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What is the Clinical Value of Labral Special Tests?

By Brent Harper, PT, DPT, DMT, OCS, FAAOMPT

INTRODUCTION

Special testing procedures for the shoulder have long been implemented in the orthopedic realm to help identify tissues in lesion. Yet, the value of these special tests continues to be debated. Presently,[1,2] a cluster of special testing is implemented to help the clinician identify regions that may be involved and have suffered injury. Due to the dynamic nature of the shoulder joint, it has been thought that performing multiple special tests to achieve a clustering of signs and symptoms is a reliable indicator to identify specific tissue involvement. The current gold diagnostic standard is arthroscopy and MR for non-surgical diagnostic evaluation.[3]

Labral tears are difficult to identify using physical examination procedures. Co-existing pathology, including glenohumeral instability, bursitis, Bankart lesions, acromioclavicular pathology, rotator cuff pathology, and intra-articular or degenerative diseasedisease may have overlapping clinical findings and be a source of confusion clinically.[4,5] Superior labral anterior posterior (SLAP) lesions have been typically divided into four groups.[3,4,5]

The labrum can be disrupted in any region, however, the two most common detachments of the labrum off the glenoid rim are: SLAP (superior labrum anterior posterior) and Bankart.[2(p115)] Bankart lesions are usually associated with dislocations.Bankart lesions result in decreased glenohumeral joint stability and increased humeral head translation in an anterior-inferior direction.

In this issue:

Bankart labral detachment for the right shoulder occurs between 2 and 6 o'clock and from 6 to 10 o'clock on the left shoulder.[2(p115)] In contrast, SLAP lesions occur in the superior aspect of the labrum. These lesions are classified into four main types (Table 1). The most common superior labral injury is type II.

Table 1

SLAP Lesion Classification[2(p115,116)]: Classification:	**Description of Classification:**
Type I	Degenerative changes with fraying edges, no distinct avulsion.
Type II Sub-classification: Type II Anterior *	Complete labral detachment from anterosuperior to posterosuperior glenoid rim, with instability of biceps long-head tendon. *Associated with trauma, less likely overhead athlete. **3x more likely in throwing athletes.
Type II Posterior ** Type II Anterior & Posterior	
Type III	Displacement free margin labrum into joint, bucket-handle type, no instability of biceps long-head tendon.
Type IV	Partial rupture in direction of fibers of biceps long-head tendon. Bucket handle displacement of glenoid labrum.

SLAP lesion type II, which is the detachment of the biceps insertion where the biceps anchor becomes destabilized and the superior labrum and the biceps tendon are torn off the superior glenoid, is the most common lesion.[3,4] Management of patients with shoulder pain or complaints is directly related to the results of the clinical examination and is, therefore, dependent on the accuracy of diagnostic physical examination. Implementing current literature regarding shoulder diagnostic testing is vital to accurately diagnosing SLAP lesions. Evidence based physical examination procedures must be clinically implemented so the clinician knows which tests are relevant and how to interpret those tests.

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Understanding the statistics involved with these examination procedures is fundamental in determining the usefulness of these special tests. A brief review concerning statistics is important and will assist the clinician in determining which special test to perform and how to use the outcomes of those tests. Specificity is ruling-in a condition. It is the ability to receive a negative test when the condition is actually absent. This means that a test with good specificity is less likely to test positive when the condition is not actually involved. Sensitivity is ruling-out a condition. It is the ability to receive a positive test when the condition is actually present. This means the test is able to produce a positive outcome when the injury is actually present.[2(pvii,3)] A positive predictive value (PPV) is "the proportion of patients who test positive and who truly have the condition."[2(p4)] Therefore, a special test with a high PPV gives a good estimate of the proportion of those who actually are involved. A negative predictive value (NPP) "indicates the probability that a person who tests negative on a clinical test actually does not have the condition."[2(p4)] The more important finding is the sensitivity of the special test. When applied to musculoskeletal special testing for clinical elimination diagnostics, especially for the glenoid labrum, sensitivity is a more important finding due to the risk involved. A person suspected of having a labral tear is typically a surgical candidate and an inaccurate diagnosis may result in unnecessary surgical intervention.[2(p3,4)] "A positive likelihood ratio (+LR) refers to how much more likely a positive test is to be found in people with the condition than in people without it. A negative likelihood ratio (-LR) refers to how much more likely a negative test is to be found in people without the condition than in people with it."[5(p342)] It is thought that likelihood ratios are one of the most useful statistics for diagnostic accuracy of clinical tests.[5] A recently developed tool, the Quality Assessment of Diagnostic Accuracy tool (QUADAS),[3,5,6] which evaluates internal and external validity allowing the researcher "to avoid exaggerated reporting of diagnostic utility from poorly designed studies that might otherwise lead to errors in clinical decision-making, including inaccurate diagnosis, inappropriate treatment, and premature adoption of a special test that provides little value."[3(pE60)] Therefore, it evaluates the quality of research. QUADAS is a retrospective tool that critiques methodological rigor, systematically evaluating the quality of these of studies. It is considered an evidence-based tool that has demonstrated good interrater agreement and face validity with the Delphi procedure.[5] "The tool consists of 14 questions that can be answered as yes, no, or unclear. Nine of these questions relate to bias, three relate to the quality of the reporting, and two relate to variability.[5(p345)]

Dessaur and Magrey[5] performed a systematic review of literature from 1996 to 2000 involving SLAP lesion assessment. They used the Quality Assessment of Diagnostic Accuracy tool (QUADAS) to determine the quality of the literature. They found a lack of quality papers in those that purported good statistical values. They identified a clinical picture of symptoms, which include popping, locking, grinding, and catching. Incidence in the general population was about six percent and 35% in the sporting population. The mechanism of injury tended to involve traction or compression forces such as a fall onto an outstretched arm or during throwing due to deceleration forces. They identified five clinical tests that had +LR greater than ten, these included active compression (O'Brien test), compression

forces such as a fall onto an outstretched arm or during throwing due to deceleration forces. They identified five clinical tests that had +LR greater than ten, these included active compression (O'Brien test), compression rotation, biceps load, biceps load II, and crank test. Unfortunately, the high value results of these studies were not confirmed or replicated in follow up studies. Using the QUADAS method of judging research quality, the special tests that tended to be associated with SLAP lesions, primarily type II SLAP lesions, were the resisted supination external rotation test and the biceps load II test.

Powell, Huijbregts, and Jensen[3] performed a review of literature from 1985 to 2007 on SLAP lesions using QUADAS. The goal of this article was to compile current evidence-based physical examinations for the diagnosis of SLAP lesions. According to their findings, achieving positives or negatives with one or a compilation of special tests assists in the identification of SLAP lesions (Table 2). The authors said "the greatest diagnostic value should likely be placed on a positive finding on the passive compression test." [3(pE78)]

Table 2[3(pE58,E77,E78)]

Negative Test (rule out a disorder, high sensitivity)	Passive compression test
Positive Test (rule in a disorder, high specific)	Anterior apprehension maneuver, Anterior slide test, Jobe relocation test, Passive compression test, Speed test, and Yergason test Or combination of: a) Jobe relocation test & Active compression test b) Jobe relocation test & Anterior apprehension maneuver

Hegedus, et al[6] performed a literature review on orthopaedic special tests (OSTs) for impingement and labral pathology to assess diagnostic accuracy and value for clinical practice. They reviewed articles from several data bases from 1966 to 2006, determined the quality of these articles' internal and external validity using QUADAS, and did a meta-analysis through meta-regression of the diagnostic odds ratio for the Speed test for superior labral pathology. They identified that the Speed's test was no better than chance as a diagnostic tool for a SLAP lesion. They described that "OST's with high sensitivity are valuable as a screen where a negative test can rule out a pathology while OSTs with a high specificity can be used as a confirmatory test where a positive finding rules in the pathology." [6(p89)] They concluded that few special tests are diagnostically discriminatory and most are clinically questionable. Continued studies are required to improve the diagnostic usefulness of special testing. The authors stated the present literature demonstrated good validity for identifying labral pathology, but these initial studies did not have the same results from other studies. Despite these noted discrepancies, the authors recommend, with caution, the Biceps Load II test as diagnostic for SLAP lesions.

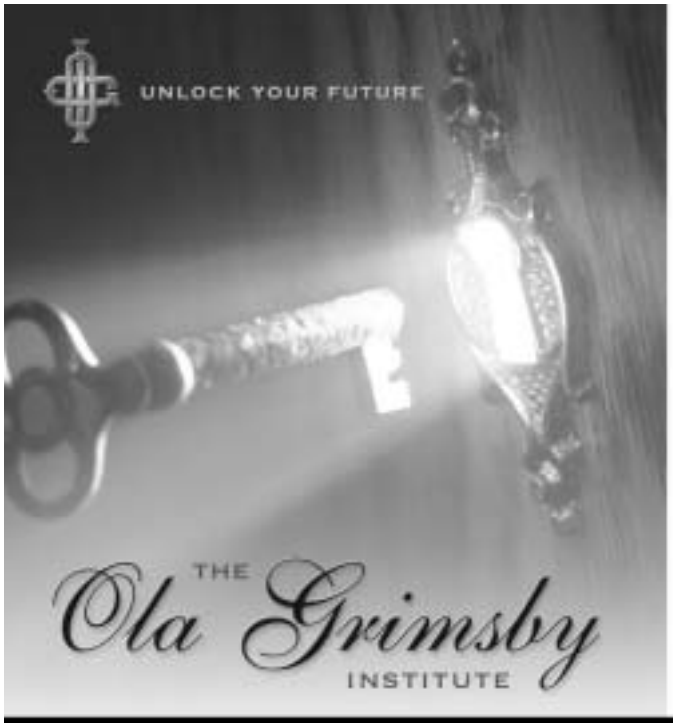
Recently, Todd Ellenbecker[2] wrote a book describing in detail specific special testing procedures purported to help identify shoulder pathology. One chapter specifically covers special testing for labral involvement. In the book, [2] he gave specific instructions on performing these tests, what constitutes a positive and/or negative result, and what is the current research for these special tests.

CASE STUDY

The purpose of this case study was to perform all special testing for labral involvement as described by Ellenbecker[2] on a patient who previously received plain film radiography and MRI and prior to her scheduled arthroscopic shoulder surgery date. The intent was to determine which labral physical examination special tests would be found positive for this patient and to discover the potential clinical value of performing multiple provocation testing on the shoulder for this specific diagnosis.

The patient was a 65-year-old female with no known trauma or mechanism of injury (MOI). The patient's primary complaint was pain limiting her active range of motion. These pain complaints were accompanied by reports of popping or clicking with various shoulder motions, but without directional specificity and not always concurrent with reports of pain during movement. The MRI results demonstrated an interosseous cyst with evidence of a SLAP lesion. Further results included some findings of impingement syndrome and tendinitis, however, there was no evidence of rotator cuff tear(s). Prior to performing the labral special testing procedures, the therapist knew the MRI results. The therapist prepared to perform the special testing procedures in accordance with the reference material[2]. Results of the nine tests performed were recorded then considered positive and/or negative based on the descriptions given[2]. Labral special testing included: Clunk, Circumduction, Crank, Compression/Rotation, Anterior Slide, Active Compression (O'Brien's), Biceps Load, Biceps Load II, and Mimori Pain Provocation.[2(P115-129)] (Table 3)

Labral Special Test[2]:	**Indication**	**Positive Test Results:**	**Present Research**
1. Clunk	Labral tear or detachment.	Pain reproduction, a clunk that reproduces symptoms, and pseudolocking.	Minimal. Lacking studies.
2. Circumduction	Labral pathology.	Pain reproduction, a clunk, or pseudolocking.	None.
3. Crank	Labral pathology.	Pain elicited primarily during external rotation with or without a click.	Moderate. Use in conjunction with other labral tests. Moderate.
4. Compression /Rotation	SLAP; superior labral pathology	Reproduction pain, a clunk, or pseudocatching.	Use in conjunction with other labral tests.
5. Anterior Slide	SLAP; superior labral pathology	Pain localized front shoulder (anterior/superior) and/or pop or click in same region.	Minimal.
6. Active Compression (O'Brien's)	SLAP; superior labral pathology & Acromioclavicular Joint involvement	SLAP: Pain deep in anterior shoulder or clicking.AC: Pain localized to the joint.	Moderate. Results vary on sensitivity, specificity, PPV, and NPV.



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7. Biceps Load II	SLAP; superior labral pathology on recurrent anterior GH dislocations	Feeling apprehension does not change during contraction of biceps or becomes more apprehensive or painful during biceps contraction. Negative if feeling apprehension lessens.
8. Biceps Load II	SLAP; Isolated superior labral injuries.	Pain during resisted elbow flexion. Negative if no pain, if pretest pain is diminished, or if pain level is unchanged.
9. Mimori Plan Provocation	SLAP; Superior labral pathology.	Pain only when forearms is in pronated position or when pain greater pronated>supinated. Negative if no difference in pain or when less painful pronated position.

The positive labral tests included clunk, crank, compression/rotation, anterior slide, Active Compression/ O'Brien's test, Biceps Load II test, and Mimori pain provocation. Clunk test caused deep pain when performing anterior motion. Crank caused deep pain, primarily with internal rotation. Compression/Rotation resulted in posterior shoulder pain when in 90 degrees of external rotation. Anterior slide caused deep anterior and inferior pain. Active Compression/O'Brien's test caused anterior shoulder pain that was equal in both test positions. Biceps load II resulted in minor deep pain complaints. Mimori pain provocation caused deep pain when forearm was placed in pronated position. Seven of the nine special tests for labral pathology indicated that the labrum was involved.

Prior to surgery, the orthopedic physician's impression was right shoulder SLAP lesion with interosseous cyst and impingement syndrome. The patient underwent arthroscopic surgery shortly after undergoing the special testing examination. Diagnostic arthroscopy was performed and the findings included: grade 3 and early 4 chondromalacia of the glenoid and humerus, significant frayed labrum with a large type II SLAP lesion, normal subscapularis tendon, minimal fraying of the supraspinatus tendon, remainder of the rotator cuff was normal, and significant synovitis. The physician performed right shoulder arthroscopy, superior labrum anterior and posterior lesion repair type II, arthroscopic subacromial decompression and pain pump placement. The postoperative diagnosis was right shoulder superior labrum anterior and posterior lesion with impingement syndrome and chondromalacia.

Conclusion

Seven of the nine special tests designed to identify the labrum were considered positive. This was a strong indicator that the labrum was involved in significant pathology using a battery of special tests. These findings were consistent with the MRI results and were confirmed upon arthroscopy.

Discussion

The significance of this case study is very limited, but it may add to the evidence regarding special testing to identify labral pathology. This case study is a clinician's observation of the value of labral special tests. The literature reveals[2,3,5,6] there is a lack of quality studies supporting the validity and clinical usefulnessorthopaedic physical testing. This case study did not take into account other potential pathologies,

co-morbidities, and the special tests related to other diagnosis. It was simply performed to evaluate the labral tests discussed by Todd Ellenbecker[2] in his book titled, "Clinical Examination of the Shoulder." For questions regarding varied nuances of what constitutes a positive or negative result from the performance of these labral tests and regarding the evidence behind those particular special tests, the reader is directed back to the book.[2] It is interesting that pain was the only positive indicator of these particular special tests, rather than additional purported symptoms. Although the patient had a positive history of clicking or popping, these symptoms were not reproduced during the physical examination tests. It is clear that there is not one special test sensitive enough to diagnose a labral injury. There may be value in performing multiple provocation special tests to help identify structures in lesion. Thus, the implementation of multiple provocation tests for labral pathology may improve the sensitivity of special testing to identify this structure. The question still remains, which tests should be included in such a battery of special tests? And how many special test should be included in any such battery of special tests? Comparing this study to recent evidence-based literature reviews[3,5,6] demonstrates that more evidence might be given to adding the Biceps Load II test to any proposed battery of special tests meant to identify labral pathology. Other special tests from this study that could be considered are the Active Compression/O'Brien's test and the Anterior Slide test. Both may add some clinical diagnostic specificity and should be included in any future studies that attempt to identify a battery of special tests specific to labral diagnostics. Despite the ambiguity and lack of statistical support, there could be some value to performing these orthopaedic special tests in order to expand one's clinical knowledge and assist with clinical reasoning to assist in identifying those who are and are not good surgical candidates leading to more timely and appropriate intervention procedures.

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Special thanks to Dan Kirk, MPT, OCS in the assistance of this case study.

A FOUNDING FATHER OF MANUAL THERAPY HAS PASSED AWAY.

Ronald Moller Stensnes left us on August 21st, 2008 in his 88th year. As an active member of the Norwegian underground movement he served at convoy marine operations in the North Sea during the Second World War. Ronald discovered his interest in rehabilitation when he was injured during his service. He received treatment from an osteopath in Scotland, and after the war he completed his education in physical therapy in Sweden and in Norway. During a conference in Copenhagen he learned about Dr. James Cyriax and his work in London. He read Dr. Cyriax's book and the following year he went to London together with his class mate from physical therapy school: Freddy Kaltenborn.

They took courses from James Cyriax and from Dr. James McMennell and brought the course curriculum back to Norway. Here a colloquium of colleagues created the "Special Interest Group for Medical Manipulation" in 1954. This was the beginning of what today is known world wide as Norwegian Manual Therapy.

In 1964 he started the first clinic offering manual therapy on the west coast of Norway and received national and international recognition as a clinician and clinical instructor. He taught and trained physical therapists, dentists and physicians throughout Scandinavia, Germany and the Netherlands, and included general and specific assessments, interventions with soft tissue treatments, mobilization/manipulation of joints and exercises in his approach to manual therapy. He served as chairman of the local physical therapy association, charied national and international manual therapy organizations and offered residency and fellowship training for mnual therapy students in the official Norwegian Physical Therapy Association's four year program. In year 2000 he received his honorary doctoral degree from the Ola Grimsby Institute for his lifelong achievements on behalf of Norwegian manual therapy.

Ronald was an inspiration and a motivator with enthusiasm and excellent clinical knowledge and skills. His patience and kindness made him an outstanding mentor and a renowned spokesperson for Norwegian manual therapy nationally and internationally. His infectious inspiration was highly appreciated by all of those fortunate enough to work with him and to study with him.

He will be deeply missed as a father, mentor, clinician and friend. We are extremely grateful for all that you gave, and will always honor what you left behind.

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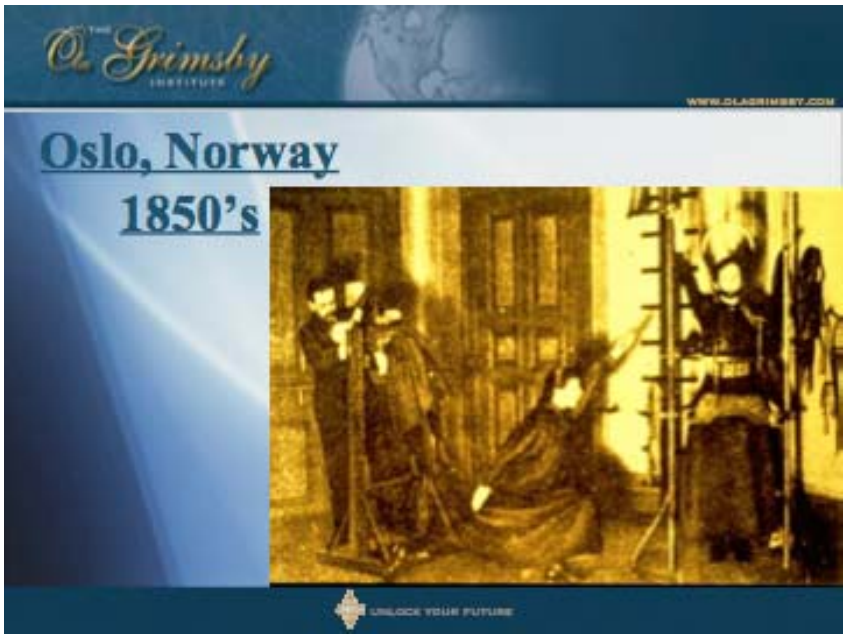
The History of Exercise Education in Scandinavia

By Ola Grimsby, PT, MNFF, MNSMT, FFAAOMP

From 1814 to 1905 Norway was in a union with Sweden and in many ways influenced by Swedish politics and culture. One of the many things that made Sweden a cultural center in Europe was its educational programs in gymnastics. These programs were mainly offered to military officers and were divided into two parts:

a) a two-year program in military gymnastics for healthy people
b) a two-year continuation with gymnastics for school children and patients (medical gymnastics).

The renowned program was founded in 1813 by Peter Hanrik Liug and was considered to be based on scientific principles. "The Royal Gymnastics Central Institute" (today called "GIH") became famous throughout Europe, and treated conditions from internal medicine to orthopedics. The curriculum was suggested to be a mandatory part of the medical education. From 1813 to 1850 numerous private clinics were opened, and the clinicians were primary health care providers, similar to performers of the medical profession. Their modalities also included manual therapy, and consequently performed manipulative procedures long before chiropractics and osteopathy were founded. In 1834 his educational program experienced a complete gender transformation – a governmental investigation in 1829 recommended that male students should not be allowed to enter the physiotherapy education program. In Anders Ottoson's these "The Physiotherapist – What Happened to Him?," a study of the de-masculinization of the physiotherapy profession from 1813-1934, Ottoson refers to this "androphobic" demasculinization as a result of a "power battle between men and male hierarchies rather than that between men and women." It was strongly influenced by a "homosocial" conflict between physicians and the physical therapist, commonly referred to as Directors of Gymnastics. In the 1850s, Lieutenant Bolling of Norway initiated a one-year physical therapy program solely for women and only for practice in hospitals. In 1897 Norwegian physicians educated at Liug's institute in Stockholm joined the Norwegian female physical therapists in order to start the Norwegian Physical Therapy Association. One year later they applied to the Norwegian government for permission to initiate a four-year educational program following the Swedish pattern. This application was neglected, and in 1899 three orthopedic surgeons in Oslo started another one-year program to educate solely female therapists. In 1902 the government responded by turning down the application for a four-year program as of 1898. The Norwegian program remained a one-year curriculum until Oslo Orthopedic Institute was formed in 1912, and only accepted women. However, in 1948 Freddy Kaltenborn was accepted as the first male participant in their two-year program, followed by Dirk Hansen in 1989. Oddvar Holten and a few other men with a prerequisite in physical education were accepted as well.



When the physical therapy education was transferred to the responsibility of the Norwegian government in 1969, male applicants had to complete a one-year education in Physical Education (Idrettshoyskole) prior to applying to the Governmental Physical Therapy School, which now was extended to an additional three-year program. The education in sports and gymnastics was a one-year program and only mandatory for males. Females received similar education during their physical therapy education. When this author was accepted as a student in the first year of governmental control less than we had to take our sports education prior to our application for physical therapy. ten percent of the students were males, and In 1964 the Norwegian teachers in manual therapy financed an education experience by sponsoring Oddvar Holten's studies at Marx Plancks Institute in Germany. When Mr. Holten returned to Norway he developed Medical Exercise Therapy (MET) and introduced this as an extension to his Manual Therapy education.

The instructors who taught this curriculum and introduced it to Scandinavia were all Norwegian physical therapists in with four-year post-secondary education in Manual Therapy credential by the Norwegian Physical Therapy Association. In 1967 MET achieved its own reimbursement code by the Norwegian National Health Insurance Company. Ola Grimsby was asked by Mr. Holten to adapt and to introduce the MET curriculum to the United States. As of 1972, based on the Norwegian MET curriculum, Mr. Holten appointed Kathy Grimsby, Rick Hobush and Ola Grimsby as the three first instructors in the US. The program is currently modified according to current evidence and research, and is today presented by The Ola Grimsby Institute as Scientific, Therapeutic Exercise Progressions in short-terms courses, as a three-month certification program, and as an important component in our Doctor of Manual Therapy degree and PhD in Manual Therapy programs.

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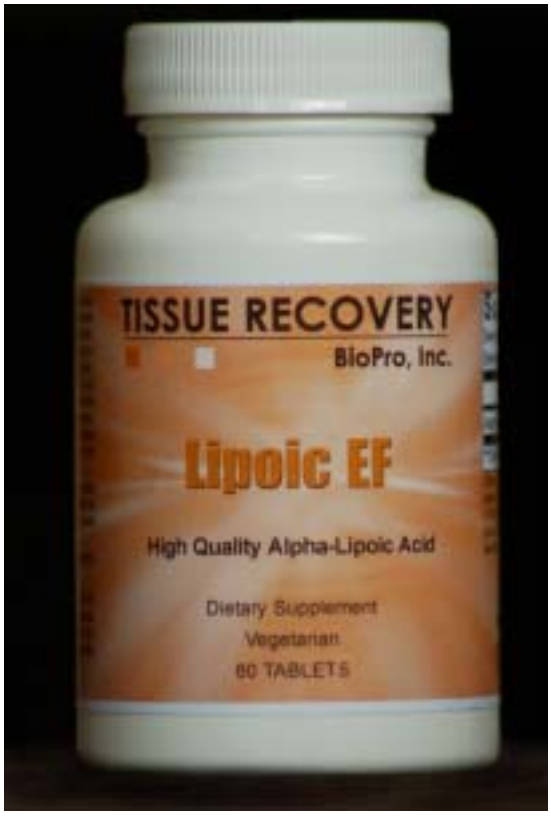

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