g. deer), domestic animals, humans

Symptoms (incubation time 5 days – 9 weeks):

Rapid onset of beginning illness with severe fever, headache (can be severe/dull, global, involves the whole head, described like the head is in a vice), sweats (usually at night, but can be day-sweats as well), fatigue (worse with exercise), "air-hunger", need to sigh and take a deep breath, dry cough without apparent reason, stiffness of neck, nausea, diminished appetite, tiredness, feeling of weakness, permanent exhaustion even worse during stress, dizziness, haemolytic anaemia, hemoglobinuria, haemangiomata, (seldom) hepatosplenomegaly, muscle pain, dizziness, mental dullness and slowing of reactions and responses, hypercoagualability, stomach pain, emotional lability, "mental dullness", kidney problems, dyspnoea, influenza-like symptoms (could be lethal)

Risk factors: Splenectomy, HIV, organ transplantation, blood transfusions

Rickettsia

Bacteria: Rickettsia conorii (Boutonneuse Fever), R. rickettsia (RMSF), R. helvetica, R. slovaca, R. prowazekii (gram-negative, obligate intracellular in endothelial cells)

Vectors/hosts: rodents, dogs, humans, Ixodes ricinus, Dermacentor reticulatus

Symptoms (incubation period 5 - 7 days): fever, nausea, vomiting, severe headache, lymphadenitis, exanthema

Complications (app. 13%): peri-/myocarditis, kidney insufficiency, pneumonia, encephalitis, gastrointestinal bleedings, anaemia, hepatitis, myalgia, meningitis

Coxiella burnetii

Q fever: worldwide disease with acute and chronic stages caused by the bacteria ***Coxiella burnetii***.

Cattle, sheep, and goats are the primary reservoirs. Coxiella burnetii are excreted in milk, urine, and feces of infected animals. The organism is extremely hardy and resistant to heat, drying.

Infection of humans usually occurs by **inhalation of Coxiella burnetii from air that contains airborne barnyard dust contaminated by dried placental material, birth fluids, and excreta of infected animals. Other modes of transmission to humans are:**

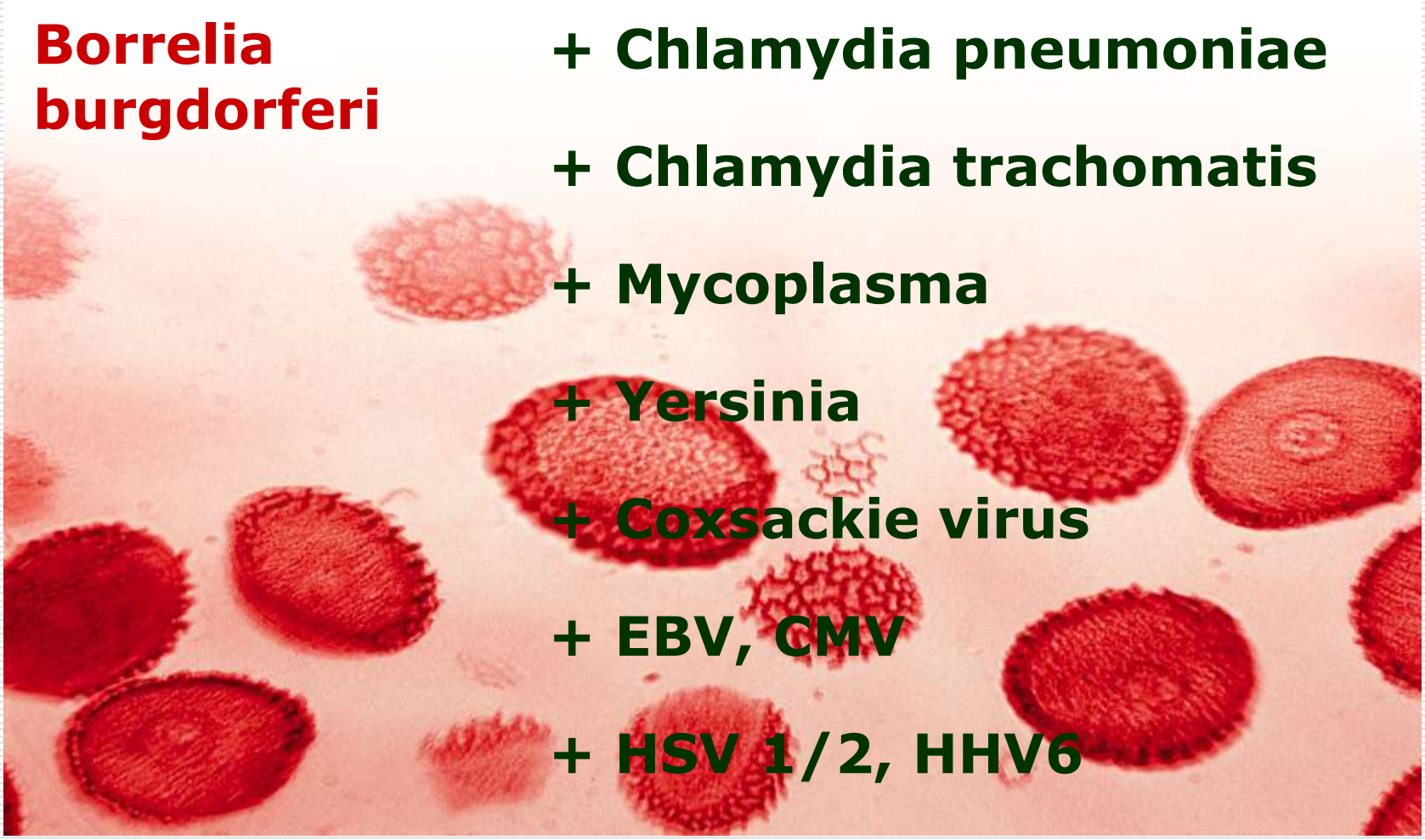
tick bites, ingestion of unpasteurized milk or dairy products.

Coxiella burnetii: B-Cell Non Hodgkin Lymphoma

- B-Cell Non-Hodgkon Lymphoma linked to Coxiella burnetii.
  Melenotte C. et al. www.bloodjournal.org Blood First Edition Paper November 12, 2015:

  „Coxiella burnetii is associated with an increased risk of lymphoma, its presence in the tumor microenvironment may favor lymphomagenesis… Lymphoma has to be considered in patients with Q fever and lymphoid disorders, especially those with persistent focalized infections."

Lyme disease + Opportunistic Infections



Chlamydia pneumoniae

Bacteria: Chlamydophila pneumoniae (gram-negative, intracellular); cystic and aberrant forms, biofilms

Vectors/transmission: airborne infection, human to human, ticks? Or reactivated in Lyme disease (horses, koalas, frogs are infected), aerogen transmission (cough) from horses to horse-riders?

Symptoms: cough, slight throat pain, hoarseness, sinusitis, atypical pneumonia, meningoencephalitis, bronchiolitis obliterans, myocarditis, Guillain-Barre Syndrome; arthritis, tendovaginitis

Associations: Alzheimer's, Multiple Sclerosis, depression, Fibromyalgia, ME/CFS, heart attacks, acute ischemic stroke (AIS), arteriosclerosis, autism, Parkinsonism, Rheumatoid Arthritis, etc.

Chlamydia trachomatis infection

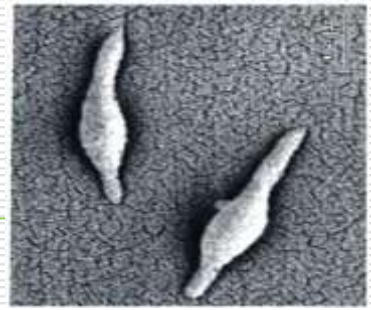
Bacteria: Chlamydophila trachomatis (gram-negative, intracellular)

Transmission: sexual contact, human to human

Clinic: cervicitis, sterility, urethritis, trachoma, acute conjunctivitis ("swimming pool conjunctivitis"), lymphogranuloma venereum

After infection: arthritis, tendovaginitis

Mycoplasma infection



Bacteria: Mycoplasma pneumoniae/fermentans (gram-positive, intracellular)

Transmission: airborne infection, human to human, ticks?

Symptoms: Fatigue (100%), fever, joint pain, swelling of joints, muscle pain, headache, insomnia, anxiety, emotional volatility, lack of concentration, memory loss, autism

M.E.: "Gulf War I syndrome" – Professor Garth Nicolson, see http://www.immed.org/

Yersinia infection

Bacteria: Yersinia species (gram-negative)

Transmission: animal-borne, contaminated food and untreated water, unpasteurized milk, occasional transmission such as human-to-human, animal-to-human and blood transfusions, "carriers" (stool)

Symptoms: enterocolitis, terminal ileitis and adenitis with watery or bloody diarrhea and fever, "pseudoappendicitis", liver-spleen abscesses, bacteriemia, chronic arthritis, erythema nodosum, reactive arthritis, possible association with Graves-Basedow thyroiditis

Coxsackie Virus

Virus: Coxsackie-Virus (obligate intracellular), belongs to Picornaviridae/Enterovirus, single-stranded RNA virus, divided into group A and group B

Transmission: faecal-oral contamination, droplets, body fluids, utensils, toys, diaper-changing table

Symptoms: Group A: Herpangina, AHC (acute hemorrhagic conjunctivitis, HFM (hand-foot-and-mouth disease), Group B: myocarditis, pericarditis, pleurodynia, hepatitis; Group A and B: fever, rashes, sore throat, diarrhea, cough, fatique, conjunctivitis, loss of appetite, headache, night sweats, aseptic meningitis

Complications: CNS disease similar to poliomyelitis, systemic neonatal disease, IDDM (insulin-dependent diabetes mellitus), Group A: generalized myositis with flaccid paralysis, Group B: focal muscle injury, degeneration of neuronal tissue with spastic paralysis

Epstein Barr Virus (EBV)

Virus: Epstein Barr Virus (obligate intracellular), double stranded DNA virus, one of the Herpesviruses, "Mononucleosis"

Transmission: "kissing disease", saliva, drinking from the same glass, toothbrush, blood, sex, blood-transfusion, organ transplantation

Symptoms (incubation period several weeks): fatique, fever, flu-like symptoms, nausea, loss of appetite, lymphadenitis (swollen lymph nodes in the neck), rash, sore throat, weakness, sore muscles

Complications: enlarged spleen, swollen liver, association with Non-Hodgkin's Lymphoma

Cytomegalo Virus (CMV)

Virus: Cytomegalo Virus (obligate intracellular), double-stranded DNA virus, one of the Herpes viruses

Transmission: body fluids (urine, saliva, breast milk, sexual transmission), organ transplantation, blood transfusion

Symptoms (incubation period several weeks): fatigue, fever, flu-like symptoms, lymphadenitis (swollen cervical lymph nodes), sore throat, splenomegaly

Complications: congenital infection with hearing loss, vision loss, seizures, mental disabilities, lack of coordination; immune-suppressed patients: hepatitis, colitis, retinitis, pneumonitis, esophagitis, polyradiculopathy, transverse myelitis, subacute encephalitis; arterial hypertension, artheroscleroris, aortic aneurysms; association with Non-Hodgkin's Lymphoma

B-Cell Non Hodgkin's Lymphoma: EBV / CMV

- Epstein Barr Virus-associated Non-Hodgkin's lymphoma of B-cell origin, Hodgkin's disease, acute leukemia, and systemic lupus erythematosus: A serologic and molecular analysis

  Mitarnun W, Pradutkanchana J, Takao S, Saechan V, Suwiwat S, Ishida T
  http://www.ncbi.nlm.nih.gov/pubmed/12188384

- EBV-Associated Lymphoproliferative Disorders: Classification and Treatment

  Carbone A, Annunziata G, Dotti, G, The oncologist 1083-7159/2008

- Cytomegalovirus infection in patients with lymphoma:
  An important cause of morbidity and mortality.

  Torres HA, Kontoyiannis DP, Aguilera EA, Younes A, Luna MA, Tarrand JJ, Nogueras GM, Raad II, Chemaly RF. Clin. Lymphoma Myeloma, 2006 Mar;6(5): 393-8

Herpes Simplex Virus 1 / 2 (HSV 1 / 2)

Virus: Herpes Simplex Virus (Human Herpes Virus HHV 1 / 2) (obligate intracellular), double-stranded DNA virus, one of the Herpes viruses

Transmission: Saliva, sharing drinks, sexually transmitted

Symptoms (incubation time 2-20 days): Watery blisters on the skin or mucous membranes of mouth, lips, genitals, anus, flu-like symptoms (fever, muscle aches, swollen lymph nodes, problems urinating, herpes keratitis (pain, light sensitivity, discharge)

Complications: Multiple Sclerosis (neurovirulent), loss of vision, encephalitis, latent infection; reactivation by organ transplantation or HIV: encephalitis, pneumonitis, bone marrow suppression

Human Herpes Virus 6 (HHV6)

Virus: Human Herpes Virus 6 (obligate intracellular), double-stranded DNA virus, one of the Herpes viruses

Transmission: Saliva, latency in salivary glands, hematopoetic system

Symptoms: Exanthema subitum (roseola infantum, sixth disease) with high temperature followed by a rash

Complications: Multiple Sclerosis (neurovirulent), cofactor in CFS, fibromyalgia, AIDS, optic neuritis, cancer, temporal lobe epilepsy, Hashimoto's thyroiditis, liver dysfunction, liver failure; reactivation by organ transplantation: encephalitis, pneumonitis, bone marrow suppression,

Consequences

Discussion: Facts

- Some Lyme Literate Medical Doctors (LLMD) treat married and other committed partners who both have Lyme disease.
  - and/or
- Some Lyme Literate Medical Doctors (LLMD) treat married and other committed partners together, although just one partner has Lyme disease.

  Argument: Possible re-infection by infected but symptom-free and untreated partner ("carrier").

Check coinfection symptoms for all family members?

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DIAGNOSING TICK-BORNE DISEASES

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GERMANY

Coinfections-Checklist

Name, first name ..... Date (DD/MM/YYYY) .....

	Actual and former symptoms Please mark with a cross	X	Score-Points (filled in by physician/naturopath)	Ranking
1	Stomach ache, gut problems		Ehrlichia:	
2	Anaemia		Babesia:	
3	Diarhoea intermittent		Rickettsia:	
4	Fever or feverish feeling		Bartonella:	
5	Lack of concentration, memory disturbance, forgetfulness		Chl.pneumoniae:	
6	Encephalitis/inflammation of the brain (NMR)		Chl.trachomatis:	
7	Yellowish colour of the skin/eyes		Yersinia:	
8	Painful joints, swollen joints		Mykoplasma:	
9	General aches and pains, tendon problems		Coxsackie-Virus:	
10	Flu-like symptoms intermittent		EBV/CMV:	
11	Rash(es)			
12	Small red/purple spots of the skin			
13	Heart problems, disturbance of cardiac rhythm			
14	Cough, expectoration			
15	Headache			
16	Impaired liver function/ liver laboratory values			
17	Pneumonia, bronchitis			
18	Swollen lymph nodes			
19	Tonsilitis			
20	Enlargement of the spleen			
21	Fatigue / exhaustion, intermittent or chronic CFS			
22	Muscle pain, muscle weakness			
23	Shivering, chill			
24	Blurred, Foggy, cloudy, flickering, double vision			
25	Nausea, vomiting			
26	Dark urine			
27	Itching or pain when urinating			

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Consequences of potential transmission within families

Are we talking about just Borrelia infections/Lyme disease or also about other infections ? Differential diagnosis ?
Are we too focused on Borrelia infections/Lyme disease ?

- **Transmission of Mycoplasma is airborne**
- **Transmission of Yersinia is human-to-human (stool)**
- **Coxsackie is transmitted via droplets, body fluids, utensils, toys, and diaper-changing tables**
- **Herpes Simplex Virus 1 & 2 can be transmitted via saliva, sharing drinks and sexually**

Do we have good science/studies about transmission of bacteria and viruses within families?
What are the potential consequences within families?

Consequences of potential transmission within families

1. **Faster diagnosis**
   If presentations among families were similar, one might assume that certain symptoms could mean Lyme Disease (and/or co-infections) in family members if another already had/has these infections. This could lead to faster diagnosis.

2. **Reduced suffering, as therapy could begin faster, hopefully recovery would be swifter.**

3. **Less strain on medical services, as patients would require less medical attention due to the swifter and more efficient diagnosis and treatment.**

4. **A stronger economy, as sufferers could return to work and would no longer be dependent upon support.**

Thank you very much for your attention!

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