Cyriax’s Illustrated Manual of Orthopedic Medicine

J.H. Cyriax M.D., MRCP and P.J. Cyriax MCSP
Prolotherapy

- Treats sprain and strain injuries
- An injection treatment to stimulate repair of injured connective tissue by collagen proliferation commonly at the fibro-osseous junction
The union of two dissimilar materials is potentially weak

- Microscopic failure: 4%
- Macroscopic failure: 5 – 6%
Prolotherapy Treatment

- Reduce inflammation
  - 7cc 0.5% lidocaine
  - 2cc 0.5% Marcaine
  - 1cc Kenalog – 10
  - 10cc

- Stimulate regeneration by inflammation and the hyperosmotic effect upon fibroblasts
  - 12.5%, 15%, 25% dextrose
  - 5cc 50% dextrose
  - 3cc 0.5% lidocaine
  - 2cc 0.5% Marcaine
  - 10cc
- **P2G**
  - 25% dextrose
  - 15% glycerine
  - 0.5% lidocaine
  - 0.5% phenol

- Na Morrhuate was often added to make the solution stronger
  - ½ to 1cc per 10cc

- DMSO was added when thickened or scarred connective tissue was present
  - ½cc per 10cc
Ozone can be injected into larger joints after the injection of 25% dextrose solution; in the lumbar region paraspinally if discogenic pain or neuropathic pain is present; also soft tissues.

Cyanocobalamin (Vit – B12)

½ to 1cc per 10cc, if neuropathic pain is present
Caudal Epidural Blocks

- 10 to 40cc 0.5% lidocaine without preservative with Kenalog – 10, 1 mgm/cc
- 5% dextrose in sterile water or 0.5% lidocaine
- 0.5% lidocaine with Sarapin
  - 2 parts lidocaine/ 1 part Sarapin
Intraneural Injections for Rheumatoid Arthritis and Osteoarthritis

by

Dr. Paul K. Pybus


and reprint for physicians and layman

The Control of Pain in Arthritis of the Knee

by

Dr. Paul K. Pybus

(Pseudonym used by Dr. Paul K. Pybus to avoid medical society accusations of ‘advertising’ by South Africa whenever a physician writes for lay people)

Dr. Paul K. Pybus 1984
Neural Therapy

- Paul K. Pybus, M.D.
  (Roger Wyburn-Mason, M.D., Ph.D.)
- The effect of nerve injury upon muscles, fascia, tendon and joints
- The unmyelinated C-fibers
Conduction of Pain

- **Superficial pain**
  - A fibers, myelinated, receptors within the skin

- **Deep pain**
  - C-fibers, unmyelinated, pain receptors in deep and superficial tissues and responsible for myofascial and arthritic pain
Result of C-Fiber Nerve Injury

- Destabilized nerve membrane due to trauma
- Distal inflammation
- Referred pain from the nerve, usually not the joint, to the dorsal root ganglion, and to the central nervous system
- Reflex muscle spasm
- Compression of articular cartilage
A Neural Therapy Solution

- 5% dextrose
- 0.5% lidocaine
- Sterile water
- Kenalog 10
Not all patients respond satisfactorily to Prolotherapy

- Diagnosis
- Nutrition
- Hormonal dysfunction
- Adverse metabolic/infective conditions
- Effectiveness of dextrose based solutions: PRP, Mesenchymal stem cells, Placental tissue, NCCM
The key is **diagnosis**

Must be aware of **all** possibilities
Diagnosis defined . . .

The art of identifying a disease or condition from its signs and symptoms

Today, Modern Medicine has expanded the scope of diagnosis by the addition of X-ray, MRI Scan, CT Scan, Blood Tests, etc.
Physical Examination

Physical Examination of the musculoskeletal system has become a perfunctory exercise by many physicians today.

Diagnosis is often primarily or solely based on blood tests, x-ray, MRI scan, etc.

Many conditions that warrant a specific diagnosis are relegated to non-specific pain syndrome.

Orthopedic medicine – to be successful must rely first on medical history and a good physical examination.

Physical Examination, essentially, is never fully mastered. It is an ongoing learning process.
Spinal Pain

- **Low back pain** ranks as the #3 complaint of people around the world

- **Neck pain** ranks as the #6 complaint of people around the world
<table>
<thead>
<tr>
<th>Waddell - 2004</th>
<th>The Back Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>- A diagnosis of specific (low back) pathology is only achievable in about 15% of cases</td>
<td>- 80% to 90% of back pain problems that come to <strong>medical</strong> attention have no obvious cause</td>
</tr>
<tr>
<td></td>
<td>- If there is no specific diagnosis, <strong>no specific treatment</strong></td>
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</table>
The most common cause of disability below the age of 45 is chronic low back pain.
Long term opioids for chronic back pain:

“The most destructive treatment in the history of back pain?”

The US has less than 5% of the world’s population, but consumes 85% of the world’s prescription opioids.
“The opioid crisis highlights the fact that there are few promising pain-relieving medications in the regulatory pipeline.”

“Limited options for treating moderate-severe pain led to an overreliance on opioids and the current opioid epidemic.”

“Re-energizing the development of pain therapeutics is necessary to quell this epidemic.”
Common Causes of Non-Specific LBP

- Strain, dorso-lumbar fascia at posterior iliac crest
- Sprain of the ilio-lumbar ligament(s) at the fibro-periosteal junction(s) at the posterior iliac crest
- Sprain/arthritis of the L5-S1 facet joint(s)
- Sprain of the posterior sacro-iliac ligaments
- Sprain/arthritis of the L4-L5 facet joint(s)
- Sprain/laxity of the L5-S1 motion segment
- Sprain/laxity of the L4-L5 motion segment
- Patients with hypermobile connective tissue often will sustain sacro-iliac subluxation, often an up-slip
- Cluneal nerve entrapment/irritation
Conditions that can Affect Healing

Protein
- Adults require 0.37-0.68 grams of protein per pound of body weight per day. Rule of thumb: 50-100 grams of protein per day, especially when healing.

Fluids
- Adults should have ½-1 ounce of fluid per pound of body weight per day.

Diet
- A Mediterranean-based is beneficial for healing.
## Conditions that Impair Healing

- Low or imbalanced hormones (esp. Low Testosterone and Low HGH)
- Adrenal Dysfunction
- Hypothyroidism/Hashimoto’s Thyroiditis
- Insulin resistance
- Diabetes
- Estrogen dominance
- Fibromyalgia
- Autoimmune conditions
- Leaky gut syndrome
- Food allergies
- Infections (Lyme, Candida, etc.)
- Vitamin Deficiencies (esp. Vitamin D deficiency)
Nutrient Support for Connective Tissue

- **Amino Acids (Glycine, Cysteine Proline, Lysine, Hydroxyproline, and Hydroxylysine)**
  - Structural material for all three major components of connective tissue: ground substance, elastin, and collagen formation
  - Glycine comprises approximately one-third of the amino acids that make up collagen

- **Glucosamine**
  - A proteoglycan and main component of GAG’s (glycosaminoglycans)
  - Essential for normal growth and repair of joints and articular cartilage
  - Anti-inflammatory (decreases IL-6, COX2 and PGE2)
  - Anabolic effects on both synoviocytes and chondrocytes by enhanced protein synthesis

- **Chondroitin sulfate**
  - A glycosaminoglycans (GA)
  - Composed of D-glucuronic acid and N-acetyl-D-galactosamine
  - Important component of the extracellular matrix (ECM)
  - Most frequent GAG in the aggrecan molecule of the cartilage
  - Aids in the water retention of the cartilage
- Vitamin C
  - Antioxidant
  - Facilitates hydroxylation of proline and lysine to hydroxyproline and hydroxylysine
  - Essential to maturation of collagen molecules
  - Reduces cartilage loss

- Vitamin D
  - Modulates immune system
  - Enhances ECM of tendons
  - Increases transforming growth factors
  - Anti-inflammatory
  - Antibiotic properties, enhances healing
  - Reduces pain

- Zinc
  - Proliferates chondrocytes
  - Required for protein synthesis for production of connective tissue
  - Required for the antioxidant SOD

- Copper
  - Required for cross-linking and maturation of collagen
  - Required to produce SOD
- **Vitamin E**
  - Reduces free radical damage
  - Enhances connective tissue repair and wound healing

- **Magnesium**
  - Helps support all three major components of connective tissue; ground substance, elastin, and collagen formation
  - Stimulates collagen synthesis
  - Prevents swelling and tissue degradation
  - Maintains extensibility of elastin
  - Regulates functional activity of integrins
  - Anti-inflammatory
  - Calms nervous system

- **Omega 3 fatty acids**
  - Reduce pro-inflammatory eicosanoids
  - Decreases IL-1, TNF-α, COX, LOX
  - Increases serotonin and dopamine to decrease pain

- **Catechins- from green tea**
  - Prevents the breakdown of collagen
  - Anti-inflammatory

- **Curcumin**
  - Stabilizes collagen
  - Anti-inflammatory effects by inhibiting leukotriene formation
  - Reduces pain (esp. in nerve endings)
### Hormones Necessary for Optimal Healing

- **Testosterone**
  - Stimulates fibroblasts
  - Reduces inflammatory cytokines
  - Increases satellite cell activation
  - Increases muscle mass
  - Reduces pain
  - Regulates immune system
  - Accelerates healing time
  - Raises dopamine levels

- **Human Growth Hormone (HGH)**
  - Stimulates fibroblasts
  - Increases amino acid uptake and protein synthesis
  - Enhances tissue growth and repair
  - Anti-inflammatory
  - Regulates the parasympathetic nervous system

- **Estradiol**
  - Stimulates collagen and cartilage production
  - Increases hyaluronic acid
  - Enhances muscle repair
  - Reduces pain signaling
<table>
<thead>
<tr>
<th><strong>Progesterone</strong></th>
<th><strong>DHEA</strong></th>
<th><strong>Thyroid</strong></th>
<th><strong>Hydrocortisone</strong></th>
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</thead>
<tbody>
<tr>
<td>Promotes collagen production</td>
<td>Regulates immune system</td>
<td>Promotes collagen synthesis and matrix metabolism</td>
<td>Anti-inflammatory</td>
</tr>
<tr>
<td>Enhances the parasympathetic nervous system</td>
<td>Stimulates connective tissue</td>
<td>Decreases muscle spasms and cramps</td>
<td>Regulates immune system</td>
</tr>
<tr>
<td>Raises GABA levels</td>
<td></td>
<td>Raises serotonin levels</td>
<td>Facilitates thyroid function</td>
</tr>
<tr>
<td>Smooth muscle relaxant</td>
<td></td>
<td>Reduces pain (esp. all over pain related to Fibromyalgia)</td>
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<tr>
<td>Acts as a natural diuretic</td>
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<td>Hypothyroidism causes accumulation of GAG’s in the extracellular matrix</td>
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<tr>
<td>Balances estrogenic effects</td>
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Hypo-thyroidism causes accumulation of GAG’s in the extracellular matrix.
A Short Practice of Spinal Surgery

H.V. Crock

1993 – Second Revised Edition
Internal Disc Disruption

- Henry V. Crock: A Short Practice of Spinal Surgery, 2nd revised edition
- Usually caused by severe or repeated episodes of trauma
- Back pain is prominent, having the character of a deep-seated ache
- Pain is aggravated by activity, spinal manipulation, etc.
- Prolonged sitting can be very painful, as well forward-bending to lift an object
- Often disturbs sleep at night
- If limb pain is present, it often is described as a deep ache, different from impingement neuralgia due to HNP
Observations

- **Disc bulges** are seen in more than $\frac{1}{2}$ of asymptomatic persons.
- **Disc protrusions** are seen in more than $\frac{1}{3}$ of asymptomatic persons.
- **Spinal stenosis** is present in more than 20% of older persons.
- The strongest baseline predictor for low back pain is poor underlying health.
Disc Degeneration

Findings in Young Populations by MRI

**Children:** Kajer Spine, 2005
- Age 13 = 21% disc degeneration

**Adolescents:** Salminen Spine, 1999
- Age 15 = 31% disc degeneration
- Age 18 = 42% disc degeneration

**Young Adults:** Takatalo Spine, 2009
- Age 20-22: n=558
- Disc degeneration = grade 3 or higher, Pfirrmann 5 pt
- Disc degeneration prevalence = 47%; 54% M, 42% F
- Multilevel degeneration = 17%
Disc Degeneration:

The prevalence of disc degeneration of the cervical, thoracic, and lumbar spines younger than 50 years is 71% men and 77% women; over 50 years, 90% for both men and women.

Most common sites of disc degeneration are:
- Cervical C5-6
- Thoracic T6-7
- Lumbar L4-5, L5-S1
## Disc Degeneration & Chronic Spinal Pain

<table>
<thead>
<tr>
<th>Category</th>
<th>Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disc degeneration</td>
<td>• Normal with aging</td>
</tr>
<tr>
<td>Trauma</td>
<td>• Repetitive or specific</td>
</tr>
<tr>
<td>Hypermobile connective tissue</td>
<td>• Genetic predisposition</td>
</tr>
<tr>
<td>Poor overall health</td>
<td>• Nutrition • Hormones • Digestive Disorders</td>
</tr>
<tr>
<td>Poor Posture</td>
<td>• Forward head, rounded shoulders, accentuated thoracic kyphosis,</td>
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<td>increased lumbar lordosis, &amp; pelvic tilt can place abnormal stress</td>
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<tr>
<td></td>
<td>upon the disc</td>
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<tr>
<td>Lack of Fitness</td>
<td>• Dynamic Stability</td>
</tr>
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<td>Fatty infiltration of the paraspinal muscles, especially the multifidi</td>
<td>• Usually from L4 to sacrum</td>
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Advancements in Orthopedic Medicine

- PRP
- Mesenchymal stem cells
- Placental tissue
- NCCM
It may be possible to develop a minimally-invasive percutaneously – delivered combination of “cell-based bioactive factors” which can “mediate the progression of degeneration of the disc.”

Notochordal cell conditioned medium (NCCM) suppresses cell death by stabilizing the mitochondrial membrane within the disc cells and by suppressing the caspase system of enzymes involved in cell death.
Degenerative disc disease (DDD) is associated with the progressive loss of notochordal cells (NCs) and the development of an inferior NP matrix compromising the structural integrity and biochemical properties of the spine. . . . Our in vitro and pre-clinical rodent model emphasized the role of inflammation in the deterioration of the NP - ECM and cell death during progressive disc degeneration. We have identified the key factors secreted by NCD-canine notochordal cells responsible for maintaining a healthy, hydrophilic, proteoglycan rich IVD NP that resists DDD. We have identified the soluble proteins present within NCCM that have the ability to maintain a healthy, proteoglycan rich nucleus pulposus and delay DDD.
MRI April 1, 2014

Post MRI May 9, 2016