

Lyme disease

Beyond Antibiotics

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Lyme disease



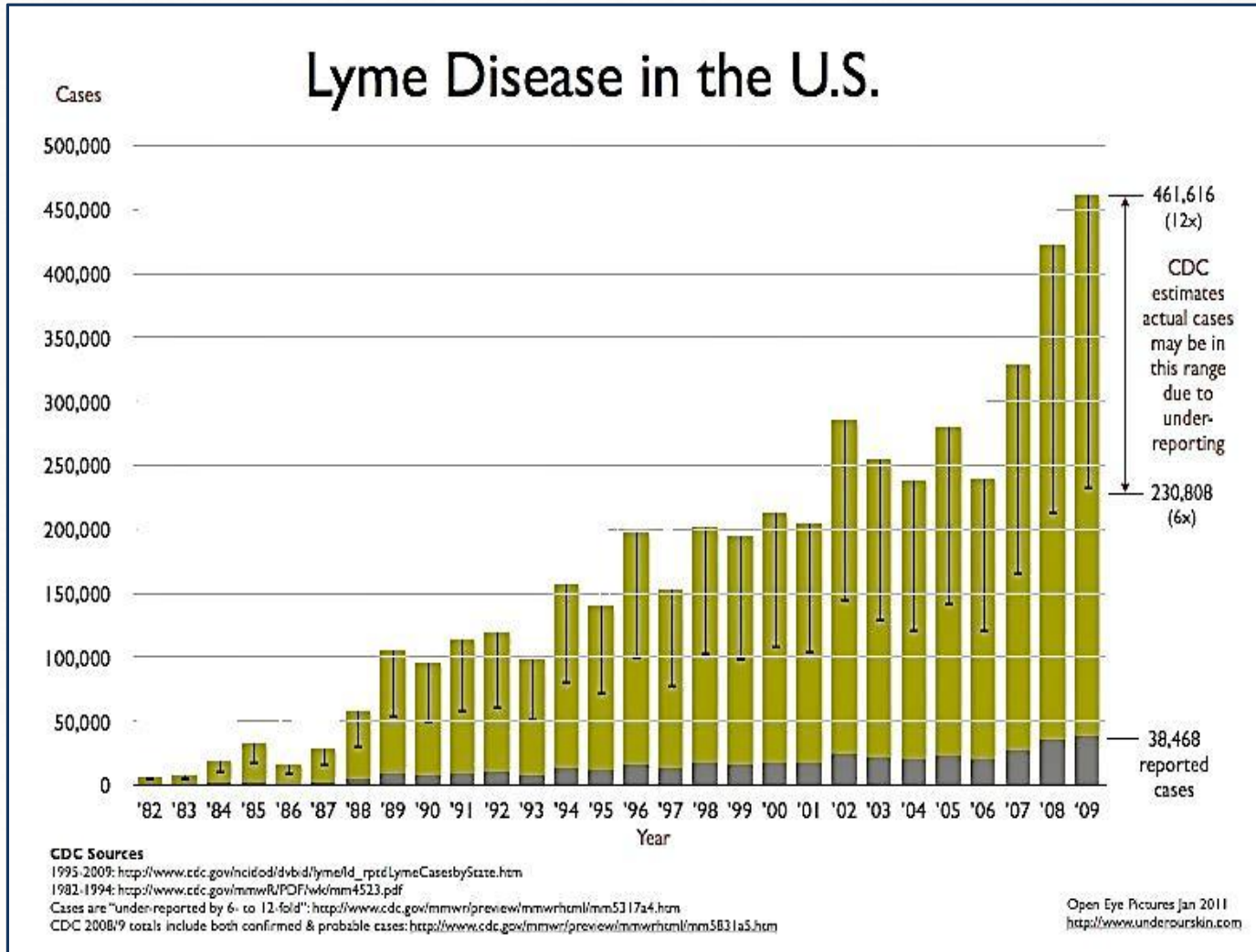
=> Systemic zoonotic infection

=> All ages and both genders are equally at risk, highest attack rates in children ages 10-14 years and in persons 30 years of age or older

=> *Borrelia burgdorferi* sensu lato is a pathogenic factor transmitted by ticks (the incubation period is typically 1-2 weeks):

- **B. garinii** and **B. afzelii** (Europe)
- **B. burgdorferi** (USA)
 - **B. garinii** (Neuroborreliosis)
 - **B. afzelii** (Lyme arthritis, Acrodermatitis Chronica Atrophicans)

The Most Common Vector-Borne Disease in the USA



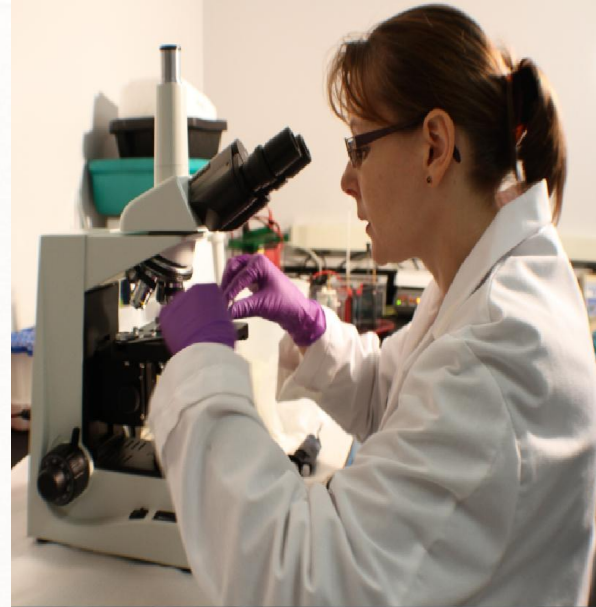
Aims

To establish therapeutic treatment for Lyme disease patients based on active and naturally-derived compounds:

- => high efficacy
- => no sides effect
- => cost- and time-efficient
- => targeting: pathogen, inflammation
- => detox/regeneration/diet



Methodology



Screening of compounds at different concentrations

Active and latent forms



Dark field and fluorescence microscope

Testing selected compounds as a mixture

Active and latent forms



Dark field and fluorescence microscope

Testing selected compounds and as a mixture in cooperation with antibiotic

Objective 1

To determine what active-and naturally-derived compounds are suitable to eliminate all three forms of *Borrelia* sp.





Compound	Compound	Compound
Hydroxytyrosol	Serrapeptase	Amygdalin
Fisetin	E-viniferin	Apricot seed
Kaemferol	Malvidin	Wild cherry
Oenin	Tranexamic acid	Black Walnut green hull
Cis-2-decenoic acid	Fucoidan	Olive leaf
Rosmarinic acid	L-lysine	Undecylenic acid
Luteolin	Quercetin 3D	White peony
Baicalein	Fulvic acid	Sage
Monolaurin	Teasel root	Grapefruit seed
Morin	Myricetin	Gape seed
Piceatannol	Aminocaproic acid	Citrus peel
Rottlerin	Defferoxamine	Anise
Vitamin D3	Ellagic acid	Bladderwrack
Vitamin C	Oregano oil	Berberine sulfate
Vitamin B-complex	Apigenin	Nordihydroguaiaretic acid
Kelp (Iodine)	Oleuropein	Vitamin E

Concentration: 0.0005-1000 mg/ml; 1-50 x dilution



Spirochetes		Rounded forms	Biofilm
Hydroxytyrosol	Undecylenic acid	Baicalein	Serrapeptase
Apricot seed	E-viniferin	Luteolin	Baicalein
Kaemferol	Malvidin	Grape seed	Luteolin
Oenin	Gape seed	Grapefruit seed	Monolaurin
Cis-2-decenoic acid	Grapefruit seed	Berberine sulfate	Undecylenic acid
Rosmarinic acid	Black Walnut green hull	Vitamin C	
Luteolin	Quercetin 3D	Wild Cherry	
Baicalein	Berberine sulfate	Rosmarinic acid	
Monolaurin	Teasel root	Black Walnut green hull	
Morin	Myricetin	Monolaurin	
Piceatannol	Wiled Cherry	Kelp/Iodine	
Rottlerin	Kelp/Iodine		
Vitamin D3	Oleuropenin		

Summary

Selected compounds for further tests:

Vitamin D3

Vitamin B-complex

Vitamin C

Baicalein

10-Hydroxy-Cis-2-decenoic acid

Kelp/Iodine

Monolaurin

Luteolin

Black Walnut green hull

Berberine sulfate

Fucoidan

Undecenoic acid

Anise seed

Apricot seed

Grape seed



Objective 2

To select the formula composed of active and naturally-derived compounds suitable to eliminate all three forms of *Borrelia sp.*





Mix

Compounds

A	Vitamin D3, Cis-2-decenoic acid, Iodine, Monolaurin, Serrapeptase, Luteolin, Rosmarinic acid
B	Hydroxytyrosol, Morin, Oenin, E-viniferin, Baicalein
C	Vitamin D3, Cis-2-decenoic acid, Iodine, Monolaurin, Serrapeptase, Luteolin, Rosmarinic acid, Hydroxytyrosol, Morin, Oenin, E-viniferin, Baicalein
D	Vitamin D3, Cis-2-decenoic acid, Iodine, Monolaurin, Luteolin, Hydroxytyrosol
E	Vitamin D3, Vitamin C, Cis-2-decenoic acid, Iodine, Monolaurin, Luteolin, Hydroxytyrosol
F	Vitamin D3, Cis-2-decenoic acid, Iodine, Monolaurin, Luteolin, Hydroxytyrosol, Rosmarinic acid
G	Vitamin D3, Vitamin C, Cis-2-decenoic acid, Iodine, Monolaurin, Luteolin, Hydroxytyrosol, Rosmarinic acid
H	Vitamin D3, Vitamin C, Cis-2-decenoic acid, Iodine, Monolaurin, Luteolin, Hydroxytyrosol, Rosmarinic acid, Baicalein
I	Vitamin D3, Vitamin C, Cis-2-decenoic acid, Iodine, Monolaurin, Luteolin, Hydroxytyrosol, Rosmarinic acid, Baicalein, Oenin
J	Vitamin B complex, Vitamin C, Cis-2-decenoic acid, Monolaurin
K	Vitamin B complex, Vitamin C, Iodine, Monolaurin, Luteolin
L	Vitamin B complex, Vitamin C, Iodine, Monolaurin, Oenin
M	Vitamin B complex, Vitamin C, Iodine, Monolaurin, Rosmarinic acid
N	Vitamin B complex, Vitamin C, Iodine, Monolaurin, Baicalein, Rosmarinic acid,
O	Vitamin D3, Vitamin B complex, Vitamin C, Cis-2-decenoic acid, Iodine, Monolaurin, Baicalein, Luteolin, Rosmarinic acid
P	Vitamin D3, Vitamin B complex, Vitamin C, Iodine, Monolaurin, Olive leaf, Grape seed, Bladderwrack
R	Vitamin D3, Vitamin B complex, Vitamin C, Bladder-wrack, Undecenoic adic, Grape seed, Apricot seed, Berberine sulfate, Anise seed, Black Walnut Hull



Spirochetes		Rounded forms	Biofilm
Mix A	Mix J	Mix A	Mix O
Mix B	Mix K	Mix C	Mix R
Mix C	Mix L	Mix D	
Mix D	Mix M	Mix F	
Mix E	Mix N	Mix G	
Mix F	Mix P	Mix H	
Mix G	Mix R	Mix I	
Mix H	Mix O	Mix O	
Mix I		Mix R	

Summary

Proposed formulas for further studies:

1. Vitamin D3

Vitamin B-complex

Vitamin C

Baicalein

10-Hydroxy-Cis-2-decenoic acid

Kelp/Iodine

Monolaurin

Luteolin

Rosmarinic acid

2. Fucoidan/Bladderwrack

10-Hydroxy-Undecenoic acid

Apricot seeds powder

Black Walnut green hull/*Juglans nigra*

Berberine sulfate/*Berberis aristata*

Anise seed extract or powder/*Pimpinella anisum*

Grape seed extract

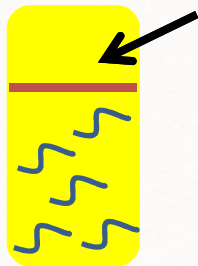


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Objective 3

To determine whereas selected formulas and its particular compounds interact with each other and with antibiotic doxycycline against *Borrelia sp.*

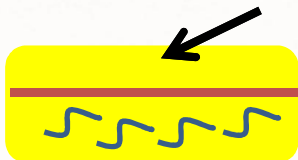
Natural compound+ Doxycycline



1, 2, 3, 7 days

Dark-Field counting
BacLight staining

Natural compound+ Doxycycline



7 days



3days

CV staining
BacLight stainig



Compound	Interaction with Doxycycline
Vitamin D3	Spirochetes killing additive effect
Vitamin C	Spirochetes killing additive effect
Vitamin B-complex	Spirochetes killing additive effect
10-Hydroxy-Cis-2-decenoic acid	No Interaction
10-Hydroxy-Undecenoic acid	No interaction
Kelp/iodine	Spirochetes killing additive effect; Rounded forms killing additive effect
Baicalin	Spirochetes killing additive effect; Rounded forms/Biofilm killing additive effect
Luteolin	Spirochetes killing additive effect; Rounded forms/Biofilm killing additive effect
Monolaurin	No interaction
Rosmarinic acid	Spirochetes killing additive effect
Bladderwrack/Fucoidan	No interaction
Grape seed	Spirochetes killing additive effect
Apricot seed	No interaction
Black Walnut green hull	Spirochetes killing additive effect; Rounded forms killing additive effect
Berberine sulfate/B. aristata	Spirochetes killing additive effect
Anise seed	No interaction



Związek	Efekt
Baicalein+Iodine	Additive effect
Baicalein+Rosmarinic acid	Additive effect
Monolaurin+Baicalein	Additive effect
Black Walnut green hull+Grape seed/Grapefruit seed	Additive effect
Berberine sulfate+Baicalein	Additive effect
Kelp/iodine+Bladderwrack/Fucoidan	Additive effect
Baicalein+Luteolin	Synergistic effect
Berberine sulfate+Luteolin	Synergistic effect
Monolaurin+Undecenoic acid	Additive effect
Rosmarinic acid+Grap seed/Grapefruit seed	Additive effect
Black Walnut green hull+Apricot seed	Synergistic affect
Black Walnut hull+RA	Additive effect
Grape/Grapefrui seed+Iodine	Additive effect
Grape seed+Grapefruit seed	Synergistic effect

Summary

Proposed formula 1 for further *in vivo* studies:

Vitamin D3

Vitamin B-complex

Vitamin C

Baicalein

10-Hydroxy-Cis-2-decenoic acid(10-HAD)

Kelp/Iodine

Monolaurin

Luteolin

Rosmarinic acid



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Summary

Proposed formula 2 for further
co-infections affiliated with LD studies:

Vitamin D3

Vitamin B-complex

Vitamin C

Bladderwrack/Fucoidan

10-Hydroxy-Undecenoic acid

Apricot seeds

Anise seed/*Pimpinella anisum*

Black Walnut green hull/*Juglans nigra*

Berberine sulfate/*Berberis aristata*

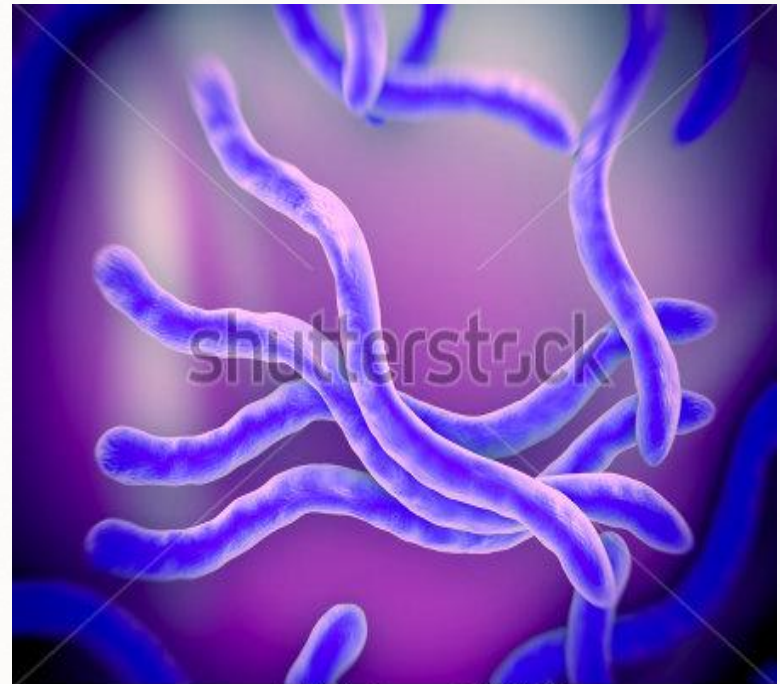
Grape seed extract



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Further Plans

- 1) To test the selected formula 1 on Lyme disease model *in vivo*
- 2) To determine whereas it expresses toxic effects
- 3) To test the selected formula 2 on Lyme disease affiliated co-infections



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Thank you

Lyme Research Laboratory



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