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# Digoxin Poisoning Management

**Introduction**

* Digoxin is a cardioactive glycoside indicated for atrial flutter, atrial fibrillation, and heart failure
* Acts as a sodium/potassium pump inhibitor for cardiac myocytes 🡪 toxicity arises with too much intracellular Na+ inhibiting the sodium/calcium pump from working properly (increasing intracellular calcium)
  + Increased inotropy within the cardiac myocytes 🡪 dysrhythmias
* EKG abnormalities: premature ventricular contractions, biphasic T wave, shortened QT interval, AV block
* Digoxin therapeutic levels range from 0.8-2.0 ng/ml (toxicity can begin >2 ng/ml)

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| Pharmacology | |
|  | **Digoxin Immune Fab**  **(DigiFab or DigiBind)** |
| **Dose** | * 1 vial = 40mg (binds to 0.5mg of digoxin) * **Unknown toxicity level: Initial 🡪 10vials** * Vials = Total body load (mg) x 2 * For chronic ingestion of unknown amount   + 3-6 vials can be given for adults   + 1-2 vials can be given for children |
| **Administration** | * IV infusion over 30 minutes * If cardiac arrest is imminent a bolus injection can be given |
| **PK/PD** | * **Onset: 20-90 minutes** * Duration of action: 15 – 20 hrs |
| **Adverse Effects** | * Orthostatic hypotension, ventricular tachycardia, worsening heat failure, hypokalemia |
| **Mechanism of Action** | * Immune antigen-binding fragments that rapidly bind with digoxin to decrease free digoxin levels within the body |
| **Compatibility** | * 0.9% NS Only |
| **Comments** | * Monitor **K+** closely as it shifts intracellularly potentially causing hypokalemia. * **Total concentration of digoxin may be falsely elevated after administration due to ↑ in free drug & bounded drug.** * Free digoxin concentrations are more clinically useful |

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| Overview of Evidence | | | |
| Author, year | **Design/ sample size** | **Intervention & Comparison** | **Outcome** |
| Wei et al., 2021 | Case reports (n=121) | **DigiBind** vs **DigiFab** adverse events reported to FAERS from 1986-2019 | * **87.2% of DigiBind** reports were serious AEs vs. **62.8% of DigiFab** * Hypotension, cardiac arrest, and death were among the most serious AEs |
| Ward et al,  2000 | Observational (n=16) | **DigiBind** vs **DigiFab in healthy volunteers** | * Both Fab products reduced free digoxin serum concentrations to **below assay detection** * Total digoxin serum concentrations increased approximately 10-fold (indicated fab product binding digoxin) |
| Renard et al., 1997 | Observational (n=16) | Influence of **age & renal dysfunction** on digoxin-specific Fab pharmacokinetics  •Doses 80-800mg infused over 0.25-2hr  •Patients aged 35-90 with CrCl 10.6-122.1 ml/min | * **Linear decrease** of total body clearance is linked to renal function and age, but not Vd * Plasma half-lives ranged from **11-34.5hrs** * All patients recovered and no adverse effects were reported |
| Antman et al., 1990 | Open-label trial  (n=150) | Digoxin-specific Fab fragment dosed based on total ingested amount (mg) or digoxin serum concentration (ng/ml) | * **90%** of patient toxicity resolved or improved with **10%** showing no response * Median dose ~ 200mg (5 vials) * Highest dose ~ 1600mg (40 vials) |

**Conclusions**

* Digoxin toxicity is a serious & life-threatening condition if not appropriately reversed by an available antidote
* At least 10 vials of digoxin Immune Fab to treat digoxin toxicity levels within the body
* Age and renal function are proven not to be factors prohibiting digoxin toxicity treatment

**References**

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