

Tumescent Local Anesthesia: DermaSurgery Applications

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**DISCLOSURE OF
CONFLICTS OF INTEREST**

HKSurigical.Com (Klein Pump)

Liposuction.Com

Liposuction101.Com

Tumescent Local Anesthesia (TLA)

**Definition: (Relatively) Large Volumes
of Very Dilute Solutions of**

- **Lidocaine (0.5 gm to 1 gm/Liter)**
- **Epinephrine (0.5 mg to 1 mg/Liter)**
- **Na Bicarb with 10 meq /Liter**

Commercial LA

vs

Tumescent LA

Commercial LA

- Lidocaine: 1% = 10 gm/L
- Epinephrine (1:100,000) = 10 mg/L
- Na Bicard = None
- pH = 4 to 5

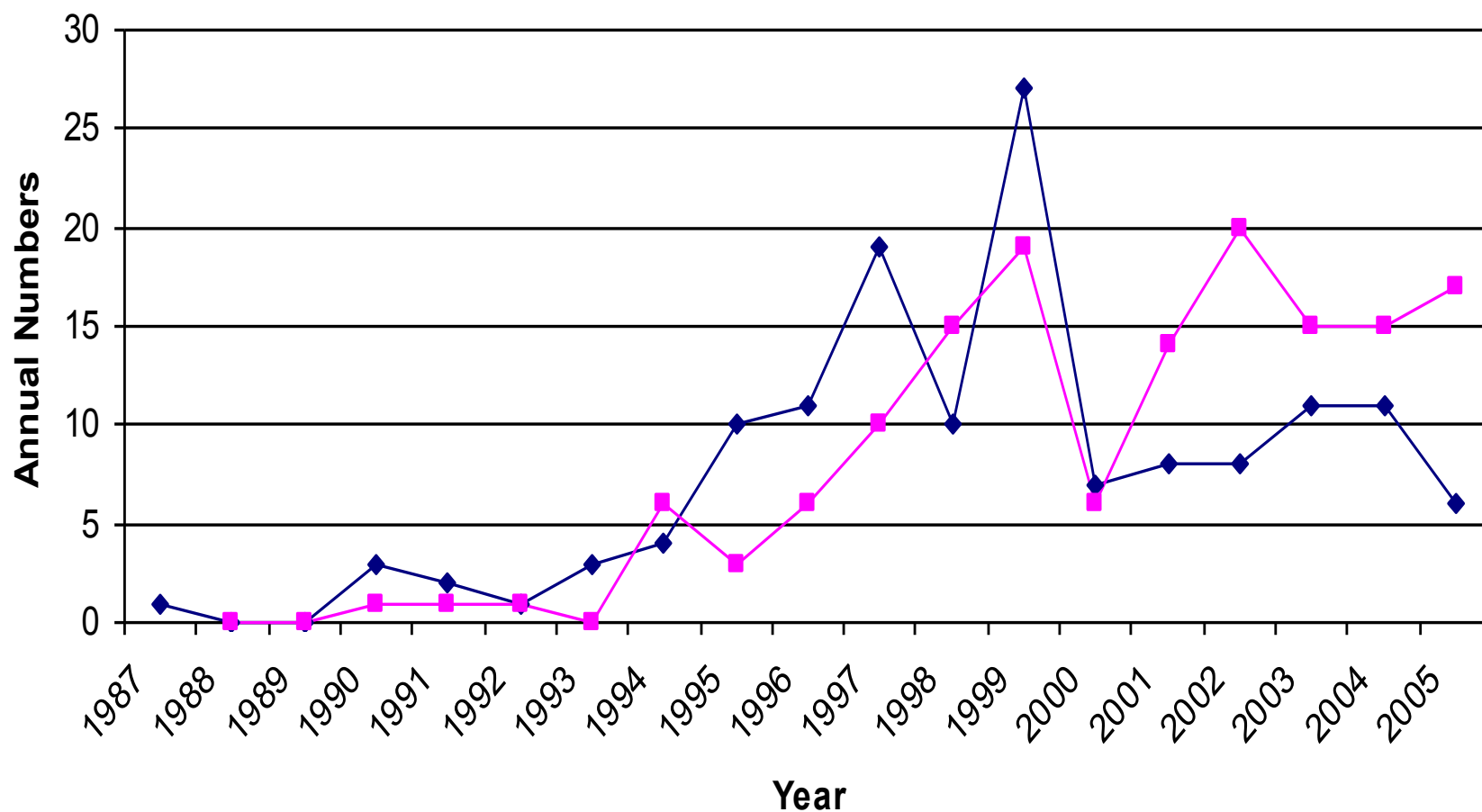
Tumescent LA

- Lidocaine $\leq 0.1\%$ = 1 gm/L
- Epinephrine $\leq$ (1:1,000,000) = 1 mg/L
- Na Bicarb = 10 meq/L
- pH = Approx 7

Tumescent Local Anesthesia Publications Listed in NLM PubMed 1990-2005

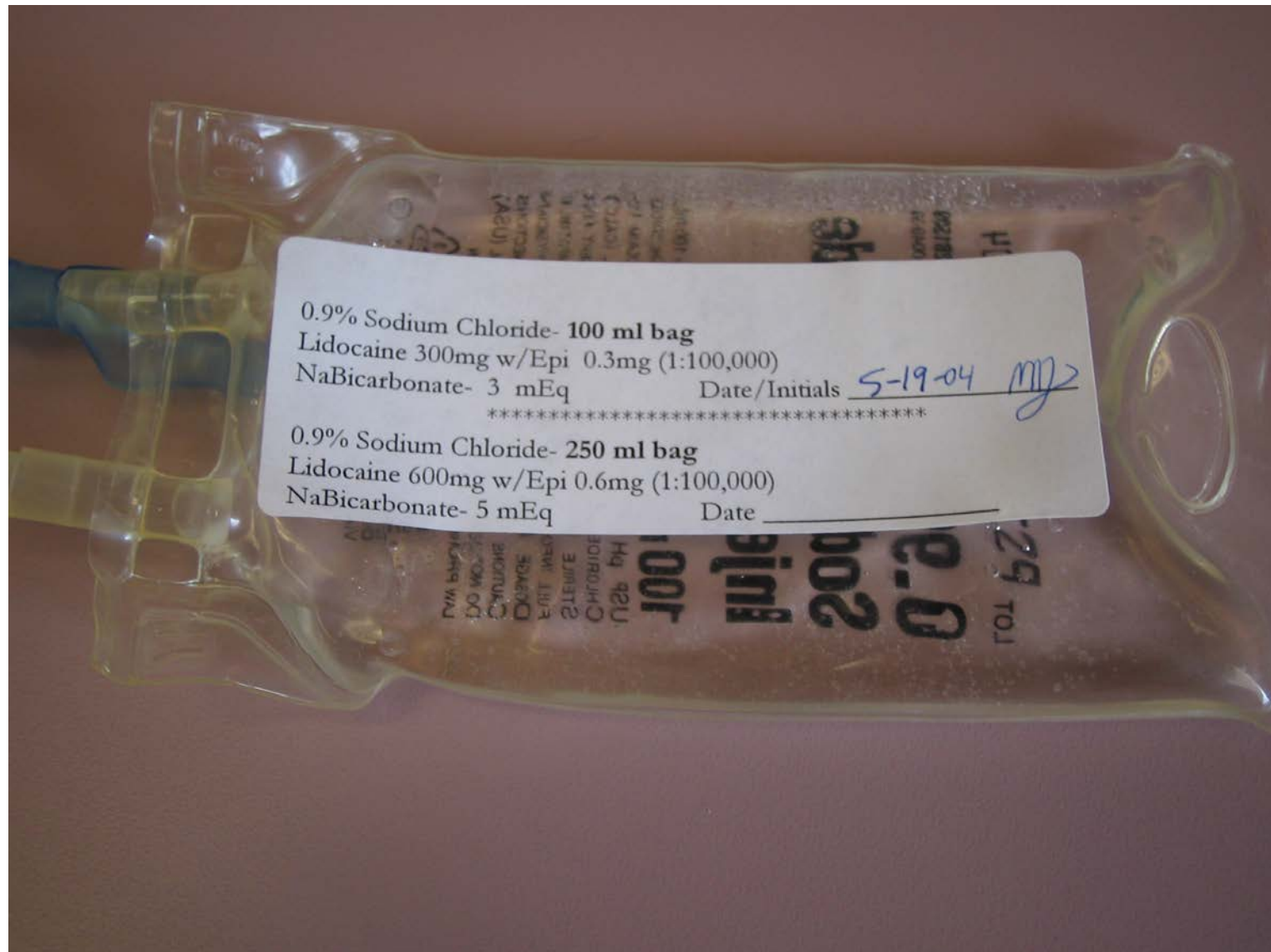
- 141 Liposuction Articles**
- 149 Other Procedures**

Annual TLA Publications 1987-2005



—◆— Liposuction —■— Other Procedures

TLA-100 & TLA-250



TLA In Dermasurgery

- **Excision of Cutaneous & SubQ Lesions (Lipoma, Cyst, Melanoma, SCC/BCC, etc)**
- **Liposuction**
- **Fat Transfer**
- **Dermabrasion**
- **Hair Transplant**
- **Axillary Hyperhidrosis**
- **Laser Resurfacing**
- **Mohs**
- **Flaps & Grafts**
- **Gynecomastia**
- **Ambulatory Phlebectomy**
- **Saphenous Vein Closure**
(Laser or Radio Frequency Cautery)

Tumescent Local Anesthesia in Non-Dermasurgery

- **Abdominoplasty**
- **Breast Surgery**
Biopsy, Mastectomy, Augmentation
- **Burn Surgery**
Debridement, Large Skin Grafts
- **Facelift**
- **Craniofacial Surgery**
- **Sentinel Lymph Node Biopsy**
- **Stem Cell Harvesting**
- **Pressure Ulcer Closure**
- **Proctology**
- **Inguinal Hernioraphy**
- **Large cutaneous resections**
Massive Neuromas,
Post-Massive Weight Loss

TRAM Flap Breast Reconstruction: Tumescent Technique Reduces Blood Loss and Transfusion Requirement

Plast Reconstr Surg. 2004 113:1645-9.

- **Donor-site infiltration before incision significantly reduced the transfusion requirement in TRAM Flap Breast Reconstruction**
- **No Adverse Effects on Breast Mound or Abdominal Donor-Site Complication Rates**

Total mastectomy under local anesthesia: the tumescent technique.

Carlson GW. Breast J. 2005 11:100-2.

- Breast CA in Older: Treated Less Aggressively**
- 4 Women (mean Age 72 years) All ASA Class IV**
- 3 Had Estrogen Receptor-Negative Tumors**
- Unilateral Total Mastectomy Totally by TLA**
- Mean Operative Time 35 Minutes**
- No Morbidity**
- Discharged 1 to 4 days Post-Op**
- Safe, Effective For Total Mastectomy in Patients Not Candidates for General Anesthesia**

TLA in Proctologic Surgery

Chirurg. 2003 74:839-43

- **50 proctologic TLA procedures : 1gm Mepivacain, 0.25 mg epinephrine in 200 ml Ringer's,**
- **perianal vein thrombectomy (n=15),**
- **subanodermal fistula resection (n=7), anal polyp resection (n=7),**
- **fissurectomy (n=6), perianal abscess revision (n=6),**
- **excision of anal skin tags (n=3), hemorrhoidectomy (n=3),**
- **intersphincteric fistula extirpation (n=1), pilonidal sinus (n=1),**
and
- **perianal tumor excision (n=1).**

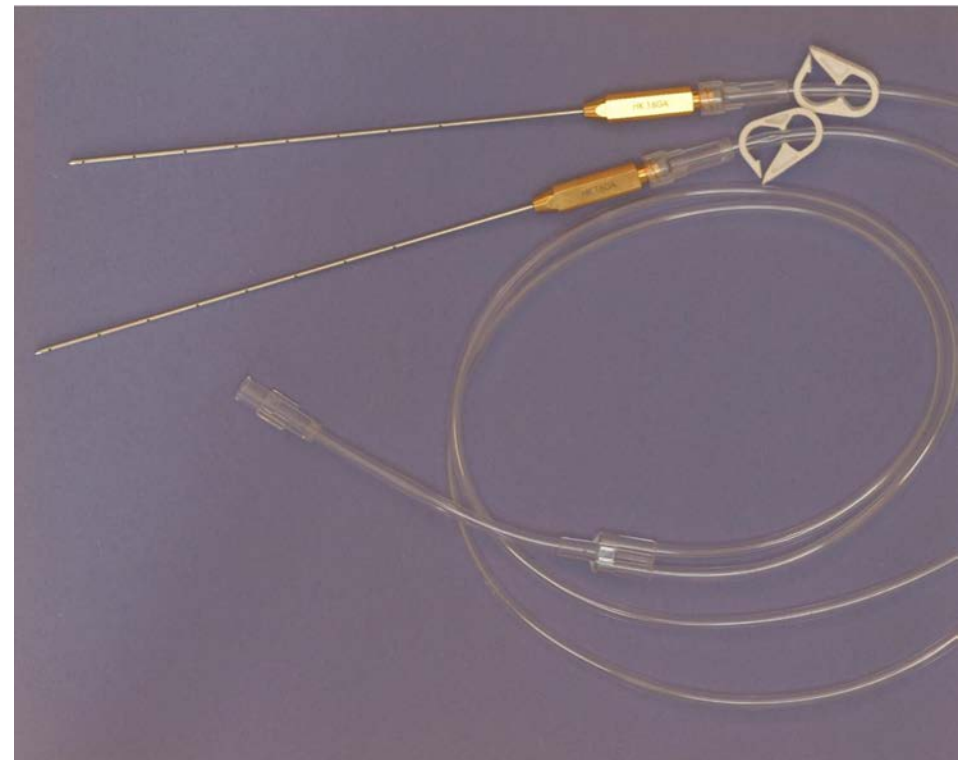
RESULTS:

- **Mean Volume of 93.1 ± 40.7 ml of TLA.**
- **Complete pain relief after 18.3 ± 5.0 min.**
- **Local anesthesia up to 14 h post-op, mean duration 6.7 ± 1.9 h.**

TLA for Liposuction



Infiltration Pump (Peristaltic) & Infiltration Cannulas



Tumescent Abdomen: Pre-Op and Post-Op



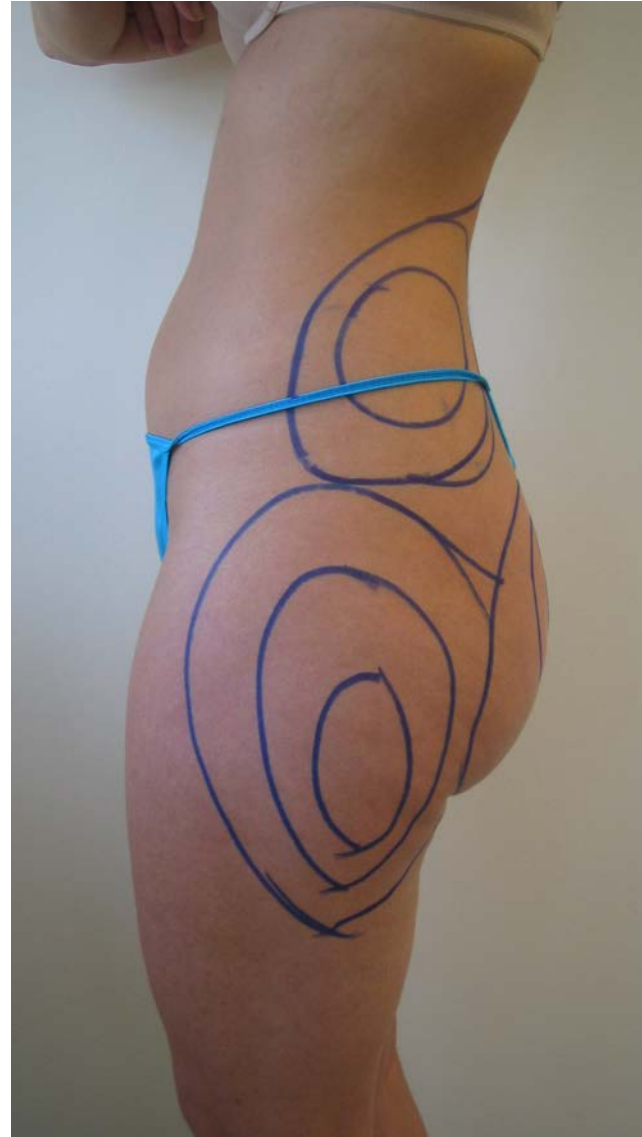
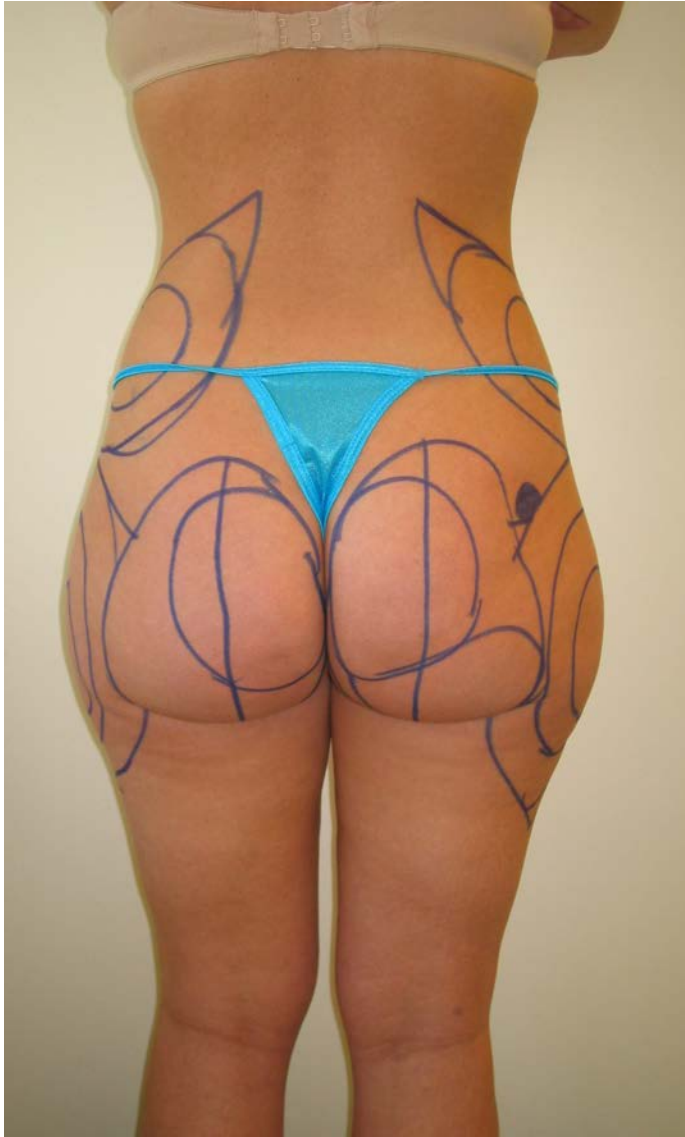
Post-Op Compression Garments



Post-Op Drainage Yields Minimal Echimosis



Hips, Outer Thighs, Buttocks



Hips, Outer Thighs & Buttocks

2 Month Post-Op



Abdomen: One Day Post-Op

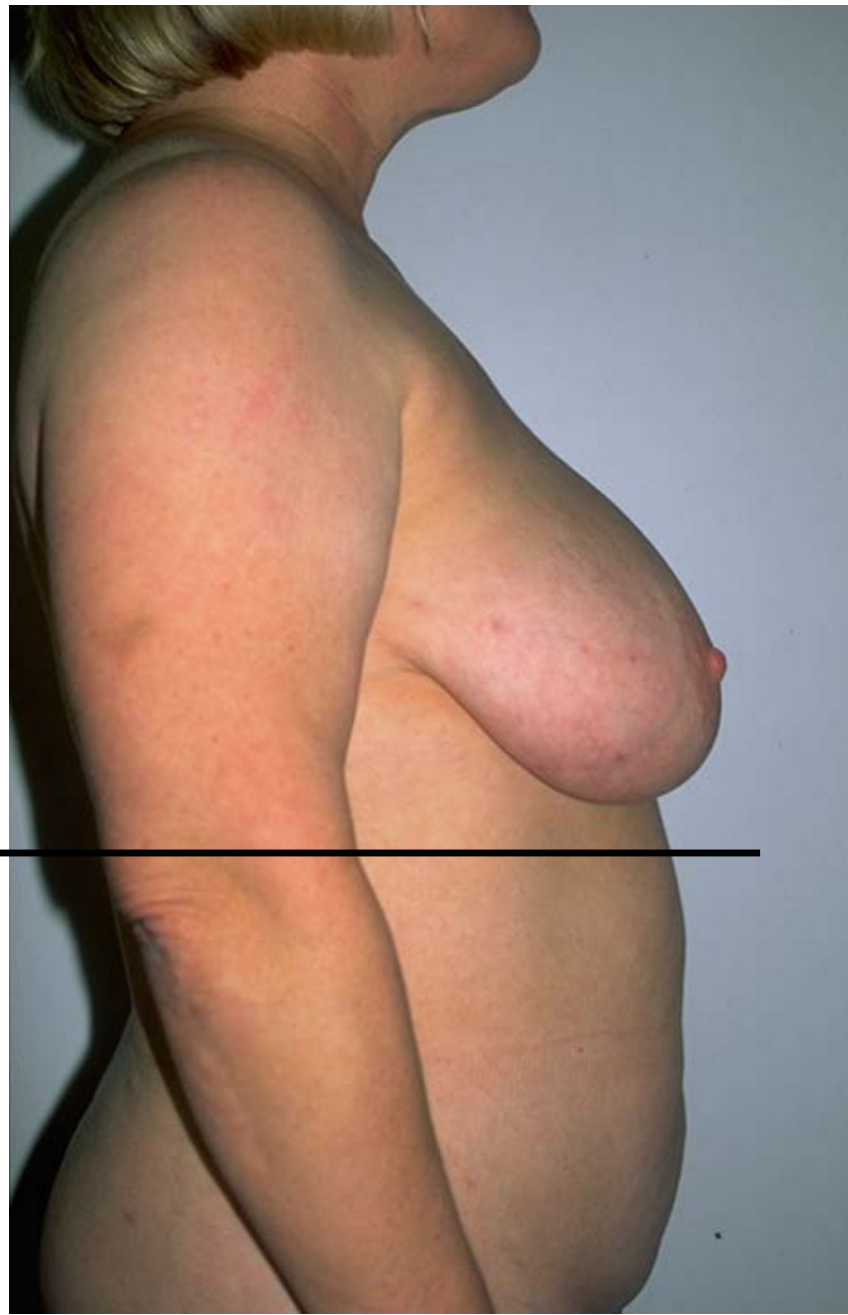


Abdomen 4 Months Post-Op

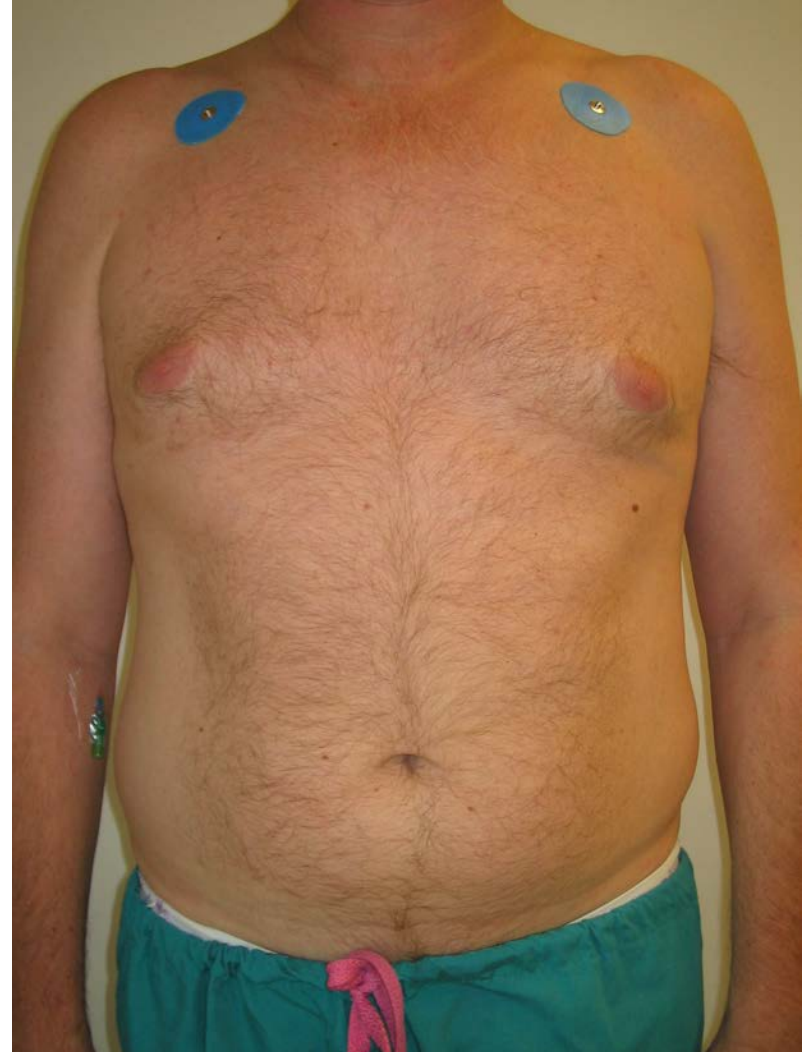


3 Week Post-Op

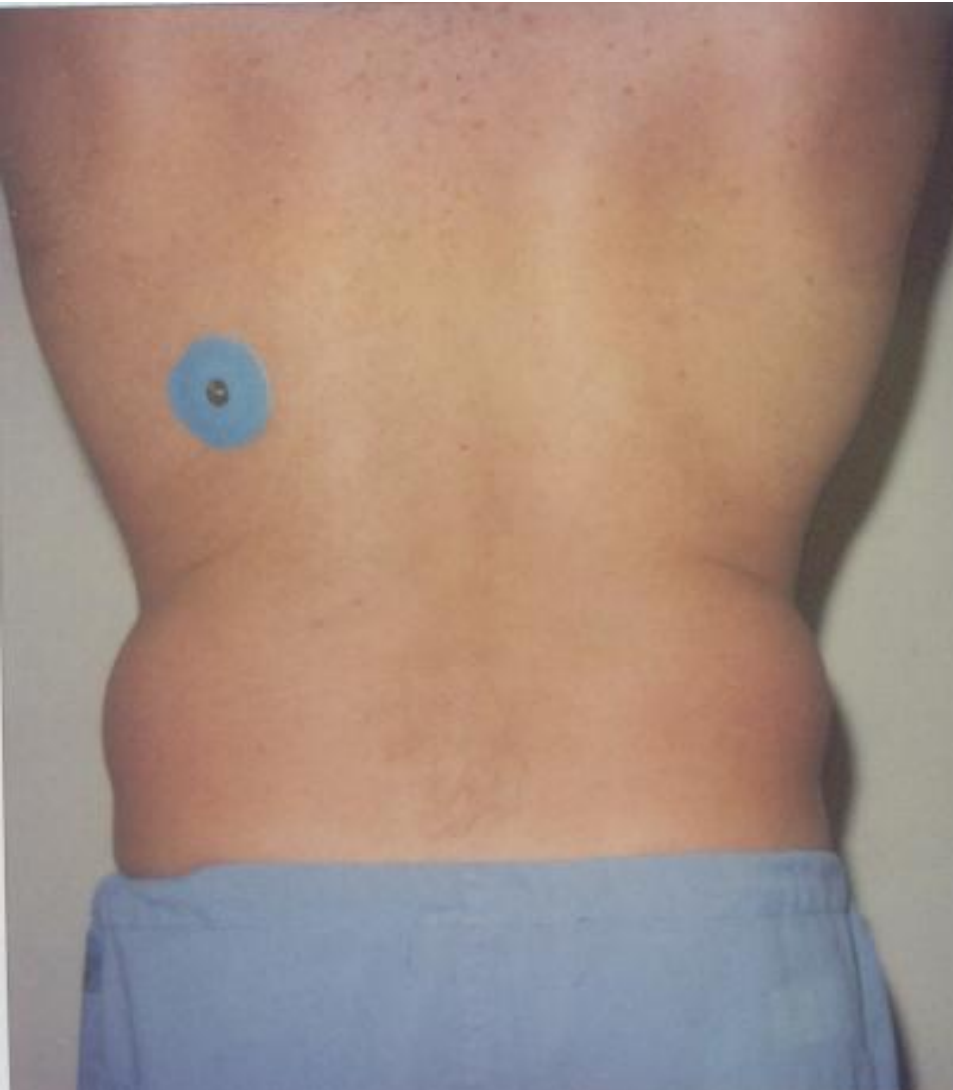




Male Breasts 4 Months Post-Op



Male Flanks 5 Month Post-Op

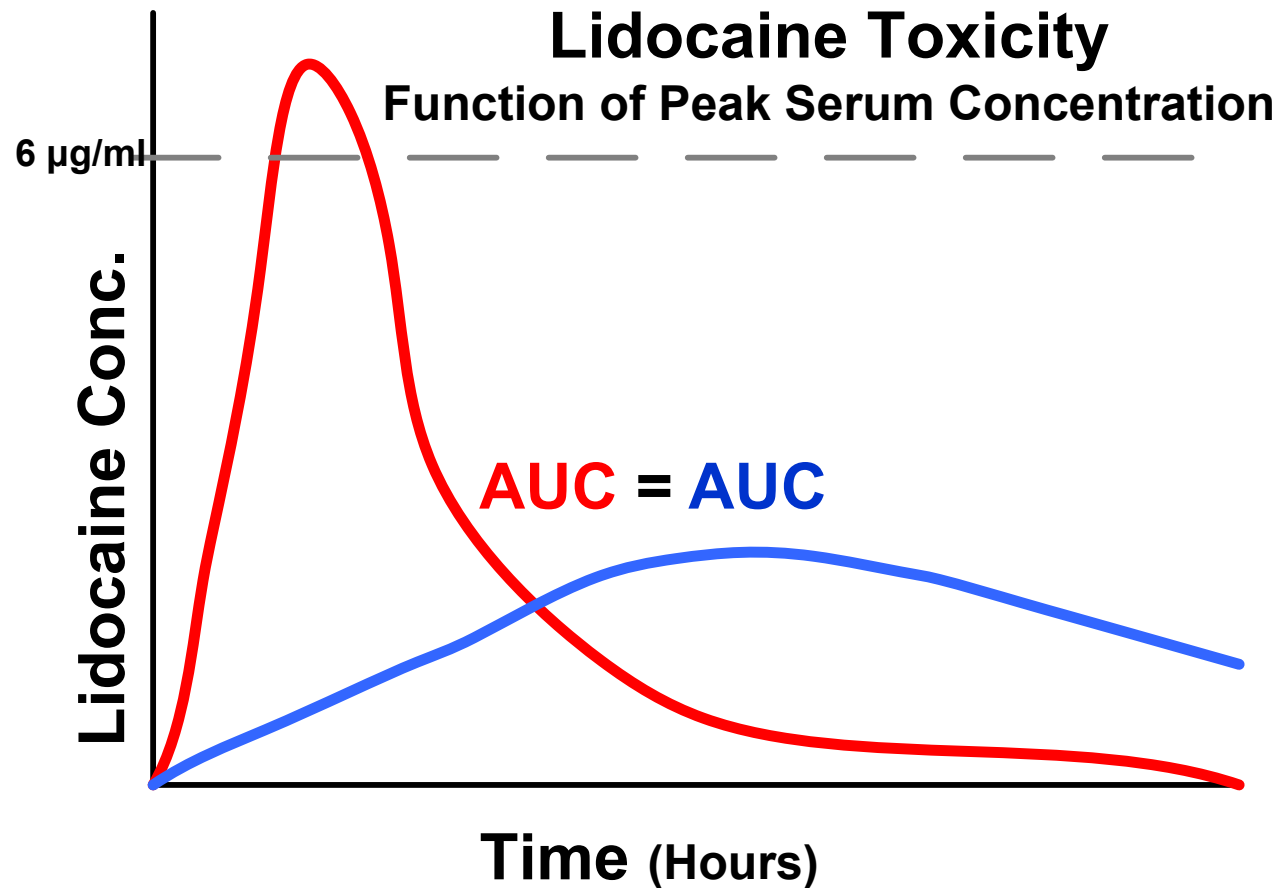


Arms 6 Weeks Post-Op



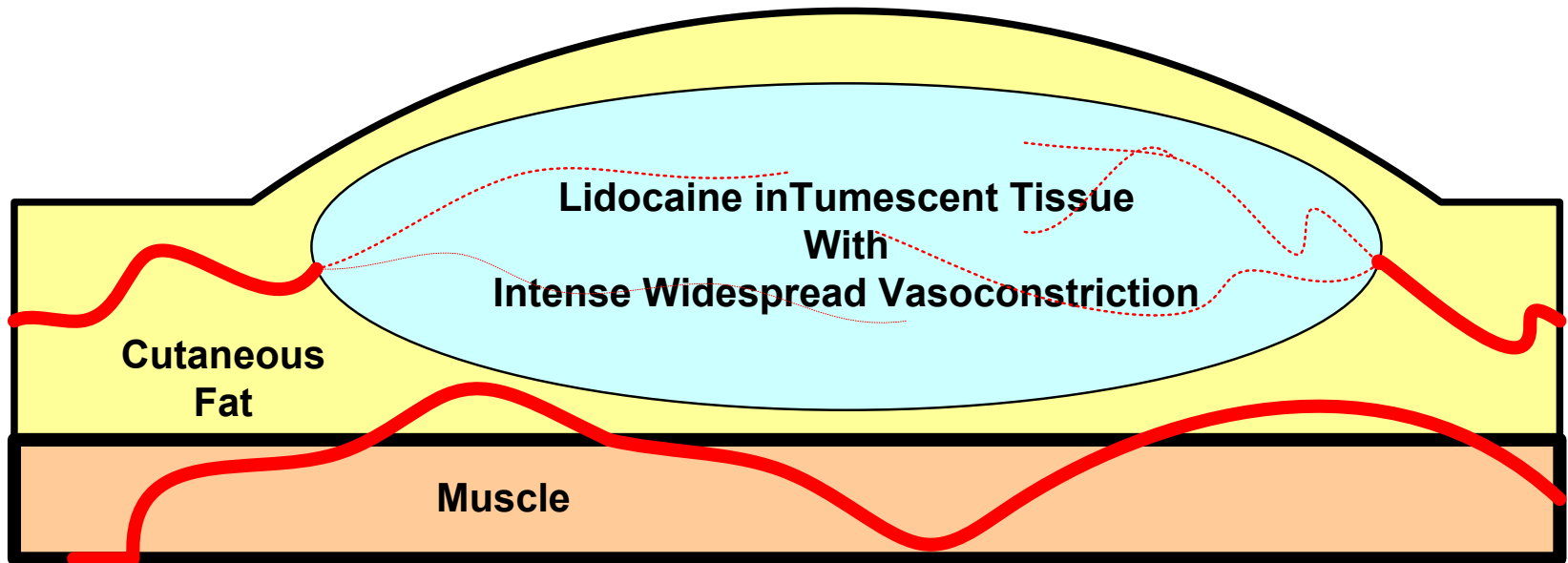
Buttocks 2 Months Post-Op





Two Equal Doses of Lidocaine
Have Equal “Area Under the Curve = AUC”
Slower Absorption Rate $\rightarrow$ Lower Peak

Lidocaine is Absorbed Only from Periphery of Tumescant Tissue



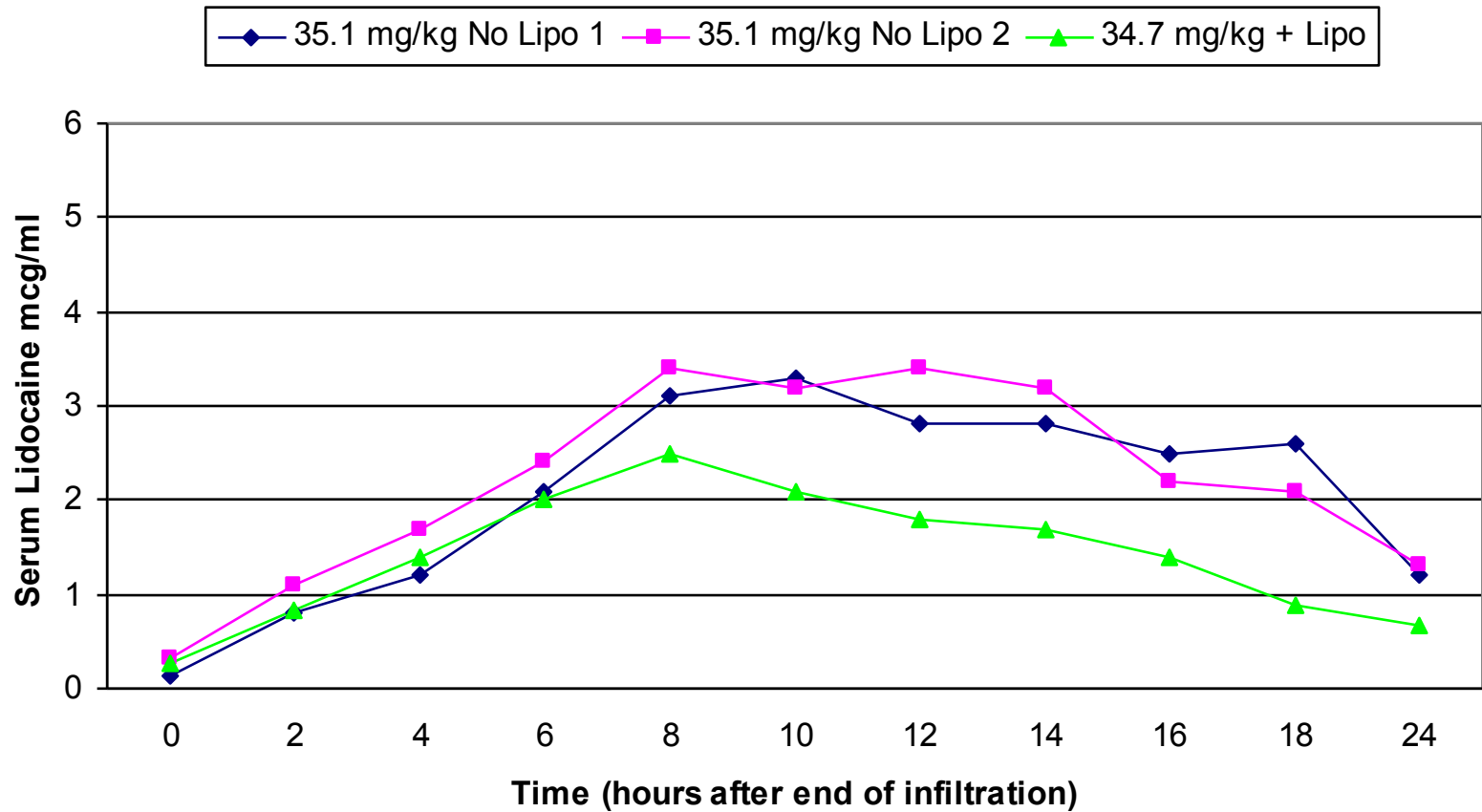
For Any Given mg-Dose of Lidocaine, Delayed Absorption
Reduces Peak Serum Level.
This Permits a Greater Safe Total Dose

Current Research Project

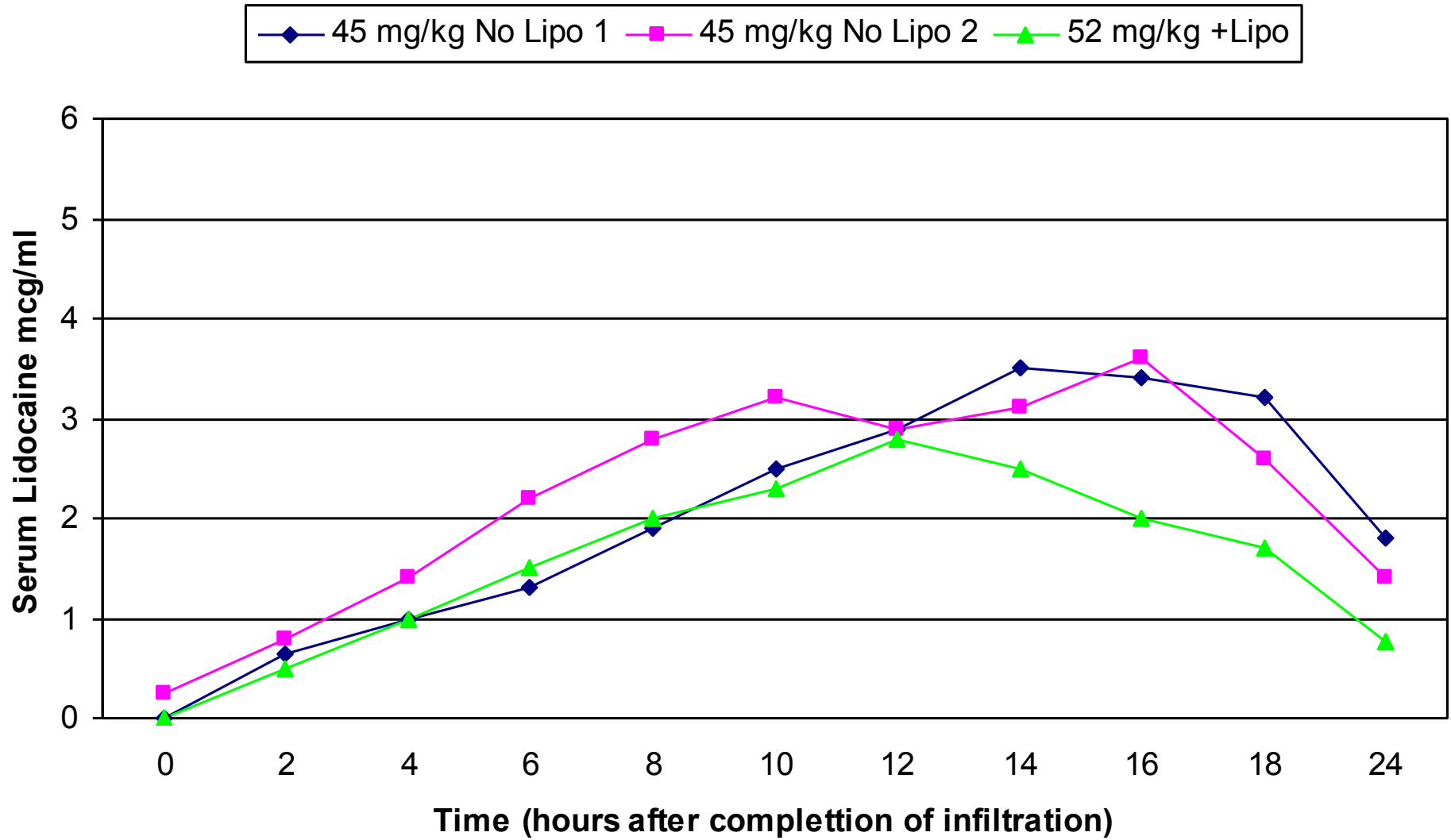
Institutional Review Board (IRB) Approved

- **Patients Given Tumescence Lidocaine Dosage On 3 Separate Occasions (≥ 2 Weeks Apart)**
- **Same Area Treated on Each Occasion**
- **24 Hours of Serum Lidocaine Conc. (Q 2 Hours)**
- **1st & 2nd Trials: Lidocaine & No Liposuction**
- **3rd Trial: Liposuction**

K.W.: Hips & Outer Thighs



D.R : Hips & Outer Thighs



Maximum TLA Dosage of Lidocaine Without Liposuction

- 45 mg/kg = maximum clinical dosage**
- 50 mg/kg = absolute maximum dosage**
- Literature states maximum TLA dosage for Liposuction is 55 mg/kg**
- I believe 55mg/kg may be too risky (especially without liposuction)**

Tumescent Local Anesthesia Clinical Effects

- A) Tumescent Local Anesthesia**
- B) Hemostasis**
 - Vascular Constriction & Compression**
- C) Hydro-Dissection of Tissue**
- D) Heat Sink**
- E) Bactericidal**
- F) Drug Delivery System**
- G) Hypodermoclysis**
 - (Systemic Delivery of Crystalloid Fluids)**

A) Tumescence Local Anesthesia

- **Long Lasting
(Extremely Slow Systemic Absorption)**
- **Profound (No Sedation Required)**
- **Requires**
 - **Skilled Infiltration**
 - **Knowledge of Pharmacology, Drug Interactions**

B) Tumescant Hemostasis

- **Vasoconstriction**
(pharmacologic: epinephrine)
- **Vasocompression**
(hydraulic: hydrostatic pressure)
- **Profound Surgical Hemostasis**
- **Affects Veins & Capillaries**

Epinephrine Vasoconstriction

- **Epinephrine (Adrenoline)**
- **Potent α - and β -adrenergic agonist**
- **Principal Site of Action:**
 small arterioles & precapillary sphincters
- **Vasoconstriction:**
 capillaries
 great veins ($\uparrow$ pulmonary pressure)
- **Vasodilation (skeletal muscle, pulmonary)**

Mechanical Vascular Compression

- **Physical (Space-Occupying) Effects of TLA Solution**
- **Transvenous Pressure**
Outside Interstitial > Inside Hydrostatic
- **Decreases Radius of Vein**

C) Hydro-Dissection of Tissue

- **Expansion of Natural Subcutaneous Tissue Spaces**
- **Physical Separation of Adjacent Anatomical Structures (Separation Target Tissue from Vulnerable or Innocent By-Stander Tissues)**
- **Liposuction, Mohs Surgery, Vein Surgery,**

D) Thermal Sink

- **Thermal Insulation of Vulnerable Tissue**
- **Water Absorbs Heat**
- **Tumescence is Essential for Safe**
 - **Ultrasonic Liposuction**
 - **Endovenolysis (Laser & Radio Frequency)**

E) Bactericidal Effects of Lidocaine

- Bacteriostatic in an Acid Solution**
- Bacteriocidal in a Neutral Solution**
- 10 meq of Na Bicarbonate/Liter**
- Perioperative Infection Rate of Liposuction is Approximately Zero**

F) Hypodermoclysis

[Gr. κλύαίς a washing, drenching]

- Injection of fluids under the skin for systemic replacement of fluids for acute or chronic dehydration (cholera or end stage cancer).
- IV Fluids are Contraindicated in Tumescant Liposuction (Pulmonary Edema)

Avoid Tumescant Concoctions

- **Keep It Simple**
- **Avoid Recipes Based On Intuition**
- **No Triamcinolone (Kenalog®)**
 - **Necrotizing Fasciitis Reported: Vein Procedure in Diabetic**
- **No Bupivacaine (Marcaine®) or Ropivacaine**
 - **Unnecessary**
 - **Precipitates If pH of Solution Is Not Acidic**
 - **Excessively Toxic (Resuscitation Unlikely)**

Bupivocaine (Marcaine) & Ropivacaine Precipitate at Neutral pH



Clonidine & Lorazepam

- **Clonidine 0.1 mg PO**
Hold if BP $\leq$ 100/60 or Pulse $\leq$ 60
- **Larazepam 1 mg PO**
Long Lasting
Not Metabolized by CYP3A4
- **Synergistic & Very Effective**
- **No Respiratory Depression**

Two Important Caveats

- **Write Legible Signed Orders for Tumescant Lidocaine Anesthesia**
(Any Lidocaine Dosage > 7 mg/kg)
- **Know Cytochrome P450 3A4 Inhibitors**
Ketoconazole, Erythromycin,
Zoloft (SSRI), Calcium Channel Blockers

TLA for Resection of Glandular Breast Tissue in Men (Gynecomastia)



G. Blugerman (Argentina) Technique: TLA & “+” Shaped Incision Thru Nipple



Immediate Post-Op Compression & 1 Day Post-Op



Incisional Scar is Typically Imperceptible



MM: Excision Down to Fascia by TLA Healing By Secondary Intention



TLA for Mohs Excision of Recurrent BCC



Large Excision with TLA & 1% Lido + Epi for Incision Hemostasis Patient Removes Sutures in 10 Days



Pre-Incision Lysis of Lipoma Adhesion Using TLA & Blunt Dissectors



1.5 mm Punch Adits

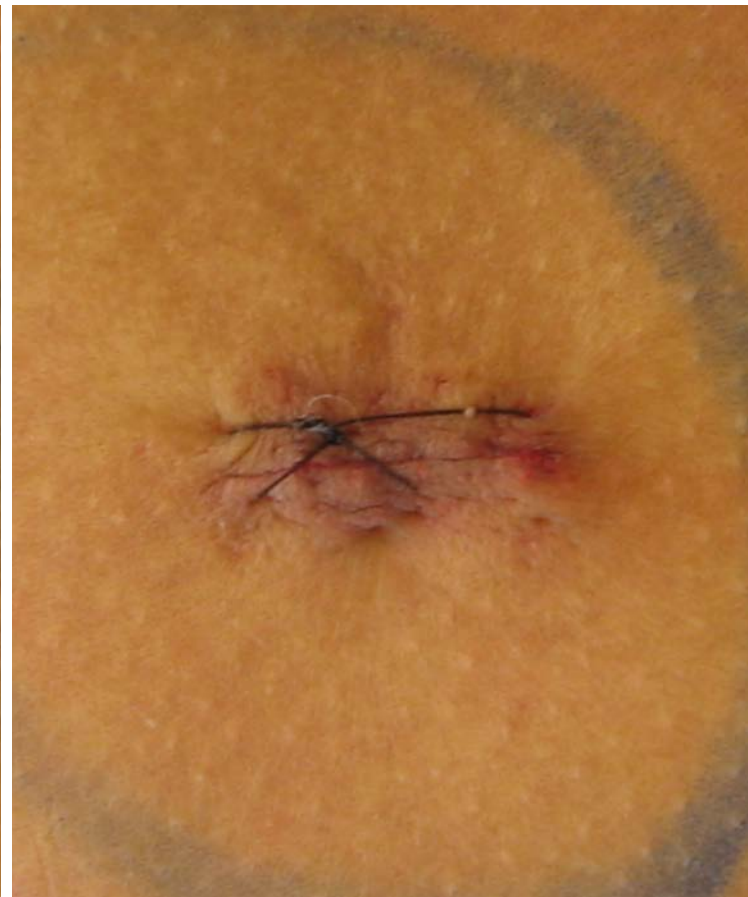
Blunt Dissectors: 16 > 14 > 12 Gauge



Lipoma Extracted with Scissors and Forceps



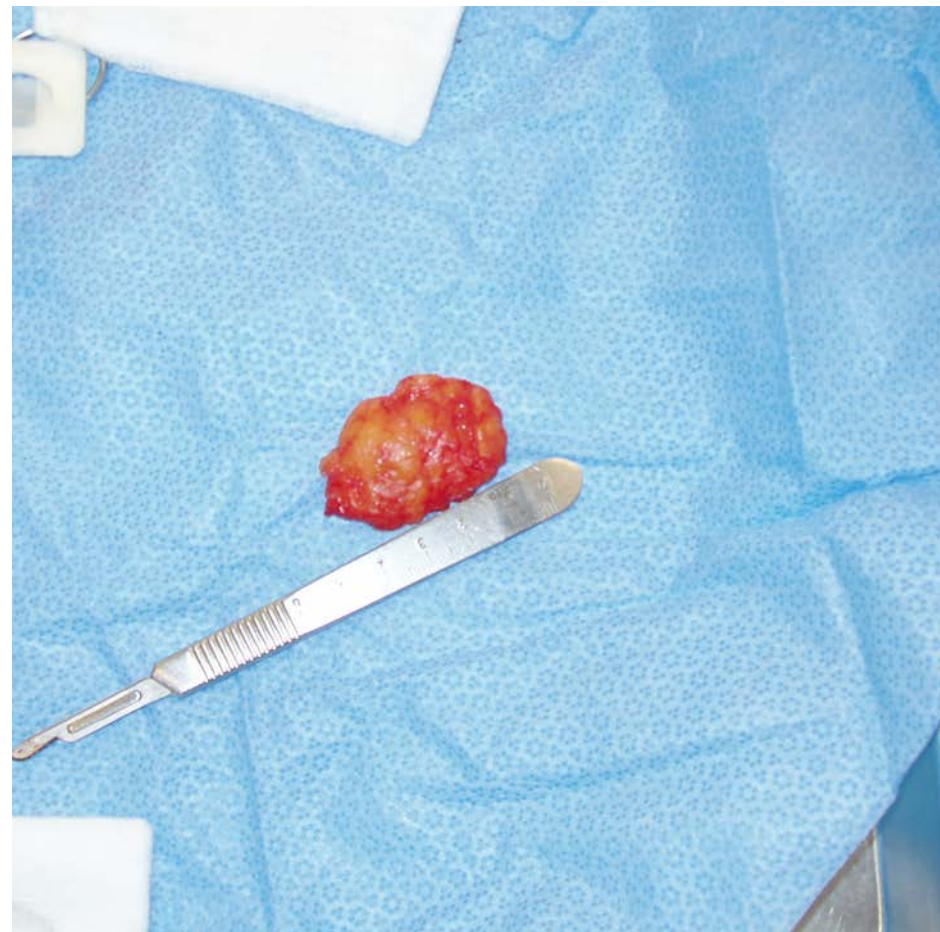
Closure of Incision by Running Intradermal 3-0 Nylon with Knot Patient Removes Suture at Home: 10 Days



Lipomas on Extremities: Well Encapsulated Neck & Back: Multilobulated & Adhesions



Sub-Frontalis Lipoma (Typically Encapsulated) Bloodless Excision by TLA



TLA Produces Separation Between Skin and Important Subcutaneous Nerves & Vessels



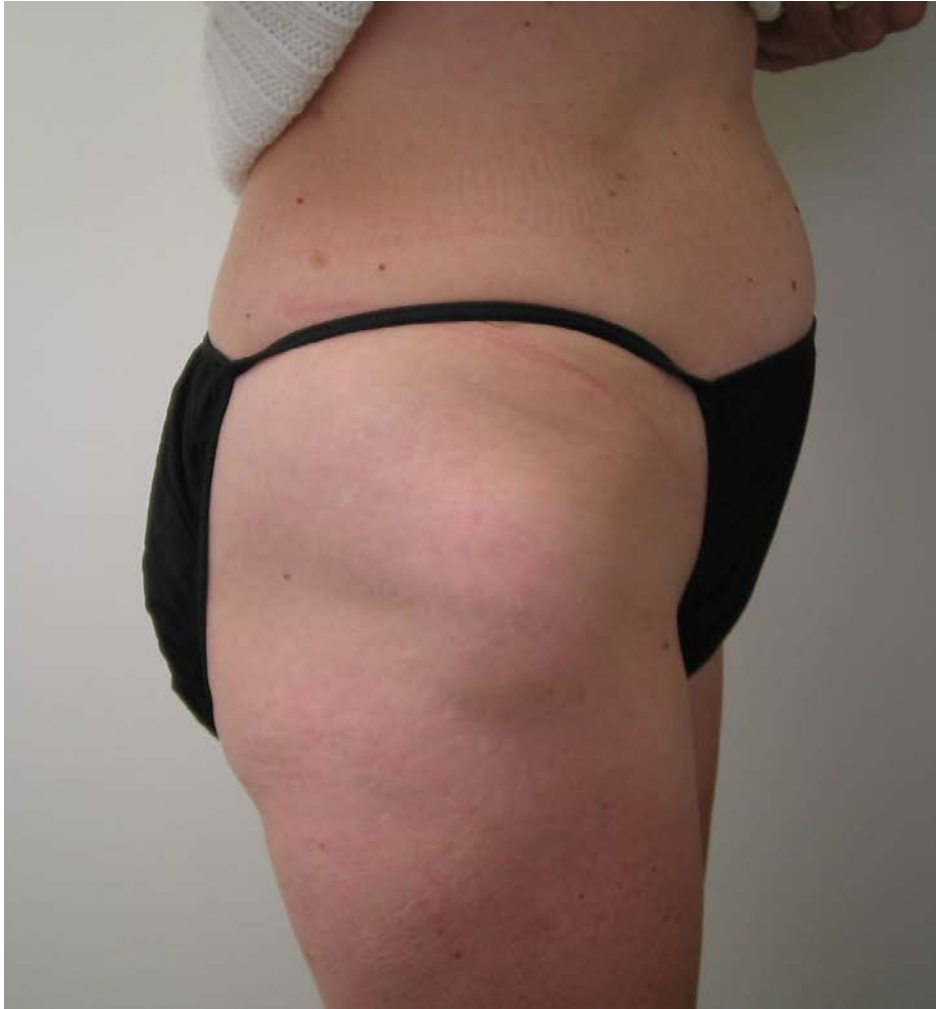
Saphenous Vein Closure by Endovenous Radio Frequency or Laser Using TLA



In Germany Dermatologists Use TLA for MM Sentinel Lymph Node Biopsies



Clinical History: Rapidly Growing Lipoma



TLA > Excision

Tissue Submitted For Histopath



Some Things Are More Important Than TLA

