

Acute Organ Transplant Rejection

Recognizing, Treating & Managing the Body's Immune Attack

‡ IMMUNOLOGY • POST-OP CARE • NGN NCLEX 2026

1 Definition & Overview

Transplant Rejection = The recipient's immune system identifies the donor organ as foreign (non-self) and mounts an immune response to destroy it.

Why it matters: Rejection is the **#1 cause of graft failure**. Early recognition and intervention can **reverse acute rejection** and preserve the transplanted organ. Missed signs = organ loss + return to transplant waiting list.

Key principle: The closer the HLA (Human Leukocyte Antigen) match between donor and recipient, the lower the rejection risk. Identical twins = best match. All other transplants require **lifelong immunosuppression**.

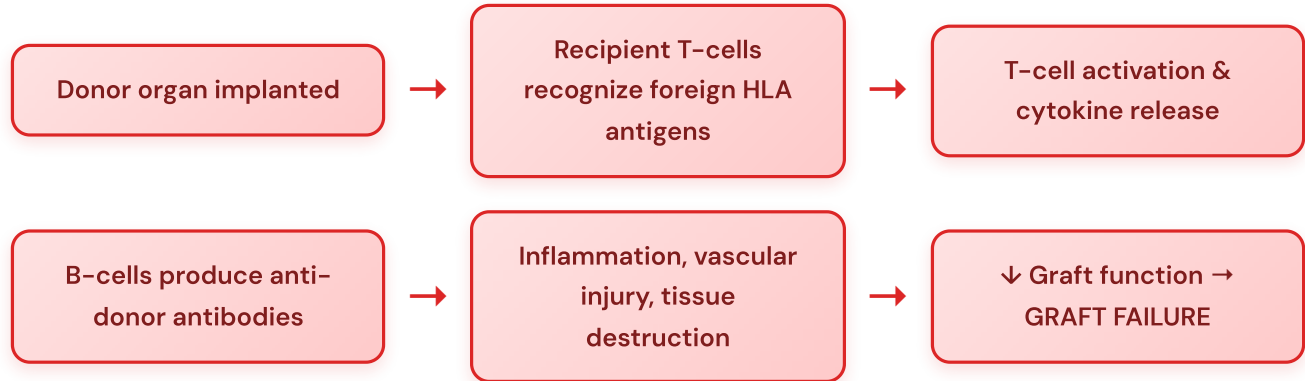


Immune cells recognize donor HLA antigens as non-self

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Pathophysiology

The Immune Cascade of Rejection:



Two arms of rejection:

- **Cellular (T-cell mediated):** Most common in acute rejection — lymphocytes infiltrate the graft
- **Humoral (Antibody-mediated):** Preformed or new antibodies attack graft endothelium — more severe, harder to treat

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Three Types of Rejection

MINUTES–HOURS

Hyperacute

- ▶ **Cause:** Preformed antibodies (ABO/HLA)
- ▶ **Onset:** Within 24 hrs of transplant
- ▶ **Outcome:** Irreversible — graft must be removed
- ▶ **Prevention:** Crossmatching & ABO typing before surgery

DAYS–6 MONTHS

Acute ★ FOCUS

- ▶ **Cause:** T-cell mediated (cellular) most common
- ▶ **Onset:** Most common in first 3 months
- ▶ **Outcome:** Often **REVERSIBLE** with treatment
- ▶ **Treatment:** Pulse steroids, ↑ immunosuppression

MONTHS–YEARS

Chronic

- ▶ **Cause:** Mixed immune + non-immune injury
- ▶ **Onset:** Gradual, after 6 months
- ▶ **Outcome:** Irreversible — slow loss of function
- ▶ **Treatment:** Supportive only; eventual re-transplant

📌 **NCLEX PEARL:** Acute rejection is the **only type that can typically be reversed**. Recognize it FAST → treat aggressively → save the graft.

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Acute Rejection by Organ: S/S

 **Universal early signs (ALL organs):** Fever > 100°F, fatigue, malaise, tenderness over graft site, flu-like symptoms, ↓ organ function on labs.



Kidney

KEY FINDINGS

- ↓ Urine output (oliguria)
- ↑ Serum creatinine & BUN
- Weight gain, edema
- Hypertension
- Proteinuria, hematuria
- Tenderness/pain over graft site

 **RED FLAG:** Sudden ↓ in urine output + ↑ creatinine = rejection until proven otherwise



Liver

KEY FINDINGS

- ↑ AST, ALT, alkaline phosphatase
- ↑ Bilirubin → jaundice
- RUQ pain, hepatomegaly
- Clay-colored stools, dark urine
- ↑ PT/INR (clotting impaired)
- Pruritus, fatigue

 **RED FLAG:** Rising LFTs + jaundice = biopsy to confirm rejection



Heart

KEY FINDINGS

- Fatigue, exercise intolerance
- Dysrhythmias (esp. atrial)
- Hypotension, ↓ ejection fraction
- S3 gallop, JVD, peripheral edema
- Dyspnea, cough, weight gain
- Often **asymptomatic early**

 **RED FLAG:** Endomyocardial biopsy is **GOLD STANDARD** for diagnosis



Lung

KEY FINDINGS

- Dyspnea, ↓ exercise tolerance
- Dry cough, low-grade fever
- ↓ SpO₂, ↓ FEV1 on spirometry
- Infiltrates on chest x-ray
- Crackles on auscultation
- Pleural effusion

 **RED FLAG:** 10% drop in FEV1 from baseline = highly suspicious for rejection



Pancreas



Cornea

KEY FINDINGS

- Hyperglycemia (return of diabetes)
- ↑ Amylase & lipase
- Abdominal pain, tenderness
- Fever
- ↓ C-peptide levels

🚩 RED FLAG: Unexpected rise in BG in pancreas transplant pt = suspect rejection

KEY FINDINGS

- Eye redness, pain
- Photophobia
- Decreased visual acuity
- Cloudy vision
- Tearing, irritation

🚩 RED FLAG: New eye symptoms post-transplant = ophthalmology STAT

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Priority Nursing Interventions (ABCs)

 **If rejection suspected:** NOTIFY HCP IMMEDIATELY → prepare for diagnostic biopsy → anticipate IV pulse corticosteroids → continue all immunosuppressants → strict I&O + daily weights → infection prevention

AIRWAY (Lung/Heart Transplant)

- ✓ Monitor SpO₂ continuously
- ✓ Auscultate lung sounds q4h
- ✓ Trend daily spirometry (FEV1)
- ✓ Pulmonary toileting (IS, cough/DB)
- ✓ Position semi-Fowler's for ease of breathing

BREATHING / CIRCULATION

- ✓ VS q4h; report fever > 100°F
- ✓ Telemetry for cardiac transplant
- ✓ Daily weights (same time, same scale)
- ✓ Assess for edema, JVD, crackles
- ✓ Monitor BP — HTN common with rejection & meds

ASSESSMENT / MONITORING

- ✓ Strict I&O q1–4h
- ✓ Assess graft site for pain/tenderness
- ✓ Monitor labs: CBC, BMP, LFTs, organ-specific
- ✓ Trough levels of immunosuppressants
- ✓ Daily temperature checks (often self-reported)

MEDICATION MANAGEMENT

- ✓ Administer immunosuppressants ON TIME — never skip
- ✓ Give pulse steroids (methylprednisolone) as ordered
- ✓ Premedicate before antibody therapy (ATG) — acetaminophen/diphenhydramine
- ✓ Monitor drug trough levels (tacrolimus, cyclosporine)
- ✓ NEVER give live vaccines

INFECTION PREVENTION (CRITICAL)

- ✓ Strict hand hygiene
- ✓ Protective (reverse) isolation if severely immunosuppressed
- ✓ Limit visitors — no sick contacts
- ✓ Avoid fresh flowers/raw fruits & vegetables
- ✓ Aseptic technique for ALL invasive procedures

PSYCHOSOCIAL SUPPORT

- ✓ Address rejection-related anxiety
- ✓ Reinforce that acute rejection is often reversible
- ✓ Encourage support groups, transplant social worker
- ✓ Assess medication adherence — #1 modifiable risk factor
- ✓ Coordinate with transplant coordinator

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Immunosuppressant Pharmacology

Immunosuppression is **LIFELONG**. Most patients are on triple therapy: **calcineurin inhibitor + antiproliferative + corticosteroid**.

Drug / Class	Mechanism	Key Adverse Effects	Nursing Considerations
Cyclosporine <i>Calcineurin Inhibitor</i>	Blocks T-cell activation by inhibiting IL-2	Nephrotoxicity, HTN, hirsutism, gingival hyperplasia, tremors	Monitor trough levels; avoid grapefruit juice; check renal function
Tacrolimus (Prograf) <i>Calcineurin Inhibitor</i>	Same as cyclosporine, more potent	Nephrotoxicity, neurotoxicity, hyperglycemia (new-onset DM), tremors	Trough levels; monitor BG & renal function; avoid grapefruit
Mycophenolate (CellCept) <i>Antiproliferative</i>	Inhibits B & T cell proliferation	GI upset (N/V/D), bone marrow suppression, ↑ infection risk	Monitor CBC; teach pregnancy avoidance (TERATOGENIC)
Azathioprine (Imuran) <i>Antiproliferative</i>	Inhibits DNA synthesis	Bone marrow suppression, hepatotoxicity, ↑ malignancy risk	Monitor CBC, LFTs; avoid live vaccines
Prednisone / Methylprednisolone <i>Corticosteroid</i>	Broad anti-inflammatory; suppresses cytokines	Hyperglycemia, HTN, osteoporosis, mood changes, weight gain, Cushingoid features, ↑ infection	NEVER stop abruptly — taper; give with food; monitor BG
Sirolimus (Rapamune) <i>mTOR Inhibitor</i>	Inhibits T-cell response to IL-2	Hyperlipidemia, thrombocytopenia, poor wound healing	Monitor lipids, platelets; delay surgery if possible
Basiliximab (Simulect) <i>Monoclonal Antibody</i>	Blocks IL-2 receptor on T-cells (induction therapy)	Generally well-tolerated; hypersensitivity, ↑ infection	Given IV at time of transplant + day 4 post-op
ATG / Thymoglobulin <i>Polyclonal Antibody</i>	Depletes T-cells; used for severe acute rejection	Cytokine release syndrome (fever, chills, hypotension), serum sickness	PREMEDICATE: acetaminophen, diphenhydramine, steroids; infuse slowly

💡 **Universal class effect:** ALL immunosuppressants ↑ infection risk + ↑ malignancy risk (especially skin cancer & lymphoma). Patients need lifelong sun protection & cancer surveillance.

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NCLEX Test Traps

✗ WRONG MINDSET

"Fever post-transplant is just a viral illness — give Tylenol and reassess in 4 hours."

✓ CORRECT THINKING

Fever in a transplant patient is **REJECTION OR INFECTION until proven otherwise** — notify HCP, draw labs/cultures, do NOT delay.

✗ WRONG MINDSET

"The patient feels nauseous from their tacrolimus — hold the next dose."

✓ CORRECT THINKING

Never hold immunosuppressants without an order — missing doses precipitates rejection. Notify HCP for antiemetic instead.

✗ WRONG MINDSET

"Patient is going home — let's give the flu shot & MMR booster before discharge."

✓ CORRECT THINKING

NO live vaccines (MMR, varicella, live flu mist, yellow fever) for immunosuppressed patients. Inactivated flu shot is OK.

✗ WRONG MINDSET

"The kidney transplant patient has decreased urine output — give a fluid bolus."

✓ CORRECT THINKING

Oliguria + ↑ creatinine = **SUSPECT REJECTION FIRST**. Notify HCP, prepare for biopsy. Fluid bolus without orders could worsen overload.

✗ WRONG MINDSET

"This heart transplant patient looks great — they have no chest pain so rejection is unlikely."

✓ CORRECT THINKING

Heart transplants are **denervated** — patients **cannot feel chest pain**. Rely on fatigue, dyspnea, dysrhythmias, and routine endomyocardial biopsy.

✗ WRONG MINDSET

"Patient drinks grapefruit juice for breakfast — that's healthy."

✓ CORRECT THINKING

Grapefruit inhibits CYP3A4 → ↑ **tacrolimus/cyclosporine levels** → toxicity. Teach **STRICT** avoidance of all grapefruit products.

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Patient & Family Education



Medication Adherence

Take immunosuppressants at the **same time every day**. Never miss a dose. Use phone alarms, pill organizers. Adherence = #1 modifiable factor preventing rejection.



Recognize Rejection

Report immediately: fever > 100°F, ↓ urine output, weight gain > 2 lbs/day, swelling, pain over graft, fatigue, jaundice, dyspnea — any new symptom.



Infection Prevention

Avoid crowds & sick people. Hand hygiene constantly. No raw/undercooked food. No fresh flowers or gardening (fungal risk). Wear mask in public when applicable.



Vaccines

NO live vaccines: MMR, varicella, live flu mist, yellow fever, oral polio. Inactivated vaccines (flu shot, pneumococcal) ARE recommended.



Food & Drug Interactions

AVOID grapefruit/grapefruit juice (↑ tacro/cyclosporine levels). Avoid St. John's wort, echinacea. Consult HCP before any OTC, herbal, or new med.



Sun & Skin Protection

Immunosuppression ↑ skin cancer risk dramatically. Use SPF 30+ daily, wear hats & long sleeves, avoid tanning beds. Annual dermatology screening.



Lifelong Follow-Up

Frequent labs (drug levels, organ function), regular transplant clinic visits, biopsies as scheduled. Carry a card listing transplant + meds at all times.



Healthy Lifestyle

Maintain healthy weight (steroids cause gain), control BP & BG, no smoking, limit alcohol, regular exercise, dental hygiene + visits q6 months (infection prevention).

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Memory Boosters & Mnemonics

"REJECT" — Signs of Rejection

R E J E C T

- ★ Rising labs (creatinine, LFTs, BUN)
- ★ Edema & weight gain
- ★ Jaundice / Joint or graft pain
- ★ Elevated temperature (fever > 100°F)
- ★ Change in urine output (↓ for kidney)
- ★ Tiredness / fatigue / malaise

"TIME" — Types of Rejection by Onset

T I M E

- ★ Total hours = Hyperacute (minutes to 24 hours, irreversible)
- ★ In days–months = Acute (REVERSIBLE!)
- ★ Months–years = Chronic (gradual, irreversible)
- ★ Earlier recognition = better graft survival

"GRAFT" — Patient Self-Monitoring

G R A F T

- ★ Glucose check daily (esp. pancreas/steroid pts)
- ★ Record weight daily (same scale, same time)
- ★ Avoid crowds, sick contacts, grapefruit, live vaccines
- ★ Fever > 100°F → call transplant team
- ★ Take meds on time, every time, lifelong

🎯 Quick Drug Recognition Pattern

- ★ **"-imus" ending** = mTOR or Calcineurin Inhibitor (tacrolimus, sirolimus, everolimus) → check trough levels!
- ★ **"-ximab" ending** = Monoclonal Antibody (basiliximab) → infusion reactions, premedicate
- ★ **Cyclosporine** = "Cycle of side effects" → Cushingoid, Creatinine ↑, gum hyperplasia (Chompers), Hairy (hirsutism)
- ★ **Steroids** = "Six S's": Sugar↑, Sodium↑, Salt & water retention, Skin thinning, Stomach ulcers, Sepsis risk

🏆 **NCLEX GOLDEN RULE:** When a transplant patient presents with ANY new symptom — fever, pain over graft, ↓ function, fatigue — assume rejection FIRST and notify HCP. Better to over-investigate than miss a reversible window.

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NCJMM Clinical Judgment Scenario

Clinical Scenario

Mr. Johnson, age 52, is 14 days post-op from a deceased-donor kidney transplant. He arrives for a follow-up visit reporting fatigue and ankle swelling for the past 2 days. He admits "skipping a few doses" of tacrolimus because of nausea. Today's findings:

- T: 100.4°F (38°C), HR: 96, BP: 158/94, RR: 18, SpO₂: 97%
- Weight: ↑ 4.2 lbs since last visit (3 days ago)
- 2+ pitting edema bilateral lower extremities
- Urine output reported as "less than usual" — 800 mL/24 hrs
- Tenderness on palpation over right iliac fossa (graft site)
- Labs: BUN 38 (↑), Creatinine 2.4 (↑ from baseline 1.2), tacrolimus trough subtherapeutic

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Recognize Cues

Low-grade fever, ↑ BP, weight gain, edema, ↓ urine output, tenderness over graft, ↑ BUN/Cr, subtherapeutic tacrolimus, history of missed doses.

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Analyze Cues

Cluster of findings + nonadherence to immunosuppressants + ↑ creatinine = classic acute kidney transplant rejection pattern. R/O infection (UTI, wound infection) which can mimic rejection.

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Prioritize Hypotheses

#1 Acute T-cell mediated rejection (most likely). #2 Tacrolimus toxicity (less likely with subtherapeutic level). #3 Infection. #4 Volume overload.

4

Generate Solutions

Notify transplant team STAT. Anticipate: kidney biopsy, IV pulse methylprednisolone, possible ATG if severe, antiemetic for nausea, IV fluids if needed, infection workup (CBC, blood/urine cultures).

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Take Action

Notify HCP IMMEDIATELY. Admit to transplant unit. Establish IV access. Strict I&O + daily weights. Draw labs/cultures. Hold no immunosuppressants. Prep for biopsy. Administer pulse steroids as ordered. Premedicate before any antibody therapy.

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Evaluate Outcomes

Expected: ↓ Creatinine, ↑ urine output, ↓ edema, resolution of fever within 48–72 hrs after pulse steroids. Therapeutic tacrolimus level achieved. Education reinforced re: adherence. If no improvement → escalate to antibody therapy.



Key NGN Judgment: The single most modifiable cause of acute rejection is **medication nonadherence**. Always assess WHY a patient missed doses (cost, side effects, forgetfulness) — addressing the root cause prevents future rejection episodes.

Diane's NGN NCLEX 2026 Study Series

Acute Organ Transplant Rejection • Immunology / Post-Op Care

✨ Recognize Early • Treat Aggressively • Save the Graft ✨