

# 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
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| **Administration** | * IV infusion over 30 minutes
* If cardiac arrest is imminent a bolus injection can be given
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| **PK/PD** | * **Onset: 20-90 minutes**
* Duration of action: 15 – 20 hrs
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| **Adverse Effects** | * Orthostatic hypotension, ventricular tachycardia, worsening heat failure, hypokalemia
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| **Mechanism of Action** | * Immune antigen-binding fragments that rapidly bind with digoxin to decrease free digoxin levels within the body
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| **Compatibility** | * 0.9% NS Only
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| **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
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| 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)
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| 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
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| 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)
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**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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