

Interplay between Diabetes and Infection

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Diabetics are prone to infection  *Infection creates imbalance in diabetics*

Sources:

- *Diabetes Mellitus*. Powers AC. Harrison's Principles of Internal Medicine, 17th ed. 2008
- *Infection and Diabetes*. Boyko EJ, Lipsky BA. Diabetes In America, 2nd ed. National Institute of Diabetes and Digestive and Kidney Diseases 1995
- *Management of Inpatient Hyperglycemia in Noncritically Ill Patients*. Lansang MC, Umierrez GE. Diabetes Spectrum, Vol 21, 2008

Diabetics Experience Greater Frequency and Severity of Infection

Common infections:

- Pneumonia: increase in *S. aureus*, *M. tuberculosis*
- Urinary Tract Infections:
 - *E. coli*, *Candida*.
 - Complications: pyelonephritis, cystitis
- Skin and soft tissue:
 - Increased colonization of *S. aureus* in skin folds
 - Protracted wound healing and skin ulcerations
- Greater risk of postoperative wounds infections

Rare infections:

- Rhinocerebral mucormycosis
- Emphysematous infections of the gallbladder and urinary tract
- Malignant otitis externa: usually *P. aeruginosa*
 - May progress to osteomyelitis and meningitis

Why are diabetics prone to infection?

Immune system defects

- Rat models: Hyperglycemia causes abnormalities in cell-mediated immunity
- Polymorphonuclear leukocytes (PMN) dysfunction:
 - Impaired migration, phagocytosis, intracellular killing, chemotaxis
 - May be due to decreased PMN membrane fluidity

Other considerations

- Diminished vascularization:
 - May lead to macrovascular disease and microvascular dysfunction
- Compromised local circulation:
 - delayed response to infection and impaired wound healing
- Incomplete bladder emptying: urinary colonization by microorganisms
- Hyperglycemia: aids pathogen colonization (e.g. *Candida*); induces pro-inflammatory transcription factors (e.g. NFkB); increases reactive oxygen species (e.g. oxidase)
- Hyperglucosuria: promotes growth of certain microorganisms

Infections Cause Imbalance in Diabetic Control

Illness alters eating habits and impairs insulin absorption.

Infection raises level of:

- Counterregulatory hormones: cortisol, growth hormone, catecholamines, glucagon
- Cytokines: e.g. Tumor Necrosis Factor implicated in insulin resistance in chronic infection

Result:

- Counterregulatory hormones: increased glucose production
- Transient insulin resistance and hyperglycemia
- Impaired glucose utilization
- Poor glycemic control

Tx of diabetics during infection:

- Monitor plasma glucose vigilantly
- Insulin requirements change rapidly: adjust treatment accordingly
- Type II DM:
 - Oral glucose-lowering agents not useful
 - Replaced direct insulin

*תודה רבה!
שבוע טוב*



Thanks and have a great week!