Borrelien – Populations – Dynamik

Bakterielle Populations – Dynamik umschreibt bakterielle Resistenzmechanismen – wie sich Bakterien (hier Borrelien) dem wirtseigenen Immunsystem entziehen können.

Pleomorphie oder Pleiomorphie heißt die **Vielgestaltigkeit** von Mikroorganismen oder von Zellen der mehrzelligen Organismen. Pleomorphie ist von der Theorie des Pleomorphismus zu unterscheiden.

Synonyme und Beispiele zu **Pleomorphie: Bakterielle Stress-Varianten**, L-Formen, Round forms, Round bodies, Cyst forms, Blebs, Granules, Cell wall deficient forms, Cell wall defective forms, 'dormant' Borrelia stages, round-body propagules (RBs), Borrelien-Metamorphosen etc..

Bacterial Populations - Dynamics describes bacterial resistance mechanisms - such as bacteria (Borrelia here) can evade the host's own immune system itself.

Pleomorphie or Pleiomorphie is the **diversity** of microorganisms or cells of multicellular organisms. Pleomorphie is to be distinguished from the theory of pleomorphism.

Synonyms and examples of pleomorphie: **Bacterial stress variants**, L-shapes, round forms, round bodies, cyst forms, blebs, Granules, Cell wall deficient forms, Cell wall defective forms, 'dormant' Borrelia stages, round-body propagules (RBs), Borrelia metamorphoses etc..

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"Many antimicrobial agents (antibiotics, antivirals, antifungals, anthelmintics or antiparasitics) used for treating other infections were found to have better activity than the current Lyme antibiotics. These include antibacterials such as rifamycins (3-formal-rifamycin, rifaximin, rifamycin SV), thiostrepton, quinolone drugs (sarafloxacin, clinafloxacin, tosufloxacin), and cell wall inhibitors carbenicillin, tazobactam, aztreonam; antifungal agents such as fluconazole, mepartricin, bifonazole, climbazole, oxiconazole, nystatin; antiviral agents zanamivir, nevirapine, tilorone; antimalarial agents artemisinin, methylene blue, and quidaldine blue; antihelmintic and antiparasitic agents toltrazuril, tartar emetic, potassium antimonyl tartrate trihydrate, oxantel, closantel, hycanthone, pyrimethamine, and tetramisole. Interestingly, drugs used for treating other non-infectious conditions including verteporfin, oltipraz, pyroglutamic acid, pidolic acid, and dextrorphan tartrate, that act on ESS the glutathione/γ-glutamyl pathway involved in protection against free radical damage, and also the antidepressant drug indatraline, were found to have high activity against stationary phase *B. burgdorferi.* Among the active hits, agents that affect cell membranes, energy production, and reactive oxygen species production are more active against the *B. burgdorferi* persisters than the commonly used antibiotics that inhibit macromolecule biosynthesis".

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« However, the round bodies displayed lower metabolic activity compared to spirochetes. Furthermore, our results indicated that the different pleomorphic variants were distinguishable by having unique biochemical signatures. Consequently, pleomorphic B. burgdorferi should be taken into consideration as being clinically relevant and influence the development of novel diagnostics and treatment protocols. »

Sharma B, Brown AV, Matluck NE, Hu LT, Lewis K (2015) **Borrelia burgdorferi, the causative agent of Lyme disease, forms drug-tolerant persister cells.** Antimicrob Agents Chemother. pii: AAC.00864-15. http://www.ncbi.nlm.nih.gov/pubmed/26014929#
„After addition of ceftriaxone, the antibiotic was washed away, surviving persisters were allowed to resuscitate, and antibiotic was added again. Four pulse-doses of ceftriaxone killed persisters, eradicating all live bacteria in the culture".

Feng J, Shi W, Zhang Sh, Zhang Y (2015) **Persister mechanisms in *Borrelia burgdorferi*: implications for improved intervention.** Emerg Microbes Infect. 4(8), e51. Published online 2015 Aug 19. doi: 10.1038/emi.2015.51 PMCID: PMC4576169 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4576169/

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«Here, we demonstrated that round bodies were processed differently in differentiated macrophages, consequently inducing distinct immune responses compared to spirochetes in vitro. Colocalization analysis indicated that the F-actin participates in internalization of both forms. However, round bodies end up less in macrophage lysosomes than spirochetes suggesting that there are differences in processing of these forms in phagocytic cells. Furthermore, round bodies stimulated distinct cytokine and chemokine production in these cells. We confirmed that spirochetes and round bodies present different protein profiles and antigenicity. In a Western blot analysis Lyme disease patients had more intense responses to round bodies when compared to spirochetes. These results suggest that round bodies have a role in Lyme disease pathogenesis. «

Jie Feng, Wanliang Shi, Shuo Zhang et al. (2016) **A Drug Combination Screen Identifies Drugs Active against Amoxicillin-Induced Round Bodies of In Vitro Borrelia burgdorferi Persisters from an FDA Drug Library.** Front. Microbiol, http://dx.doi.org/10.3389/fmicb.2016.00743 http://journal.frontiersin.org/article/10.3389/fmicb.2016.00743/full
"Drug candidates that are preferentially active against the round bodies include artemisinin, ciprofloxacin, nifuroxime, fosfomycin, chlortetracycline, and some sulfa drugs. We found that triple drug combinations artemisinin/cefoperazone/doxycycline, daptomycin/sulfachlorpyridazine/doxycycline and daptomycin/cefoperazone/ doxycycline had among the best activity against both the round body model and the stationary phase persister model. … stationary phase *B. burgdorferi* persisters".

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„Warum manche Patienten klassische Bakterien ausbilden und andere Patienten nur intrazellulär persistierende bakterielle Dauerformen (L-Formen, Spheroplasten) (L. Mattman 2001 s.u. S.93)“, d.h. warum Infektionskrankheiten bei einigen Patienten unauffällig verlaufen und bei anderen Patienten chronisch.

Why some patients develop classic bacteria and other patients only intracellularly persistent bacterial survival structures (L-forms, spheroplasts) (L. Mattman 2001 S.U. p.93) ", that is, why infectious diseases in some patients run unobtrusively and chronically in other patients.“

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