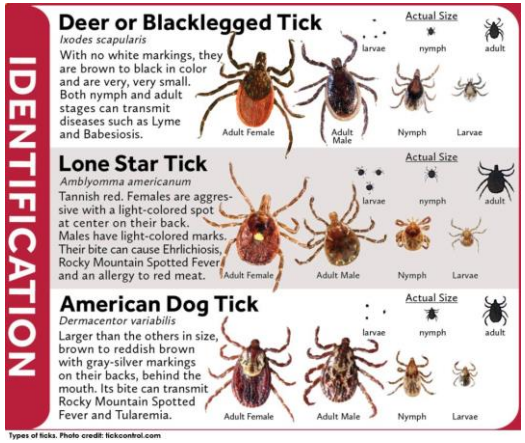
Ticks

We all like to go for a nice walk through woods, fields, laying on the grass, horse riding, golfing, etc, however exploring these natural areas may also bring the hidden danger of tick-borne infections (TBI or TBD).

Tick-borne diseases, which afflict humans and animals, are caused by infectious agents transmitted by tick bites. Lyme disease is the most widely known tick-borne disease and is caused by bacteria of the genus Borrelia. A tick can transmit multiple diseases at the same time, making appropriate diagnosis and treatment difficult. Lyme disease is among the most prevalent vector borne infection in the U.S. and Europe.
It is important to prevent the tick bite and
to know what to do in case of it.

Know where ticks are found: any tall grass, low-to-the-ground
shrubs, trees, woody plants may have ticks in them; ticks can even be
found in your own backyard, in the park. Pay special attention when hiking, horse-riding, golfing, hunting, camping, having a picnic... Cover up as much as possible: limit the amount of exposed skin! Consider using a repellent spray.

After having been outside, check your clothing for ticks: carefully inspect all outer layers of clothing and gear for ticks. Wash the clothes in hot water with soap.
Do a tick check: Inspect every part of your body for ticks, they can be as small as a poppy seed! Make sure to check between joints (behind the knees, elbows, armpits), behind your ears and any hair-covered part as tics love warm, dark places. Inspect also your animals (dogs, cats).

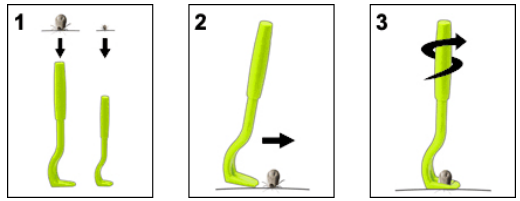


Types of ticks. Photo credit: tickcontrol.com

R.E.D. Laboratories Belgium, Z.1 Researchpark 100, B-1731 Zellik | Belgium +32(0)2 481 53 10 +32(0)2 481 53 11
info@redlabs.be www.redlabs.be

Tick Bite: What To Do

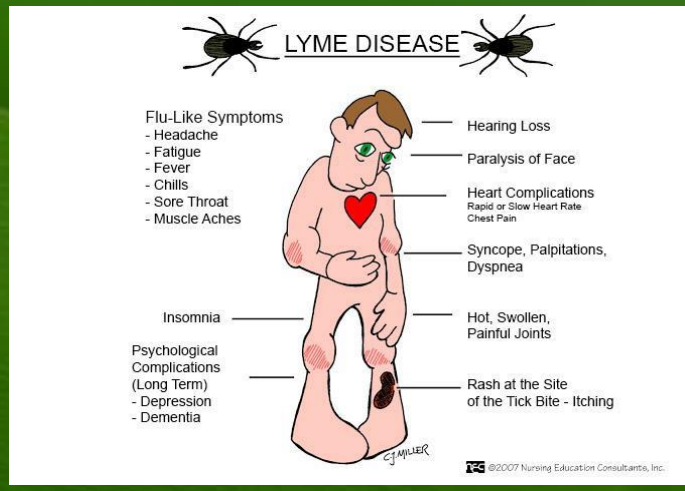
1. Do not put any chemical on the tick, use the appropriate tweezers to pull it out :
   a. special tick twist tweezers or
   b. fine-tipped tweezers to grasp the tick as close to the skin as possible and pull upward with steady, even pressure. Do not jerk the tick.
2. After removing the tick, clean the bite area and your hands with rubbing alcohol or soap and water.
1. Send us the ticks you removed from your family members or from your animals and we will test them for different tick-borne disease :
   TEST REQUEST FORM



If it is not possible to send it for the testing, the tick should be burned (in an ashtray or fireplace). Do not crush it with your fingers! This can expose you to any sort of pathogen the tick may be carrying.

Pay attention to the bite site - check for different skin rashes (but be aware that they occur only in 30-40% of cases):

Watch for symptoms for 30 days



Consider calling your healthcare provider if you get any of the following symptoms: bull's-eye rash, or general flu-like symptoms such as fever, achiness or a general lack of energy. It is important to address each tick bite even in the absence of the rash.
The long-term consequences may be very serious.

R.E.D. Laboratories Belgium, Z.1 Researchpark 100, B-1731 Zellik | Belgium +32(0)2 481 53 10 +32(0)2 481 53 11
info@redlabs.be www.redlabs.be

The importance of novel testing approaches for both an early and late diagnosis - Phelix Phage Test

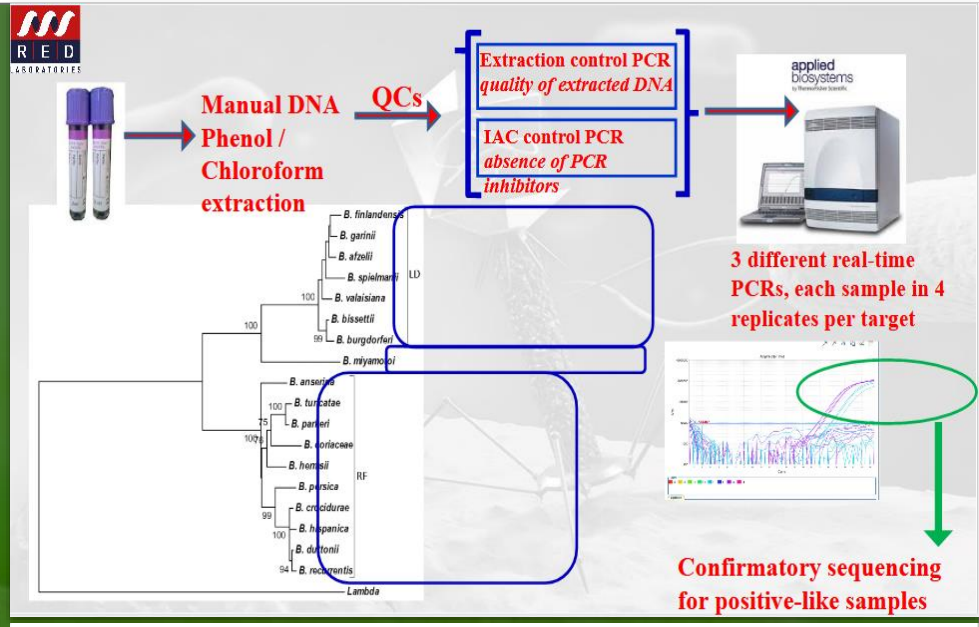
Phelix Phage Borrelia detection method consists of targeting the presence of outnumbered prophages as part of the bacteria lysogenic cycle.

Bacteriophages could become a diagnostic tool based on the principle that if there are phages it is because there are living bacteria.

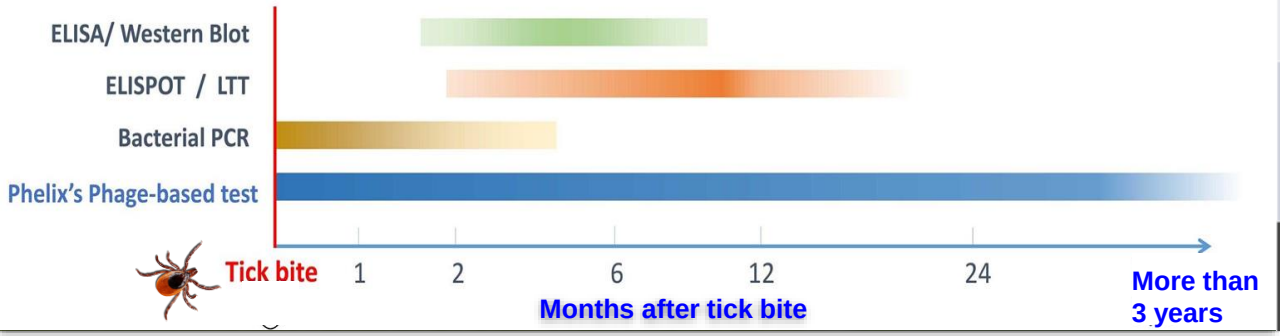
Phelix Charity together with Leicester University microbiology department have recently developed a Borrelia Phage-based PCR test (patent WO2018083491A1; publication doi: 10.3389/fmicb.2021.651217) searching for 3 major Borrelia groups:

- Borrelia burgdorferi sensu lato (including B. burgdorferi ss, B. afzelii, B. garinii, B. spielmanii, etc)
- Borrelia miyamotoi and
- Relapsing fever group (B. recurrentis, B. hermsii, etc).

The phage-based PCR test is unique as it addresses actual infection by different Borrelia subgroups. This method is efficiently used to assess both human samples and ticks. Highly sensitive and specific.
False positive results are ruled out by sequencing.



Kinetic detection



Reminder on Available Diagnostic Methods

Diagnostics	Remit
Antibody-based	• Give indirect evidence • Low sensitivity • Can't distinguish active and non-active *Borrelia* presence • Some difficulties in identifying *Borrelia* sub-types
Bacterial DNA-based	• Direct evidence of *Borrelia* presence • Low sensitivity • Can't distinguish live and dead *Borrelia* • Might be able to tell different *Borrelia* sub-types
Lymphocyte transformation test	• Provide indirect evidence • Variable sensitivity • Can only detect Lymphocytes that have been in contact with *Borrelia* within 45±15 days, thus limited in application • Distinguish active *Borrelia*? • Difficult identification of *Borrelia* sub-types?
Phage test	• Direct evidence of *Borrelia* presence • High sensitivity and specificity (Pilot study) • Can distinguish Lyme from Relapsing fever *Borrelia* strains • Active and non-active *Borrelia* presence

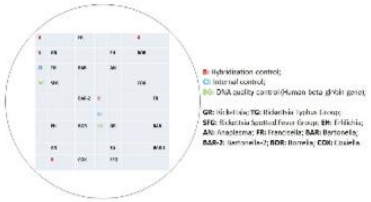
R.E.D. Laboratories Belgium, Z.1 Researchpark 100, B-1731 Zellik | Belgium +32(0)2 481 53 10 +32(0)2 481 53 11
info@redlabs.be www.redlabs.be

R.E.D. Laboratories Procedures Testing Ticks

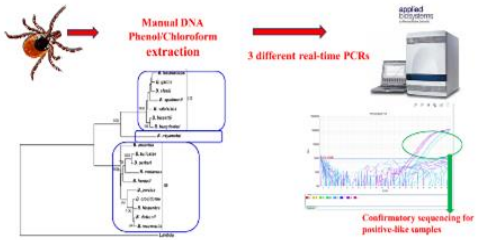
- Whole ticks were mechanically gridded with glass beads and DNA extracted by Phenol-Chloroform method.
- Extracted DNA was analysed by 2 methods:

HYBRISPOT TICK-BORNE BACTERIA FLOW CHIP
Simultaneous detection of 7 tick-borne bacteria genera:

Rickettsia
Erhlichia
Anaplasma
Francisella
Bartonella
Borrelia
Coxiella



PHELIX PHAGE BORRELIA TEST



- 40% of analysed ticks were negative (no detected pathogens)
- 60% of analysed ticks were positive for at least 1 pathogen

HYBRISPOT TICK-BORNE BACTERIA FLOW CHIP
Simultaneous detection of 7 tick-borne bacteria genera:

Rickettsia NONE DETECTED
Erhlichia NONE DETECTED
Anaplasma NONE DETECTED
Francisella NONE DETECTED
Bartonella NONE DETECTED
Borrelia 20% POSITIVES
Coxiella NONE DETECTED

PHELIX PHAGE BORRELIA TEST

Pathogens found in positive ticks:

Borrelia burgdorferi sl:17% pos
Borrelia miyamotoi : 60% pos
Borrelia Relapsing Fever Group 23% pos

25% of positive ticks were for 2 pathogens

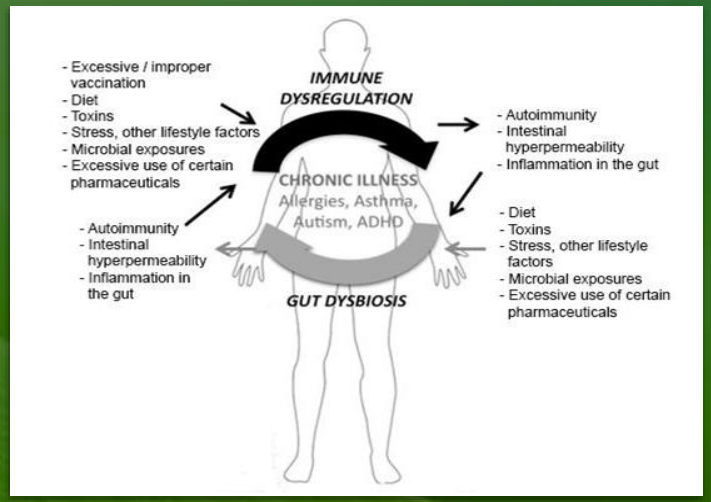
➔ Unexpected high rate of B. miyamotoi and Relapsing Fever Borrelia Phages in tested ticks

Vector-borne infections are increasing globally ⇒

Read our updated summary, available in different languages.
Lyme disease exhibits a variety of symptoms that may be confused with immune and inflammatory disorders, thus look for a Lyme disease specialist.

R.E.D. Laboratories Integrative Approach in Testing Human Samples

If an individual has any chronic health condition, ranging from arthritis to chronic fatigue syndrome to fibromyalgia, it is important to rule out tick-borne disease(s) by testing for it. It appears that many cases of fibromyalgia and chronic fatigue syndrome are actually TBD in disguise.



The all too often failure of therapies for vector-borne infections, especially in late/persistent/chronic patients, underscores the necessity to fully investigate different concurrent infections along with resulting gastrointestinal and immune dysregulations.

In order to offer better management of patients with chronic and/or persistent infections that are very difficult to uncover, it is important to focus both on direct pathogen detection as well as on indirect supportive tests.

R.E.D. Laboratories Belgium, Z.1 Researchpark 100, B-1731 Zellik | Belgium +32(0)2 481 53 10 +32(0)2 481 53 11
info@redlabs.be www.redlabs.be