Dextrose-Prolotherapy: It’s Not Experimental Anymore!
An updated Review of the Literature

32nd AAOM Annual Conference and Scientific Seminar
May 1, 2015

K. Dean Reeves, M.D., FAAPM&R
Clinical Associate Professor
University of Kansas
My submitted talk has Details on individual studies and is on the Web Site
Todays Talk has a Different Focus Will be On DrReeves.Com Front Page
My Practical Job Description

- **Combining prolotherapy** and **perineural injection** (injection around nerves to decrease pain to find optimum combinations for **curative treatments** for research.

- **Design** practical low cost research in **musculoskeletal medicine**: IE Physical therapy, ozone, stem cells, functional medicine,

- **Develop teams** to facilitate research. IE: David Rabago for writing and key design input.

- **On site training in key abilities** for successful research (Of research or teaching colleagues)
  - Artfulness
  - Focus (Minimum eclecticism)
  - Ultrasound approaches for all connective tissue structures and nerves.
  - Treatment combinations for maximum treatment efficacy
  - How to do research that matters
Research That Matters is Critical for Dextrose Prolo & Ozone & PRP & Stem Cells & Therapies & Functional Medicine

• **Level 1 Randomized, Controlled:** Agreement to even a brief control period but gather data to 1 year after crossover. (Two examples)

• **Level 2 Non Randomized Cohort:** Gather data prospectively on those who can’t afford treatment. (IE: Stem cell studies)

• **Level 3: Case Control:** Take data, delay treatment, take data and start. Often a natural delay. (Example)
A Treatment is Not Experimental if it is: **EITHER** (See your BOHA Statutes)

- Part of normal curriculum in DO, MD or residency training, **OR**
  - Required for program accreditation in neuromusculoskeletal medicine residency. (D.O.s and M.D.s)
  - Normal part of F.P. training at U.W. (D.O.s and M.D.s)

http://acgme.org/acgmeweb/Portals/0/PFAssets/ProgramRequirements/ONMM_Reqs_07012015.pdf
University Based Training Model: University of Wisconsin, Madison

- Taught to F.P. Residents.
- Elective overseas training time for residents.
- Continuing education UW sponsored.
- Yearly research seminar with many countries represented.
- Multiple research publications from U.W.
- Tenured faculty with primary research in prolotherapy.
A Treatment is Not Experimental if it is:

- Based upon sufficient learned publications supporting safety (review articles) and efficacy” (Several level I or level 2 studies with positive outcomes.)
- Level I evidence is published in the area of knee osteoarthritis, (Rabago 2013, Dumais 2012), Osgood Schlatter Disease (Patellar tendinosis) (Topol 2011) and hand osteoarthritis,(Jahangiri 2014, Reeves 2000).
- Level II evidence is published in SI joint dysfunction(Kim 2010), lateral epicondyllosis(Rabago 2013), low back pain (Yelland 2004), Achilles tendinosis (Yelland 2011), adductor and abdominal tendinosis (Topol 2008), knee osteoarthritis (Reeves 2000), and ACL laxity (Reeves 2003).
Dextrose Prolotherapy is Not Experimental: But, is it Pertinent. In Tendinopathy/Ligamentopathy?

- **NSAID Use**: (Short term reasonable/ Long term)
- **Steroid Use**: (Short term reasonable/ Long term)
- **Physical Therapy**: (ELE/HSR in 1-2 conditions)
- **Surgery**: Some complete tear or longitudinal tears
- **PRP Injection**: Patellar and Lateral Epicondylosis but heterogenous results.
- **Dextrose injection**: OSD (patellar tendinopathy), abdominal/adductor strain, lateral epicondylosis, SI vs steroid, Periachilles vs ELE.
1. Evidence is Strong for Clinical Benefit of Dextrose Proliferant in Two Types of Arthritis and Four Areas of Tendinopathy.

2. There is Significant Basic Science Information about the Effect of Dextrose Prolotherapy

A Step By Step Description of How That Evidence Came About
Family Practice Led Studies

World Diabetic Research + USA Orthopedic Surgeon

- USA PM&R
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- USA FP
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United States PM&R

- SOUTH KOREA PM&R
- USA (Mayo Clinic) BS ORTHO / NEURO

Argentina PM&R

- USA PM&R

Australia / NZ FP

Canada FP

Canada FP
Cellular Production of Growth Factors in Response to 0.6 % Dextrose

Lig/Tend Healing

Cartilage Healing
Teamwork-Based Clinical and Basic Science Progress

GF publications on 0.6% dextrose + Gale Borden’s 5% Dextrose Work

10% Finger OA 2000 ↓ 1c d/t small size

10% Knee OA 2000 ↓ 2c d/t both improved

10% Thumb OA 2014 Study Jahangiri 1b

HSC Permission 12.5/25% knee Studies Rabago 1b Dumais ↓ 1c d/t fup

Topol Knee Cartilage Growth Study D 12.5 BS-b

Topol 05/08 Groin Pain ↑ 3b d/t size/fup/cure

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Smigel Epidural D5W Pending BS-b

Bertrand Rotator Cuff ↓ 1b- d/t meas

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10% Dextrose Yoshii Carpal Tunnel Studies Rabbit Mayo Clinic 09.11,14 BS-a

Yelland Achilles ↓ 2b d/t both imp
Key Decision

• Since DNA for production of GFs for repair of connective tissue elevate in as little as 15 minutes with only 0.6% Dextrose exposure and since Dr. Borden found (non-published) proliferant effects and clinical benefit with D5W →

• Decision to study the effects of non inflammatory levels of dextrose (10% - 504 mOsm – note IV peripheral IV line intolerance begins about D10W)
Teamwork-Based  Clinical and Basic Science Progress

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% Improv. Movement Pain After 3 Injections

- Dextrose: 42
- Lidocaine: 15

(P = .027)

Improv. Finger Flexion in Degrees

- Dextrose: +8
- Lidocaine: -8.7

(P = .003)
Clinical EBM Findings Dextrose: 2 arthritis locations and 4 tendinopathy locations

- Finger/Thumb OA: IA Dex may be effective.
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Dextrose prolotherapy may be effective for Knee DJD July, 2000

- **Bottom line:** Prolotherapy injection with 10% dextrose may be effective in the treatment of osteoarthritis of the knee. Combining outcomes to obtain statistical significance is a bit of a 'fishing expedition' and the true clinically significant effect of this treatment may be minimal. (LOE = 2c)


- **Reviewer:** David Slawson, MD
  Director of Information Sciences
  University of Virginia Health System
  Charlottesville, VA
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General Method 2014 Thumb RCT

3 Months Pain, > 3 pain on 0-9 scale, mild to moderate arthritis

↓ 30

Dextrose 10% in 1% lidocaine at 0, 1 and 2 months. 1 ml divided between joint and periarticular

↓ 27

Completed 6 month Trial followup and Data Gathering with VAS 0-9, Pressure algometer, Function (HAQ-DI) and lateral pinch grip at time 1, 2, 6 mo

↓ 30

Saline Injection time 0 and 1 month, 1 ml. 40 mg MP in 1% lidocaine (1 ml volume) at 2 months

↓ 28
Between Group Comparison of Results in Thumb OA RCT – 6 months

- **VAS movement pain % improvement**
  47% steroid; 76% dextrose.  \( P = .02 \)

- **Function % improvement (HAQ-DI)**
  41% steroid, 65% dextrose.  \( P = .01 \)
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Athletic Groin Pain Study Method

Elite career threatened rugby/soccer athletes with chronic pelvic rim or adductor insertion pain, therapy treatment failure, reproduction of pain on examination and pain elimination with diagnostic injection.

Minimum 2 Sessions of injection of pubic rim, symphysis pubis and adductor origins as painful with 12.5% dextrose

6 Still Impaired.

66 Full Sport
Start Post 26 Mo

- **VAS for Sport Pain**
  - Start: 6.5
  - Post: 1
  - 26 Mo: 1.2

- **Nirschl Pain Phase Scale**
  - Start: 5.1
  - Post: 0.9
  - 26 Mo: 1.1
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- **Finger OA/Thumb**: IA Dex is **likely effective**.
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- **Chronic abdom/adductor strain/osteitis pubis**: Dex enthesis injection **may be effective = best surgical results > any therapy study**
Dextrose prolotherapy decreases pain and stiffness in knee DJD July 19, 2013

- **Bottom line:** Dextrose prolotherapy appears to be more effective in decreasing pain and stiffness and improving function in patients with knee degenerative joint disease (DJD) than saline injections and home exercise. *(LOE = 1b)*


- **Reviewer:** Henry C. Barry, MD, MS
  Professor
  Michigan State University
  East Lansing, MI
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Dumais Study Method

21

Dextrose 25% 5 ml IA, 15% Col. Lig @ 0, 4, 8, 12 weeks†

Home-based Exercise program Without Further Injection

24

Home-Based Exercise Program* Without Injection

Dextrose 25% 5 ml IA, 15% Col. Lig @ 20, 24, 28, 32 weeks.
WOMAC Total Score Change Over Time

-5
-10
-15
-20
-25
0
4
8
12
16
20
24
28
32
36
WEEKS

EXERCISE

DEXTROSE

0 4 8 12 16 20 24 28 32 36
WEEKS
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Patellar Tendon
OSD Method

Randomized

Usual Care for 3 months

Lidocaine injection monthly for 3 months

Dextrose Injection monthly for 3 months

3 month data collection, unblinding, and optional dextrose injection for 1 year → 1 year data
Dex (n=21)
Usual Only (n=14)
Usual-Dex (n=8)
NPPS Score

- Dex (n=21)
- Lido Only (n=13)
- Lido-Dex (n=9)
Dextrose injection effective for Osgood-Schlatter disease
Jan 6, 2012

• **Bottom line:** An injection of a solution of 12.5% dextrose and 1% lidocaine is an effective treatment of Osgood-Schlatter disease (OSD) symptoms in young athletes. The mechanism of action is not clear. *(LOE = 1b-)*


• **Reviewer:** Allen F. Shaughnessy, PharmD, MMedEd
  Professor of Family Medicine
  Tufts University
  Boston, MA
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John L Achilles ↓2b d/t both imp

Liza S Epidural D5W Pending BS-b

Helen B Rotator Cuff ↓1b- d/t meas

Helen B Mannitol Cream BS-b
Mid Substance Achilles Tendinosis

- ELE Twice Daily 12 weeks
- 20% Dextrose PSI weekly 4-12 sessions
- BOTH

Data at 6 weeks, 3 mo, 6 mo and 12 mo
According to VISA-A Score, significant difference between ELE and BOTH (ELE + PSI)
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- **OSD:** Dex enthesis injection is **likely effective.**
- **Achilles tendinosis:** Peritendinous **dex plus therapy** is **likely more effective vs therapy alone.**
Teamwork-Based Clinical and Basic Science Progress

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Gather pre waiting period data and await ultrasound.

Screening/Initial Ultrasound at a mean of 3.6 month (0.8 to 9.2 Months)

Gather post waiting period data. Randomly allocate to groups

- Enth-Dex
- Enth-Saline
- Superfic-Saline

Exclusions
Rotator Cuff Therapy + Results

• **Results:** ... moderate to severe shoulder pain (7.0±2.0) for 7.6±9.6 years. ... At 9 month follow-up 59 percent of Enth-Dex participants maintained a 2.8 improvement in VAS pain (twice the MCID) compared to Enth-Saline (35%;p=.088) and Superfic-Saline (27%;p=.017).
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- **OSD**: Dex enthesis injection is **likely effective**.
- **Achilles tendinosis**: Peritendinous **dex plus therapy is likely more effective vs therapy alone**.
- **Rotator cuff tendinopathy**: Dextrose **enthesis injection plus therapy is likely more effective than sham injection plus therapy**.
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% Improvement in Walking Pain, Swelling and ACL Looseness (A.D.D)

KT-1000 A.D.D. 2.88 → 0.82 (0→36 mo)
Basic Science EBM Findings Dextrose

• ACL Rupture/Laxity: Dextrose *may tighten connective tissue* (either residual ACL or secondary contraints) *and improve symptoms.*
Clinical Trials to Cartilage Protection Study in Animals

• Park et al Arthritis Res Ther 2007
• Cut ACL in rabbits → Waited 6 weeks for OA development → Every 3 week saline or 10% dextrose (+AA for proprietary interest) . Opposite side control.
• Makes you wonder what if they did not wait for OA to develop?

<table>
<thead>
<tr>
<th>Intact ACL</th>
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<tbody>
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• ACL Lysis OA Knee Model: Dextrose is *likely chondroprotective in rabbits.*
.1 ml 10% dextrose vs saline: 1 (2009), 2(2011) or 4 (2014) weekly injections into the carpal tunnel in rabbits

- Saline: No change in Transverse Carpal Ligament equivalent (Subsynovial Connective Tissue) with saline injection.
- 10% Dextrose: Increase in tensile load of SSCT. Thickening of collagen bundles.

Y. Yoshii et al. Tendon and Soft Tissue Biology Laboratory and Orthopedic Biomechanics Laboratory. Division of Orthopedic Research. Mayo Clinic, Rochester

Measured thickness of transverse carpal ligament equivalent (2014 study)
SSCT Tissue (TCL Equiv) Example
Energy Absorption (p < .05)

- **Dextrose** (Joules)
- **Saline** (Joules)
Ultimate Load Before Rupture (p < .05)

mNewtons
2500
2000
1500
1000
500
0

Dextrose
Saline
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- ACL Lysis OA Knee Model: Dextrose is *likely chondroprotective in rabbits*.
- Injection in Rabbit Carpal tunnel: Dextrose increases ligament thickness, energy absorption and ultimate load in the rabbit transverse carpal ligament equivalent in rabbits. (Three RCTs)
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Epidural Dextrose Analgesia Method

Categories: 12-Spinal Stenosis, 8-Radic, 8-Low Back Pain, 5 Post Lam, 2 Peripheral Neuropathy.

D5W 10 ml caudal epidural

Normal Saline 10 ml caudal epidural

0-10 NRS pain @ time 0, 2 hrs, 4hrs, 48 hrs and 2 weeks.
D5W Is Analgesic, as Shown by Epidural Injection
Chronic Back and Buttock or Leg Pain: Abstract
Submitted by Liza Smigel – Results

• ...35 participants with moderate-to-severe LBP (6.7±1.3) for 127±126 months received one epidural injection. ... D5W participants reported greater and significant NRS point change at
  - 15 minutes (4.4 vs 2.4; p=.015),
  - 2 hours (4.6 vs.1.8; p=.001),
  - 4 hours (4.6 vs1.4; p=.0001),
  - and 48 hours (3.0 vs.1.0; p=.012).
  - Not 2 weeks (2.1 vs.1.2; p=.217). ...
Basic Science EBM Findings Dextrose

- **ACL Rupture/Laxity:** Dextrose *may tighten connective tissue* (either residual ACL or secondary contraints) *and improve symptoms in humans.*
- **ACL Lysis OA Knee Model:** Dextrose is *likely chondroprotective in rabbits.*
- **Injection in Rabbit Carpal tunnel:** Dextrose *increases ligament thickness, energy absorption and ultimate load in the rabbit transverse carpal ligament equivalent in rabbits.* (Three RCTs)
- **Epidural Injection of D5W in Humans:** D5W *likely creates analgesia upon injection in the epidural space in low back +/- leg pain*
Teamwork-Based Clinical and Basic Science Progress

GF publications on 0.6% dextrose + Gale Borden’s 5% Dextrose Work

10% Finger OA 2000 ↓ 1c d/t small size

10% Thumb OA 2014 Study Jahangiri 1b

HSC Permission 12.5/25% knee Studies Rabago 1b Dumais ↓ 1c d/t fup

Topol Knee Cartilage Growth Study D 12.5 BS-b

10% Knee OA 2000 ↓ 2c d/t both improved

Topol 05/08 Groin Pain.↑ 3b d/t size/fup/cure

Topol OSD Study 2011 ↓ 1b- d/t meas

10% ACL Lig 2003 4 (consec patient) but obj measure

10% Park Knee OA 2007 Rabbit ACL Sacrifice Cartilage Preservation BS-b

10% Dextrose Yoshii Carpal Tunnel Studies Rabbit Mayo Clinic 09.11,14 BS-a

Yelland Achilles ↓ 2b d/t both imp

Bertrand Rotator Cuff ↓ 1b- d/t meas

Smigel Epidural D5W Pending BS-b

Bertrand Mannitol Cream BS-b
10% Finger OA 2000 ↓ 1c d/t small size
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Gaston T Knee Cartilage Growth Study D 12.5 BS-b

Liza S Epidural D5W Pending BS-b

John L Achilles ↓ 2b d/t both imp

Helen B Rotator Cuff ↓ 1b- d/t meas

Helen B Mannitol Cream BS-b
Gaston Topol Knee OA Growth Study
Results (From Abstract Submitted)

• Results: **Six participants** (72±7.5 years old, 2 female) with **moderate-to-severe knee pain** (WOMAC 58.5±4.2 points) for **9.6±13 years** received **5.6±0.8 injections of 12.5% dextrose**. All three reviewers agreed on semi-quantitative zone growth ratings of new growth ("+1") and cartilage loss ("-1") in 26/54 and 0/54 zones respectively (inter-rater agreement = 0.926; Fleiss kappa =0.901). Biopsy specimens showed **metabolically active cartilage** with variable cellular organization, fiber parallelism, and cartilage typing patterns consistent with fibro- and hyaline-like cartilage. Compared with baseline status, participants reported improved WOMAC scores (17.6±4.7 points; p=.013).
Basic Science EBM Findings Dextrose

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- **ACL Lysis OA Knee Model:** Dextrose is likely chondroprotective in rabbits.

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- **Epidural Injection of D5W in Humans:** D5W likely creates analgesia upon injection in the epidural space in low back +/- leg pain

- **Arthroscopic Study of Dextrose Chondrogenesis:** D5W likely induces chondrogenesis on denuded bone.
Mannitol (Dextrose Cousin) Analgesia Method

Apply capsaicin to upper lip to create burning by activating the TRPV1 receptor

Apply Mannitol Cream to 1 side of lip

Same cream without mannitol to other side of lip

0-10 NRS pain @ every minute for 10 minutes
Helene Bertrand Mechanism of Analgesia of Mannitol (Dextrose Cousin) Cream Study: Results from Abstract Submitted

- Pain level of 7.8 when creams applied
- Both groups improved over time (typical for red pepper exposure)
- Mannitol cream side was significantly less painful at 3-10 minutes. (p < .05)
Basic Science EBM Findings Dextrose

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- **Arthroscopic Study of Dextrose Chondrogenesis:** D5W *likely induces chondrogenesis on denuded bone.*
- **Mannitol (Dextrose alcohol congener) post capsaicin lip application:** Mannitol (and likely dextrose) downregulates the effect of TRPV1 activation, which may explain its analgesia.
Self Funded Studies in White

World Diabetic Research + USA Orthopedic Surgeon

- USA PM&R
- IRAN PM&R
- USA FP
- CANADA FP
- ARGENTINA PM&R
- SOUTH KOREA PM&R
- USA (Mayo Clinic) BS ORTHO / NEURO
- USA PM&R
- CANADA FP
- CANADA FP
- AUSTRALIA / NZ FP

Gaston T 05/08 Groin Pain. 3b d/t size/fup/cure
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ARGENTINA PM&R
SOUTH KOREA PM&R
USA (Mayo Clinic) BS ORTHO / NEURO
USA PM&R
AUSTRALIA / NZ FP
CANADA FP
CANADA FP
Advances in *Dextrose*
Prolotherapy Research: Building a Body of Evidence. What has Changed in a Year?

33rd AAOM Annual Conference and Scientific Seminar
Hilton Clearwater Beach, Florida
April 16, 2016

K. Dean Reeves, M.D., FAAPM&R

Private Practice PM&R  Roeland Park Kansas
Past Clinical Assistant/Associate Professor (1986-2015)
University of Kansas Dept. PM&R, Kansas City Kansas
Details on individual studies are on the AAOM web site under the research tab. This talk is updated from your jump drive version and will be at DrReeves.com
Prolotherapy: Injection of non-biologic solutions to repair/proliferate soft tissue.

(and reduce pain?)
Changes in a year

• **Significant basic science studies** have been published in the areas of analgesia mechanism (Bertrand 2015, Smigel 2015, Smigel 2016), and chondrogenesis (Topol 2016), and

• **Multiple RCTs are published in the areas of knee osteoarthritis** (Rabago 2013, Dumais 2012) and **finger osteoarthritis** (Jahangiri 2014, Reeves 2000).

• **Singlet RCTs are published in six areas of tendinopathy**: Osgood Schlatter Disease (Patellar tendinosis) (Topol 2011), lateral epicondylitis (Rabago 2013), low back pain (Yelland 2004), Achilles tendinosis (Yelland 2011), **rotator cuff tendinopathy** (Bertrand 2005), and **TMD dysfunction** (Louw 2016).
Dr Bertrands Mannitol (Dextrose) Analgesia Mechanism Study

- Bertrand H, Kyriazis M, Reeves KD, Lyftogt J, Rabago D; Topical Mannitol Reduces Capsaicin-induced Pain: Results of a Pilot Level, Double-Blind Randomized Controlled Trial. PM&R 2015; 7(11):1111-1117, doi: 1016/j.pmrj.2015.05.002
Potential participants screened (n = 26)

Lip lesions (n = 1)

.075% capsaicin applied to the upper lip (n = 25)

Lip pain reaches 8/10 or 5 minutes after application (n = 25)

Control Cream applied to left or right side of upper lip using an allocation masked swab

Participants with minor burning pain at the 10 minute assessment (n = 5)

Residual pain at 20 minutes (n = 1a)

Mannitol Cream applied to the other side of upper lip using an allocation masked swab

Participants with minor burning pain at the 10 minute assessment (n = 0)

Residual pain at 20 minutes (n = 0)
Improvement in Capsaicin-Induced Burning Pain After Cream Application

![Graph showing improvement in NRS change over minutes after cream application. The graph compares Mannitol and Control groups.](image-url)
Conclusions of Helene’s Study

• Capsaicin specifically activates, and then gradually exhausts, the transient receptor potential vanilloid type 1 (TRPV-1) receptor, a key receptor in neuropathic pain.

• Mannitol cream reduced self-reported pain scores in a capsaicin pain model more rapidly than a control cream, potentially via a TRPV1 receptor effect.

(Note mannitol is a close cousin of dextrose and clinically has a similar effect on nerves with injection or with application in a cream. Dextrose cannot be used as easily on the lips due to sweetness which impairs the ability to blind the study)
Dr Smigel’s Epidural Dextrose Analgesia Study

Epidural Analgesia Study Method

Chart Review for Screening Criteria

Offered Participation (n = 54)

Randomization

10 ml caudal D5W (n = 19)

10 ml caudal NS (n = 16)

NRS Pain 0, 15 min, 2, 4, 48 hrs & 2 wks

Declined (n = 19)
Epidural Dextrose Analgesia Results
Conclusions of Epidural Analgesia Study

• Conclusions: Compared to blinded saline caudal epidural injection, D5W using a vertical approach resulted in significant analgesia within 15 minutes and persisted for 48 hours, among chronic non-surgical LBP patients. While the utility of such short term effects is unclear, D5W merits further study; a clinical trial to assess the efficacy of a more robust injection protocol for chronic LBP is underway.
Dr Smigel’s Epidural Dextrose Efficacy Study

- Maniquis-Smigel L, Reeves KD, Lyftogt J, Rosen H, Rabago D. Caudal Epidural Dextrose Injections (D5W) for Chronic Back Pain with Accompanying Buttock or Leg Pain: A Consecutive Patient Study with Long-Term Follow-up. Pending ≈ 1 month AAPM&R Annual meeting
Treatment offered to all 35 participants who completed a single randomized and blinded injection of either D5W or normal saline

Biweekly D5W caudal epidurals up to 4 by request, then unscheduled as needed to 1 year. None after 1 year. (n = 33)

Phone contact 2 years after last injection for last enrollee. (n = 33)

41 ± 2.8 month ODI and NRS pain (n=31)

Job Conflicts Prevent Treatment (n = 1)
Normal Saline Eliminated Pain (n = 1)

Not reachable (n = 2)
Efficacy Study Figure 3: NRS pain pattern after caudal epidural D5W injection: Consistent short term analgesia with some residual benefit. No treatment after 12 months.
Epidural Dextrose Results By Category

Do Not Copy. Pending Publication.

<table>
<thead>
<tr>
<th>Category</th>
<th>NRS Pain</th>
<th>ODI</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS (n=11)</td>
<td>51</td>
<td>44</td>
</tr>
<tr>
<td>NLBP (n=8)</td>
<td>45</td>
<td>29</td>
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<td>RAD (n=8)</td>
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<td>PL (n=4)</td>
<td>37</td>
<td>10</td>
</tr>
<tr>
<td>PN (n=2)</td>
<td>28</td>
<td>0</td>
</tr>
</tbody>
</table>
Conclusions of Epidural Efficacy Study

• D5W, upon introduction into the caudal space in consecutive participants with moderate-to-severe chronic non-surgical low back pain and radiation to either gluteal or leg areas, demonstrated consistent analgesic responses and resulted in a long-term improvement in pain and disability.
Dr Topol’s Dextrose Chondrogenesis Study

Met eligibility criteria and were clinically examined (n = 20)

- Ineligible
  - Any valgus (n = 3)
  - Varus > 20° (n = 3)

Ultrasound scan of medial femoral condyle confirms exposed subchondral bone (n = 14)

- Grade IV cartilage loss not confirmed (n = 6)

- 0.2% lidocaine injection to confirm intraarticular contribution to pain (n = 8)

- Refused arthroscopy (n = 1)

Baseline assessment, screening/baseline arthroscopy, methylene blue injection, and zone by zone video. (n = 6)

- Proliferative synovitis (n = 1)

- 12.5% dextrose injections monthly (n = 6)

Clinical outcome assessment, second look arthroscopy with methylene blue instillation and video. Biopsy of area of new growth. (n = 6)
Conclusions of Dextrose Chondrogenesis Study

- Positive clinical and chondrogenic effects were seen after prolotherapy with hypertonic dextrose injection in symptomatic grade IV KOA participants suggesting disease-modifying effects and the need for confirmation in controlled studies.
Dr Bertrands Rotator Cuff Tendinopathy Study Citation

Gather post waiting period data. Randomly allocate to groups

- Enth-Dex Double Blind
- Enth-Saline Double Blind
- Superfic-Saline Single Blind (Tested)

Injections at 0, 1 and 2 months plus 6 sessions of physical therapy

9 Month Follow-up Pain Levels
Improvement in a 0-10 NRS for pain with 6 sessions of physical therapy (0-3 months) plus 3 injections (0, 1, and 2 months) of DPT versus enthesis needling or superficial injection with anesthetic.
Conclusions of Dextrose Rotator Cuff Tendinopathy Study

• In participants with painful rotator cuff tendinopathy who receive physical therapy, injection of hypertonic dextrose on painful entheses resulted in superior long term pain improvement and patient satisfaction compared with blinded saline injection over painful entheses, with intermediate results for entheses injection with saline. These differences could not be attributed to a regenerative effect. Dextrose prolotherapy may improve upon standard care of painful rotator cuff tendinopathy for certain patients
Dr Louw’s Abstract Citation

• Louw F, Reeves KD, Rabago DP. Treatment of Temporomandibular Dysfunction with dextrose prolotherapy: A randomized controlled trial with long term follow-up. Pending ≈ 1 month. NAPCRG
Facial Pain > 5/10 + Jaw symptoms > 5/10
(39 participants with 50 painful (TMJs)
(1 dropout due to tumor in parotid gland)

- Dex 20%/Lido .2% 1ml @ 0, 1, and 2 mo
- Sterile Water/Lido .2% 1 ml @ 0, 1, and 2 mo.

Simple single injection tiny needle closed mouth

- Inject with Dextrose if any residual pain or jaw dysfunction by request until 1 year

Numerical Rating Scale (NRS) for pain at 3 months & 1 Yr
Mouth opening with pain at 3 months & 1 Yr
Satisfaction score (0-5/5) at 3 months.
Improvement in NRS 0-10 Dysfunction Score to 1 Year in TMD Study

Do not copy. Pending publication
Change in mouth opening with pain to 1 year in TMD Study

Do not copy. Pending publication
Conclusions of TMD Study #1

• Prolotherapy resulted in safe, significant, sustained improvement of jaw pain, function and mouth-opening compared to masked control injections at 3 months; change appears to endure to 12 months.