Practical Aspects of Starting an LDL Apheresis Unit

Linda Cashin Hemphill, MD
Massachusetts General Hospital
Institute for Heart, Vascular and Stroke Care
Disclosures

Nothing to Disclose
Presentation Outline

- Determination of need
- Procedure: Efficacy/Adverse reactions
- Indications
- Clinic setting and requirements
- Financial aspects
Determination of Need

- Complex algorithm
- Practical advice
Prevalence of Apheresis Eligible Patients: Assumptions
Vishwanath J Clin Lipidol. 2014;8:18-28

- Distribution of untreated LDL derived from baseline data of statin trials in FH patients
- Distribution of maximally treated LDL derived from those same statin trials
- Prevalence of CHD in FH derived from registry data (Dutch, English, Spanish and Italian)=30%
- Did not consider statin intolerance
Prevalence of Apheresis Eligible Patients
Vishwanath J Clin Lipidol. 2014;8:18-28

Pretreatment LDL-C levels in maximally treated FH (317 ± 93)

LDL-C Post MAX LLT treatment ~135.3 ± 46.4 (% CVD history in max treated FH patients is ~30%)

LDL-C >200 mg/dL with CVD ~2.4 of all FH patients on MAX LLT

LDL-C >300 mg/dL <0.02% of all FH patients on MAX LLT

The prevalence of severe (apheresis eligible patients) FH is ~1/20,000 and may range from 1/11,700 to 1/62,500

Prevalence of Apheresis Eligible Patients: Alternative Assumptions

- Distribution of untreated LDL derived from FH patients in 2 major S.Africa lipid clinics
- Assumed LDL reduction with maximal statin of 50%
- Prevalence of CHD in FH derived from registry data (Dutch, English, Spanish and Italian)=30%
- Assumed 5% statin intolerance
Distribution of Untreated LDL-C in a Capetown FH Population

Blom S Afr Fam Pract 2011;53:11-18
For Every 1 Million Population:

- One Homozygote = 1 eligible
- 2,000 Heterozygotes: 100 statin intolerant, 28% LDL over 300mg/dL = 28 eligible; of the 72 remaining statin intolerant, 30% CHD = 22 eligible
- 1,900 statin tolerant Heterozygotes: 6% have LDL over 400mg/dL (114 patients) of whom 30% CHD = 34 eligible
Expected (Greater Boston=4.6 million)

- 37/million.....170 apheresis eligible
- 50/million.....230 apheresis eligible
- 85/million.....391 apheresis eligible
Actual

- Total=13
- 2 not FH (sitosteroolemia/elevated Lp(a)
- 1 HoFH
- 7 HeFH and CHD (4 statin intolerant)
- 3 HeFH no CHD (all statin intolerant)
Practical Advice

Don’t start a program if you are within 1-2 hour drive from an existing program
LDL Apheresis

- Selective removal of LDL, VLDL, Lp(a) (Acutely lowered 60-75%)
- Little or no effect on other plasma components (albumin, IgG, HDL)
- LDL returns to baseline in ~2 weeks
LDL Levels in Apheresis

LDL-C

Time

Diet Therapy

Diet & Drug Therapy

LDL Apheresis Treatments

Pre

Time Average

Post

Time
LDL Apheresis

- Approved by FDA in 1997
- Two technologies: Heparin precipitation (Braun/HELP) or Dextran sulfate adsorption (Kaneka/Liposorber)
- Which system? One each!
LDL Apheresis

- Access: withdrawal and return
- 300-500 cc extracorporealized
- 75-85cc/min native vein; 85-95cc/min fistula
- Disposables: tubing, cell separator, adsorption column or precipitation filter for removal of apoB lipoproteins
Clinical Benefit

- No rigorous, randomized, controlled clinical trials
- Multiple prospective observational studies demonstrating reduction in incident events
LDL Indications for Apheresis Treatment

*After diet and maximum tolerated drug therapy X 6 mos.*

- **CAD:** LDL > 200
- **NO CAD:** LDL > 300

Criteria set by MEDICARE late 1990s.
Indications for Apheresis Treatment

- Not approved for Lp(a) in US
- Tufts Health Plan in Boston: CAD: LDL>160
- “Treating physician discretion”
Treatment Frequency/Volume/Time

- Homozygotes - weekly
- Heterozygotes - every other week
- Kaneka: 1.5 plasma volumes; Braun: 3,000cc
- Kaneka: 3 hours; Braun: 1 ½ - 2 hours
Adverse Reactions

- Hypotension: 0.8% treatments
- Nausea/vomiting: 0.5% treatments
- Flushing/blotching: 0.4% treatments

Patients can NOT be on ACE inhibitor with the Kaneka system
Access

- Peripheral venous access: 17 gauge fistula needle for withdrawal; 18 gauge angiocath I.V. for return
- AV fistula: 17 gauge fistula needle for both withdrawal and return
Anticoagulation

- Both systems employ heparin anticoagulation
- Activated clotting time is checked pre-treatment, mid-treatment and post-treatment (need Hemochron machine)
Possible Clinic Setting

- Apheresis Unit
- Dialysis Unit
- Blood Bank
- Dedicated Unit: Cardiology Dept/Private MD Office
Patient Population

- Adult vs Pediatric: Keep them separate
Clinic Setting Requirements

- 10X10 foot space per patient
- Apheresis chair or hospital bed
- Biohazard waste receptacle
- 120 V outlet
- Storage space for disposable supplies
- Sink and phone
Clinic Setting Requirements

- Hemochron (measure ACT)
- “Crash Cart”
- Wide screen TV and DVD player
Apheresis Nurse

- I.V. Nurse background NOT dialysis
- ACLS certified
- Personality!
Financial Considerations

- Training provided free of charge
- Machines are “leased” free of charge
- Technical support free of charge
- Disposables ~$1,500/treatment
- Insurance reimbursement
Practical Consideration: The Elephant in the Room

- PCSK9 Inhibitors- very effective (50% reduction in LDL without the “see-saw”) and very well tolerated.
- Kaneka: Other indications
“Take Home Message”: Is it worthwhile to set up an LDL apheresis unit in the present environment?

YES