CYREX® Laboratories

CLINICAL SPECIFICATIONS

BACTERIAL CYTOTOXINS

Function:

Bacterial Cytotoxins refer to the cytolethal distending toxin, subunit B (CdtB) that is released by *Escherichia coli*, *Salmonella*, *Shigella* and *Campylobacter jejuni*. Utilizing subunits A and C, gram-negative bacteria can bind to human cells, allowing CdtB to infiltrate the cell. Inside the cell, CdtB contributes to cytoskeletal damage, which may induce apoptosis (cell death). CdtB is the first bacterial toxin known to act in the nucleus of a target cell.

Associated With:

Irritable bowels[1]
D-IBS[1]
SIBO[1,2]
Gut dysbiosis[1]
Chronic functional bowel changes[2]
Localized aggressive periodontitis[3]

Known Cross-Reactions: Inositol polyphosphate 5-phosphatase,[4] deoxyribonuclease-1 (DNase-1),[5] Amyloid-Beta peptide[7]

Clinical Significance:

Bacteria such as *E. coli*, *Salmonella*, *Shigella* and *C. jejuni*, are members of the bacteria that participate in diseases that involve the disruption of a mucosal or epithelial layer.[6] By producing cytotoxins, these bacteria affect the delicate environment of the small intestine, and then gain entry into the cell, where by binding to the cellular DNA, they induce apoptosis. They find their way to the submucosa, regional lymph nodes, and into circulation where the immune system responds by producing antibodies against them. Indeed, *in vitro* studies have shown that human epithelial cells are native targets of the CdtB expressed by these bacteria.[reviewed in 5] Cell infiltration by CdtB induces DNA damage which signals growth arrest at the G_2/M (state of cell growth and division) interphase of the cell cycle.[4] The epithelium is an early line of defense in the oral cavity and the gastrointestinal system against microbial assault. When damaged, bacteria collectively gain entry into the underlying connective tissue where microbial products can affect processes and pathways culminating in the destruction of the epithelial barrier and the underlying tissue. Antibodies against Bacterial Cytotoxins indicate gut dysbiosis with the potential for causing intestinal barrier damage.

This array tests for IgG, IgA and IgM separately. Equivocal or out-of-range results indicate heightened antibody reactivity to the tested antigen. We tested 120 blood donor sera against Bacterial Cytotoxins at optimal dilution, 12% of these donors were IgG reactive; 13% of these donors were IgM reactive; 16% of these donors were IgA reactive.

References:

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3. Xynogala et al. Evaluation of the humoral immune response to the cytolethal distending toxin of *Aggregatibacter Actinomycetemcomitans* Y4 in subjects with localized aggressive periodontitis. Mol Oral Microbiol, 2009; 24(2):116-123.
4. Shenker et al. A novel mode of action for a microbial-derived immunotoxin: the cytolethal distending toxin subunit B exhibits phosphatidylinositol 3,4,5-triphosphate phosphatase activity. J. Immunol, 2007; 178:5099–5108.
5. Guerra et al. The biology of the cytolethal distending toxins. Toxins, 2011; 3:172-190.
6. DiRienzo. Breaking the gingival epithelial barrier: role of the *Aggregatibacter actinomycetemcomitans* cytolethal distending toxin in oral infectious disease. Cells, 2014; 3(2):476-499.
7. Vojdani et al. Reaction of amyloid-ß peptide antibody with different infectious agents involved in Alzheimer's disease. J Alzheimer's Dis, 2018; 63:847-860.