Reflex Sympathetic Dystrophy: Diagnostic Controversies
Robert S. Fournier and Lawrence E. Holder

Reflex sympathetic dystrophy, (RSD) is a complex physiologic response of the body to an external stimulus resulting in sympathetically mediated, usually nonanatomic pain, which is out of proportion to the inciting event or expected healing response. This complex entity has been the focus of much investigation, leading however to somewhat confusing and conflicting results and theories about the etiology and pathophysiology. There is even significant conflict about what characteristics define the clinical entity called RSD, and if these characteristics vary with the specific site of involvement. We have examined the current literature regarding these fundamental conflicts, and in addition we have evaluated the current controversies surrounding the role of Three Phase Radionuclide Bone Imaging (TPBI) for diagnosis, prognosis, and patient management. These controversies include the role of scintigraphy, the various criteria for scintigraphic diagnosis, and the reported variations in sensitivity and specificity of TPBI in RSD. We have examined several factors that may have affected these results, and potentially underestimated the value of scintigraphy in the diagnosis of RSD. In addition to the heterogeneous patient populations used to establish the diagnosis by different subspecialty physicians, these factors include duration of patient's symptoms, age of the patient population evaluated, location of the disease, and the varying scintigraphic scan interpretation criteria used.

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Reflex Sympathetic Dystrophy (RSD), is a term filled with controversy and misunderstanding. The confusion encompasses its name, definition, and even the process of its diagnosis. In this article we will outline and analyze some of the controversies and research surrounding RSD, emphasizing radionuclide bone imaging. A well-referenced recent review has focused on the debate involving the pathophysiology, pharmacology, and treatment.

Many of RSD's aliases have subtle differences; the more common terms include causalgia, algodystrophy, algoneuropathy, sudek's atrophy, shoulder-hand syndrome, sympathetically mediated pain syndrome (SMPS), and complex regional pain syndrome, type 1 (CRPS-1). RSD's definition creates disagreement within both specialties and subspecialties. Schutzer and Gossling presented the definition most commonly agreed upon by orthopedic surgeons and radiologists. "RSD is an excessive or an exaggerated response to an injury of an extremity, manifested by four somewhat constant characteristics: (1) intense or unduly prolonged pain, (2) vasomotor disturbances, (3) delayed functional recovery, and (4) various associated trophic changes." The key feature of this syndrome is pain, and indeed this may be the initial clinical manifestation of RSD.

Because RSD lacks specific pathologic, histologic, or biochemical markers, a clear and accurate definition is necessary. RSD's diagnosis often becomes one of exclusion, heavily weighted by clinical evaluation and supported by supplemental examinations such as scintigraphy. RSD typically occurs in an extremity after an inciting event (eg, trauma, surgery). In as many as 10% to 26% of reported cases, though, no identifiable cause can be determined. Some suspected causes or inciting factors include: acute stroke/CVA, limb trauma, spinal cord injury, myocardial infarction, medications including anticonvulsants and barbiturates, neuromuscular disorders, rotator cuff injury, and cervical spine disease of all types.

The clinical picture of RSD has been described in the literature by authors from different clinical disciplines (anesthesiologists, hand surgeons, orthopedists, physiatrists, rheumatologists), who have not unexpectedly emphasized different signs, symptoms, and diagnostic criteria. A clinical schema in which the stage of the disease was related to the duration of symptoms following the inciting event was proposed by a rheumatologist. The time frames are highly variable and considerable overlap exists between the following stages:

- **Stage One—Duration of Weeks to Months.**
  The limb has nonfocal pain, swelling with associated joint stiffness and decreased range of motion. There is increased skin temperature and pain peaks at the end of this period.
- **Stage Two—Duration of 3 to 6 Months.**
  Pain continues but decreases over time.

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ing evolves into thickening of the dermis and facia. The extremity becomes cooler. Early signs of atrophy and osteoporosis become evident.

• Stage Three—Atrophic Stage.

Pain continues, atrophy is exacerbated with continued decreased range of motion and increased joint stiffness. The extremity demonstrates decreased vascularity and is cooler.

As there is no true pathological "gold standard" for RSD diagnosis to which a three-phase bone scan (TPBS) is compared for accuracy, scan results must be compared to a predefined clinical presentation/examination. This is the first diagnostic dilemma—what characteristics define RSD and is there a difference in the presentation or the syndrome itself in different anatomic regions? Clinical criteria for the diagnosis is currently under debate. Kozin et al., also working in a rheumatology clinic, subdivided their population into definite, probable, or possible candidates of having RSD in the hands and feet. This subdivision of the population group was based on the combination and severity of pain, vasomotor instability, and swelling. Kozin's populations are not easily separable, however, and are not universally accepted. MacKinnon and Holder defined a more homogenous group of patients thought to have RSD in the hand and wrist as defined by a group of hand surgeons in a referral center. Their diagnostic criteria included: complaint of diffuse hand pain, diminished hand function, joint stiffness, skin and soft tissue trophic changes, with or without vasomotor instability. Patients without these specific criteria, which were more definitive and strict than those set forth by Kozin, were not considered to have RSD. Further studies have been performed using both sets of criteria, producing variable results which will be discussed shortly.

Pathophysiology

There is no single unifying hypothesis that yet explains the complex picture of RSD. The most widely accepted theory arises from early work performed in the 1930s and 1940s by Livingston and Lewis and discussed in subsequent publications. They both suggested the existence of a "short-circuit" in the reflex arc between somatic afferent sensory fibers and autonomic sympathetic efferents, which results in overall increased sympathetic stimulation. Hyperactivity in the spinal inter-}

outflow. In addition, they surmised that constant afferent input from damaged hyperactive overstimulated nociceptive cells may constantly feed back and stimulate the internuncial neurons and thereby increase sympathetic efferent output. Later, Almay postulated that the reflex arc is also modified centrally via inhibitory systems within the dorsal horn of the medulla. Problems with the reflex arc may therefore also occur centrally with dis-inhibition of the inhibitory central activity. Roberts hypothesized that the primary pathology begins with sensitization of wide dynamic range neurons (WDR) of the spinal cord by hyperactive nociceptors in the periphery. These peripheral nociceptors/mechanoreceptors are continuously activated by sympathetic efferent stimulation which need not be hyperactive but merely present in the basal state.

On the biochemical level, tissue injury as the "initial inciting event" leading to a multistep process in which substance P, histamine, and prostaglandins are released, causing secondary capillary dilation, edema, and loss of thermoregulatory control through AV shunting, has been discussed. Prostaglandins have a multifaceted role. They have an indirect effect on bone metabolism, potentiate pain mediators, and mediate the overall inflammatory process. There may be a vicious cycle of nociceptor stimulation by the release of biochemi-}

cals, such as prostaglandin, which causes vasodilation and AV shunting, which in turn creates regional hypoxia and further stimulates nociceptors to produce pain, increasing outflow of prostaglandins, thereby perpetuating a vicious cycle of vasodilation, low flow and restimulation of nociceptors. More recent work emphasizes the role of the alpha adrenergic receptors, given their essential role in maintaining and controlling thermoregulatory modulation. One theory suggests that these receptors may be expressed on afferent nociceptors which may become stimulated/hyperstimulated via the release of norepinephrine from a post-gangli-}
vironment of a hypoactive sympathetic nervous system.

**Scintigraphic Diagnostic Criteria**

The most comprehensive diagnostic criteria for interpreting the TPBS was set forth by Holder and MacKinnon (Table 1). They stated that the abnormal increased activity must be diffuse. This was differentiated from multifocal uptake, which is not RSD; or from focal uptake, as a possible initiating lesion, upon which diffuse uptake of RSD is superimposed. The pattern of increased flow on the radionuclide angiogram, diffuse increased blood pool phase activity, and diffuse increased delayed activity may be the most suggestive of RSD; however abnormality in all three phases are seen in less than half of patients. The diffuse increased activity, with juxtaarticular accentuation on the delayed images appears to be the most suggestive and sensitive scintigraphic finding (Fig 1). The radionuclide angiogram and blood pool imaging in the three-phase exam provide less sensitivity and specificity and may not be essential in the diagnosis of RSD.

Demangeat and colleagues demonstrated three separate scintigraphic patterns which they related to the duration of symptoms. Like most attempts to stratify patients there was considerable overlap in each of these separate scintigraphic patterns.

**Stage One: 0-20 Weeks from Onset of Symptoms**

Abnormal/asymmetric perfusion, increased vascularity on blood pool imaging, and increased activity on delayed/early images.

**Stage Two: 20-60 Weeks**

Overall normal appearing perfusion and blood pool imaging (however these may be variable); persistent hyperfixation in the majority of patients in delayed/early imaging.

**Stage Three: 60-100 Weeks**

Possibly decreased vascularity in blood pool images with normalization of delayed/early imaging.

Demangeat et al concluded that the delayed image was the most sensitive in their Stage One patients (less than 20 weeks duration of symptoms), and that the use of the TPBS, albeit not essential for the

<table>
<thead>
<tr>
<th>Table 1. Criteria for Grading Diffuse Positive Three Phase Radionuclide Bone Scans of the Hand</th>
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<tbody>
<tr>
<td><strong>Phase I. Radionuclide Angiogram (RNA, Flow Study)</strong></td>
</tr>
<tr>
<td>Flow must be diffusely increased to all portions of the wrist and hand. Increased perfusion usually appears in the abnormal side at least one frame (0 to 5 sec) earlier than the normal side but can appear in the same frame. The activity in the abnormal hand is compared with that in the normal hand.</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
</tr>
<tr>
<td>0/3 Normal. Radial and ulnar artery activity appear as distinct lines, the palmar arch activity appears as a blush within one frame, with finger activity appearing as a homogeneous blush by that frame or the immediately following frame.</td>
</tr>
<tr>
<td>1/3 Definitely increased, but not dramatic, 1/2 to 2 times normal.</td>
</tr>
<tr>
<td>2/3 Easily discernible, between 2 and 3 times normal; increased activity can also be seen in the radial and ulnar arteries.</td>
</tr>
<tr>
<td>3/3 Very intense increase, at least 3 times normal; increased activity in the radial and ulnar arteries can be seen.</td>
</tr>
<tr>
<td><strong>Phase II. Blood Pool or Tissue Phase Image</strong></td>
</tr>
<tr>
<td>Activity must be diffusely increased. The increase in the metacarpal-phalangeal regions and in the juxtaarticular regions of the digits is usually diffuse, ie, one does not have to specifically define the MP or IP joints for the blood pool image to be considered positive.</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
</tr>
<tr>
<td>0/3 Normal. Slight increased activity in the thenar and hypothenar areas. Approximately twice as intense as activity in the distal forearm or fingers. Otherwise, tissue activity is homogenous.</td>
</tr>
<tr>
<td>1/3 Definitely increased, but only slightly greater than normal.</td>
</tr>
<tr>
<td>2/3 Easily discernible, 1½ to 2 times normal.</td>
</tr>
<tr>
<td>3/3 Very intense increase, at least 3 times normal. One can often see increased relative vascularity outlining the juxtaarticular regions.</td>
</tr>
<tr>
<td><strong>Phase III. Delayed Image</strong></td>
</tr>
<tr>
<td>Diffusely decreased activity must involve the radial-carpal, intercarpal, carpal-metacarpal, MP, and IP joints. Occasionally, one sees increased activity involving the distal radius and ulna.</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
</tr>
<tr>
<td>0/3 Normal. The MP joint areas are 1½ to 2 times more intense than the shafts of the bone. It is less easy to distinguish the PIIP joints and even more difficult to distinguish the DIP joints.</td>
</tr>
<tr>
<td>1/3 Minimally positive. Wrist activity is asymmetrically increased. MP and IP joint activity is just slightly greater than normal, but definitely increased when compared to the opposite side.</td>
</tr>
<tr>
<td>2/3 Easily seen difference, at least 1½ to 2½ times normal. PIIP juxtaarticular joint activity more prominent than DIP activity.</td>
</tr>
<tr>
<td>3/3 Very intense increase, including the MP and IP joints, usually at least 3 times normal.</td>
</tr>
</tbody>
</table>
diagnosis of the disease, may be helpful in determining the disease's stage. This work was corroborated by Werner et al. In their series of patients with symptoms of less than 26 weeks' duration or in patients older than 50 years, they found the delayed images were most sensitive in diagnosing RSD.

*The Role of Scintigraphy*

With no generally accepted objective marker for the disease, there is substantial difficulty in making a clinical diagnosis of RSD. The TPBS has become widely accepted as an adjunct to the physical findings. There is, however, considerable debate about the sensitivity, specificity, positive predictive value, and negative predictive value of this exam. The range of these values in the current literature must be critically analyzed: sensitivity 54% to 100%; specificity 85% to 98%; positive predictive value 67% to 95%; and negative predictive values 61% to 100% (Table 2). The sensitivities and specificities quoted reflect the original author's criteria for diagnosis, criteria for scan interpretation, as well as their referral pattern and patient population, and may therefore not really be comparable.

The factors that appear to be affecting the reported sensitivity and specificity values in these studies are:

(i) diagnostic criteria of RSD used in each study;
(ii) duration of symptoms in the study population;
(iii) age of patients in the study population;
(iv) scan interpretation criteria;
(v) location of disease.

*Table 2. Comparison of Three Retrospective and One Prospective Study Evaluating Usefulness of Three-phase Bone Scintigraphy in Diagnosing Reflex Sympathetic Dystrophy*

<table>
<thead>
<tr>
<th>Author</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Positive Predictive Value (%)</th>
<th>Negative Predictive Value (%)</th>
<th>No. of Static Scintigrams Examined</th>
<th>No. of Patients with RSD</th>
<th>Mean Age (Years)</th>
<th>Average Duration of Symptoms (Weeks)</th>
<th>No. of Positive Scintigrams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kozin et al16 groups 1, 2, 4, 5</td>
<td>83</td>
<td>NA</td>
<td>NA</td>
<td>18</td>
<td>18</td>
<td>76</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kozin et al16 group 1 only</td>
<td>96</td>
<td>98</td>
<td>99</td>
<td>145</td>
<td>23</td>
<td>43</td>
<td>28</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Mackinnon and Holder11,12</td>
<td>50</td>
<td>92</td>
<td>67</td>
<td>63</td>
<td>16</td>
<td>38</td>
<td>84</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Werner et al17 groups 1, 2</td>
<td>64</td>
<td>94</td>
<td>88</td>
<td>79</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Werner et al17†</td>
<td>100</td>
<td>85</td>
<td>75</td>
<td>100</td>
<td>19</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Pollock et al11†</td>
<td>54</td>
<td>-</td>
<td>-</td>
<td>28</td>
<td>26</td>
<td>39</td>
<td>15</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Kozin's study group has been listed twice to show the results when groups 1 and 2 are combined, and when the more selective group 1 is analyzed alone. Mackinnon and Holder's group would be comparable to Kozin's group 1 criteria. Werner and Davidoff's data are broken down into three categories:

*hand patients;
†hand patients with RSD < 26 weeks;
‡hand patients over age 50; — data not available.

NA cannot be defined in this group. [Reproduced with permission.22]
(ii) Diagnostic Criteria of RSD. The two most widely accepted diagnostic criteria for RSD have been discussed. Kozin reported TPBS sensitivity and specificity of 60% and 92%, respectively, using his clinical and scan interpretation criteria. Holder and MacKinnon reported much greater sensitivity and specificity using their more demanding clinical criteria and much stricter scan interpretation criteria. Their sensitivity and specificity results were 96% and 98%, respectively. (It should be noted that Holder and MacKinnon’s patient population had a significantly shorter duration of symptoms, averaging 28 weeks compared with Kozin’s 76 weeks.) The single patient with RSD in their series who did not have diffuse increased tracer accumulation on delayed images, was characterized as Lankford type 4 (end stage disease) although the exact duration of symptoms was not reported. Werner et al reproduced Kozin’s results, using Kozin’s criteria and scan interpretation, with an average patient symptom duration of 84 weeks.

(iii) Duration of Symptoms and (iii) Age of Patient Population. Werner et al supported the finding that sensitivity is inversely affected by duration of symptoms. Additionally, their patients over 50-years-old had greater TPBS sensitivity in the detection of RSD. Werner’s older population demonstrated a sensitivity of 100% and specificity of 85%, positive predictive value of 75%, and negative predictive value of 100%. In the population group with symptoms less than 26 weeks in duration, the sensitivity was 64%, the specificity 94%, positive predictive value 88%, and negative predictive value 79%. The apparent difference in the sensitivity between Werner et al and Holder and MacKinnon may be explained in their inclusion criteria—Werner follows Kozin’s less strict criteria, whereas Holder and MacKinnon adhere to much stricter criteria. Additionally, Werner’s work may be affected by the low prevalence rate in his patient population. The age factor was supported by Watson’s later work.

(iv) Scan Interpretation. The difficulty in comparing scan interpretation criteria is that they were established using different patient populations. It is relatively easy to recognize and describe diffuse uptake involving, for example in the upper extremity, the entire wrist, carpals, carpal metacarpal, metacarpal phalangeal, phalangeal and interphalangeal regions and contrast that pattern with all degrees of focal or multifocal uptake. The problem arises in applying these patterns to classify patients who present with varying degrees of pain, dysfunction, and sympathetic signs and symptoms. Does the diffuse bone uptake pattern define a group of patients who have a similar pathophysiologic process taking place or, on the other hand, does the pattern define a group or subgroup of patients that have a similar response (tracer accumulation) to one or more pathophysiologic processes? Alternatively do some patients simply not express the “bone tracer accumulation response” (ie, decreased sensitivity of the test) or do these patients have a variant of the disease that has a different pathophysiology and hence the test is highly specific? These questions are not resolved.

(v) Location of Disease: The Upper Extremity. The clinical presentation of RSD varies with the anatomic location involved. In addition the different specialists who see these patients have different criteria for diagnosis. The scintigraphic pattern of RSD in the hand has already been discussed since most of the research in evaluating RSD as an entity has involved the upper extremity. There is general agreement among hand surgeons that the syndrome of RSD rarely, if ever, involves children. We have seen one mature 12.5-year-old girl whose clinical picture, TPBS, and response to a series of sympathetic ganglion blocks was consistent with RSD. Also occurring occasionally is the so-called shoulder-hand syndrome in which a more proximal inciting event, leads to shoulder pain and typical hand and wrist findings. In these patients increased tracer accumulation sometimes involves the forearm, elbow, arm, and shoulder.

The Foot. There is much less agreement on the clinical criteria that should be used to diagnose RSD of the foot. In an attempt to evaluate a more homogeneous population, Holder et al working with referring physicians from a variety of disciplines used diffuse nonanatomic pain, autonomic vasomotor signs, dermal changes, and a positive response to sympathetic blockades as their criteria for RSD in the foot. With this clinical criteria, they demonstrated a scintigraphic pattern similar to that in the hand with diffuse increased activity in the hind, mid and forefoot with juxta-articular accentuation. Their overall sensitivity and negative predictive value was 100%. The specificity of 80% and positive predictive value of only 54% was attrib-
uted to the large number of patients in their population with diabetes mellitus who presented with infection, in whom there was no clinical suspicion of RSD. These results were obtained in patients whose symptoms were less than 6 months in duration. In the lower extremity, patients with symptom complexes possibly related to RSD, SMPS, or CRPS-1, including those fitting the more specific criteria for RSD have a more variable radiotracer accumulation than that seen in the hand.  

Intenzo, for example, demonstrated a sensitivity of 72% in a group of patients responding to lumbar sympathetic blockade therapy. These variations remain unresolved and further work is required to better understand RSD in the foot. In the pediatric population, which is not generally discussed in this report, patients with neurovascular signs and symptoms often have decreased radionuclide perfusion and decreased tracer accumulation on delayed images (see Mandell’s article in this issue).

RSD in the Knee. Evaluating the knee for RSD is extremely challenging for the nuclear imager because the underlying clinical criteria for diagnosis are very uncertain. For example, in a 1989 review, orthopedic surgeons Poehling et al defined a dystrophic response in the knee as “a departure from the orderly and predictable response of the knee to a surgical or traumatic insult.” Experimentally they felt that in RSD the signs and symptoms of “normal” pathophysiology following injury are exaggerated. They described unremitting pain, vasospasm, edema, immobility, progressing in some to soft tissue contracture and atrophy. These signs and symptoms, and also the response to lower sympathetic blockade, have been variably found and reported.

It has been our experience and the experience of others that most patients in whom the diagnosis of RSD is considered have had arthroscopy or open surgery, and the full gamut of interventional and noninterventional therapies. This may account for the wide variation in reported clinical signs, symptoms, and plain radiographic findings. Regional osteoporosis involving the patella femoral joint on plain radiograph has been reported. Tietjen described increased radiotracer activity on delayed images in the patella and medial tibial plateau in 67% of his study population. In their series, Katz et al showed diffuse uptake in 46% of his patients and increased patella activity in 15%. This diffuse pattern of uptake on delayed images is also seen in nonspecific three-compartment synovitis and balanced three-compartment osteoarthritis.

Cooper et al found five out of seven patients with incremental activity in the patella femoral joint. Ogilvie-Harris and Roscoe evaluated the relationship of positive scintigraphic results with respect to symptom duration. In their study, patients with a diagnosis of RSD with symptoms less than 6 months in duration were more likely to show increased tracer accumulation than those with symptoms greater than 6 months in duration.

Focal RSD. The controversy deepens with the topic of focal RSD. Some believe it to be a nonentity, since focal activity alone is incongruent with RSD defined as a diffuse process. Others, however, including McCarthy believe that the underlying pathophysiology can be present more focally. The entity called “focal RSD” has been described in the literature in cases involving the hand and knee. Multiple case reports of RSD affecting a single digit have also been reported, as have two cases of RSD involving a single ray in the hand. Kline et al described a collection of patients with the clinical symptomatology of RSD localized in one to three rays, and used the term segmental RSD to distinguish this more limited presentation from the classic regional RSD which involves the entire hand. All of these reported variations can be considered as forme-frustes of RSD.

Non-Scintigraphic Diagnostic Testing

Scintigraphy is not the only complementary or supportive test available to supplement the clinical diagnosis of RSD. Plain film radiography can be useful, as a patchy or diffuse osteopenia can suggest RSD. This pattern is, however, nonspecific and is seen in about one-half of all RSD patients and in many other patients as a result of disuse without superimposed RSD. These changes may be seen as early as 2 to 3 weeks after the onset of symptoms. Later, affected bones may take on a ground glass appearance. Patients may have cortical erosions in a periarticular distribution. In most patients, however, radiographs are normal early in the RSD process. Thermography typically demonstrates the affected extremity to be cooler than the nonaffected contralateral extremity. Resting sweat
output asymmetry, quantitative pseudomotor axon reflex test asymmetry, and quantitative vasomotor changes have all been used in RSD diagnosis.\(^5\) Anesthesiologists specializing in pain emphasize the use of sympathetic blockade as both a diagnostic and treatment intervention.\(^7\) The phenolamine infusion test is more frequently used.\(^6\) MRI has proven to be of little value in the diagnosis of RSD. Koch et al found that MRI showed either no changes, nonspecific soft tissue changes, or bone marrow sclerosis; signal changes were only found in one of seventeen patients examined.\(^47\) Schweitzer et al also showed a variety of nonspecific soft tissue changes in a group of patients in whom RSD was part of the differential diagnosis.\(^48\)

**Conclusion**

There is still no unifying theory to adequately explain the varied signs, symptoms, and patient presentations in which pain is apparently related to an abnormality in sympathetic nervous system function. Whatever the abnormality and however it is produced and mediated, it leads to a complex and not completely understood physiologic response. Radionuclide bone scintigraphy capitalizes on that aspect of this physiologic response resulting in abnormal tracer accumulation, thereby providing objective evidence for the clinical entity called RSD. In the appropriate population it does so with a high degree of sensitivity and specificity.

We currently apply the TPBS in patients with pain, usually nonanatomic and disproportionate to their clinical injury, who also have signs and symptoms of sympathetic dysfunction, in order to stratify the patient into one of two groups. In the first group the positive TPBS provides objective evidence confirming the clinical diagnosis of RSD, and may also serve as a marker/baseline for therapeutic management. The second group consists of patients with a strong clinical suspicion of RSD, and a TPBS that does not support the diagnosis of active RSD. The scan may be normal, or especially in the foot demonstrate decreased tracer accumulation on delayed images. In this population, the patient may have late stage burnout disease or, if showing a decrease, may have another neuroregulatory or vasomotor process. In most of these Stage Two patients, if an underlying focal lesion was not present, re-examination will uncover an alternative disease processes to explain their pain. Most of these patients in group two will improve as the underlying focal abnormality resolves.

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