



LASER &amp; SKIN SURGERY CENTER OF NEW YORK

A hemangioma without ulceration is shown on an infant's elbow before and after undergoing four treatments with the 595-nm pulsed dye laser.

# PDL With Dynamic Cooling Zaps Pediatric Hemangiomas

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KISSIMMEE, FLA. — The treatment of childhood hemangiomas using the 595-nm pulsed dye laser with dynamic cooling resulted in excellent clearance rates and relatively few adverse events in 95 infants who had a median age of 4 months, a retrospective chart analysis shows.

The findings support the recommendation that uncomplicated childhood hemangiomas be treated early to minimize additional growth and hasten the involutational process, Dr. Lori Brightman reported at the annual meeting of the American Society for Laser Medicine and Surgery.

The infants, most of whom were girls with skin types I/II (although all skin types were represented in the study), had not undergone any prior surgery or laser treatment for their hemangiomas. Of a total of 110 superficial and mixed hemangiomas, most were on the head and neck; 52% of the superficial hemangiomas and 65% of the mixed hemangiomas were in the active stage.

The patients were treated between April 2006 and September 2007 at 2- to 8-week intervals until the lesions cleared (an average of 9 months for superficial lesions, and 11 months for mixed lesions).

Treatment was provided using a spot size of 7 mm to 10 mm; an average energy fluence of 8.60 J/cm<sup>2</sup> or 11.48 J/cm<sup>2</sup>, respectively; and a pulse duration of 0.45 or 1.5 milliseconds, with dynamic cooling duration of 30 milliseconds. At a mean of 10 months' follow-up, the treatment resulted in complete (100%) clearance in 22% of the 67 superficial lesions and 14% of the 43 mixed lesions, and in near-complete (75%-99%) clearance in 60% of the superficial lesions and 68% of the mixed lesions. Clearance was measured by three independent reviewers based on color and depth of before and after photographs of the lesions, said Dr. Brightman, a dermatologist with a laser and skin surgery group practice in New York.

All patients had at least some response, she noted.

Adverse events included hyperpigmentation in 4% and hypopigmentation in 14% of the cases. Ulceration occurred in one case, but was resolved during treatment. There were no cases of atrophy or hypertrophic scarring, she said.

Previous studies of the 585-nm pulsed dye laser for the treatment of childhood hemangiomas used no dynamic cooling, resulting in what was likely an "overrepresentation of adverse outcomes," Dr. Brightman said, noting that the use of updated technology (dynamic cooling, longer wavelengths, and varying pulse widths) appears to provide substantially improved results.

The findings are important, given the early risk of ulceration, infection, and bleeding with childhood hemangiomas, as well as the later risk of obstruction of vital structures, epidermal atrophy, residual telangiectasias, and hyper- and hypopigmentation, she said, noting that the psychosocial component is important to consider as well.

Current approaches to treatment include observation; systemic or intralesional corticosteroids; imiquimod; cryosurgery; sclerotherapy; surgery; and laser treatment, among others.

Dr. Brightman stated she had no conflicts of interest to disclose.

SC twice weekly. In plaque psoriasis studies, ENBREL<sup>®</sup> doses studied were 25 mg SC once a week, 25 mg SC twice a week, and 50 mg SC twice a week.

#### Injection Site Reactions

In controlled trials in rheumatologic indications, approximately 37% of patients treated with ENBREL<sup>®</sup> developed injection site reactions. In controlled trials in patients with plaque psoriasis, 14% of patients treated with ENBREL<sup>®</sup> developed injection site reactions during the first 3 months of treatment. All injection site reactions were described as mild to moderate (erythema and/or itching, pain, or swelling) and generally did not necessitate drug discontinuation. Injection site reactions generally occurred in the first month and subsequently decreased in frequency. The mean duration of injection site reactions was 3 to 5 days. Seven percent of patients experienced redness at a previous injection site when subsequent injections were given. In post-marketing experience, injection site bleeding and bruising have also been observed in conjunction with ENBREL<sup>®</sup> therapy.

#### Infections

In controlled trials, there were no differences in rates of infection among RA, psoriatic arthritis, ankylosing spondylitis, and plaque psoriasis patients treated with ENBREL<sup>®</sup> and those treated with placebo (or MTX for RA and psoriatic arthritis patients). The most common type of infection was upper respiratory infection, which occurred at a rate of approximately 20% among both ENBREL<sup>®</sup>- and placebo-treated patients in RA, psoriatic arthritis, and AS trials, and at a rate of approximately 12% among both ENBREL<sup>®</sup>- and placebo-treated patients in plaque psoriasis trials in the first 3 months of treatment.

In placebo-controlled trials in RA, psoriatic arthritis, ankylosing spondylitis, and plaque psoriasis no increase in the incidence of serious infections was observed (approximately 1% in both placebo- and ENBREL<sup>®</sup>-treated groups). In all clinical trials in RA, serious infections experienced by patients have included: pyelonephritis, bronchitis, septic arthritis, abdominal abscess, cellulitis, osteomyelitis, wound infection, pneumonia, foot abscess, leg ulcer, diarrhea, sinusitis, and sepsis. The rate of serious infections has not increased in open-label extension trials and is similar to that observed in ENBREL<sup>®</sup>- and placebo-treated patients from controlled trials. Serious infections, including sepsis and death, have also been reported during post-marketing use of ENBREL<sup>®</sup>. Some have occurred within a few weeks after initiating treatment with ENBREL<sup>®</sup>. Many of the patients had underlying conditions (e.g., diabetes, congestive heart failure, history of active or chronic infections) in addition to their rheumatoid arthritis (see **WARNINGS**). Data from a sepsis clinical trial not specifically in patients with RA suggest that ENBREL<sup>®</sup> treatment may increase mortality in patients with established sepsis.<sup>9</sup>

In patients who received both ENBREL<sup>®</sup> and anakinra for up to 24 weeks, the incidence of serious infections was 7%. The most common infections consisted of bacterial pneumonia (4 cases) and cellulitis (4 cases). One patient with pulmonary fibrosis and pneumonia died due to respiratory failure.

In post-marketing experience in rheumatologic indications, infections have been observed with various pathogens including viral, bacterial, fungal, and protozoal organisms. Infections have been noted in all organ systems and have been reported in patients receiving ENBREL<sup>®</sup> alone or in combination with immunosuppressive agents.

In clinical trials in plaque psoriasis, serious infections experienced by ENBREL<sup>®</sup>-treated patients have included: cellulitis, gastroenteritis, pneumonia, abscess, and osteomyelitis.

In global clinical studies of 20,070 patients (28,308 patient-years of therapy), tuberculosis was observed in approximately 0.01% of patients. In 15,438 patients (23,524 patient-years of therapy) from clinical studies in the US and Canada, tuberculosis was observed in approximately 0.007% of patients. These studies include reports of pulmonary and extra-pulmonary tuberculosis (see **WARNINGS**).

#### Malignancies

Patients have been observed in clinical trials with ENBREL<sup>®</sup> for over five years. Among 4462 rheumatoid arthritis patients treated with ENBREL<sup>®</sup> in clinical trials for a mean of 27 months (approximately 10,000 patient-years of therapy), 9 lymphomas were observed for a rate of 0.09 cases per 100 patient-years. This is 3-fold higher than the rate of lymphomas expected in the general population based on the Surveillance, Epidemiology, and End Results Database.<sup>10</sup> An increased rate of lymphoma up to several fold has been reported in the rheumatoid arthritis patient population, and may be further increased in patients with more severe disease activity.<sup>11,12</sup> (see **WARNINGS: Malignancies**). Sixty-seven malignancies, other than lymphoma, were observed. Of these, the most common malignancies were colon, breast, lung, and prostate, which were similar in type and number to what would be expected in the general population.<sup>10</sup> Analysis of the cancer rates at 6 month intervals suggest constant rates over five years of observation.

In the placebo-controlled portions of the psoriasis studies, 8 of 933 patients who received ENBREL<sup>®</sup> at any dose were diagnosed with a malignancy compared to 1 of 414 patients who received placebo. Among the 1261 patients with psoriasis who received ENBREL<sup>®</sup> at any dose in the controlled and uncontrolled portions of the psoriasis studies (1062 patient-years), a total of 22 patients were diagnosed with 23 malignancies; 9 patients with non-cutaneous solid tumors, 12 patients with 13 non-melanoma skin cancers (8 basal, 5 squamous), and 1 patient with non-Hodgkin's lymphoma. Among the placebo-treated patients (90 patient-years of observation) 1 patient was diagnosed with 2 squamous cell cancers. The size of the placebo group and limited duration of the controlled portions of studies precludes the ability to draw firm conclusions.

Among 89 patients with Wegener's granulomatosis receiving ENBREL<sup>®</sup> in a randomized, placebo-controlled trial, 5 experienced a variety of non-cutaneous solid malignancies compared with none receiving placebo (see **WARNINGS: Malignancies**).

#### Immunogenicity

Patients with RA, psoriatic arthritis, ankylosing spondylitis, or plaque psoriasis were tested at multiple timepoints for antibodies to ENBREL<sup>®</sup>. Antibodies to the TNF receptor portion or other protein components of the ENBREL<sup>®</sup> drug product were detected at least once in sera of approximately 6% of adult patients with RA, psoriatic arthritis, ankylosing spondylitis, or plaque psoriasis. These antibodies were all non-neutralizing. No apparent correlation of antibody development to clinical response or adverse events was observed. Results from JIA patients were similar to those seen in adult RA patients treated with ENBREL<sup>®</sup>. The long-term immunogenicity of ENBREL<sup>®</sup> is unknown.

The data reflect the percentage of patients whose test results were considered positive for antibodies to ENBREL<sup>®</sup> in an ELISA assay, and are highly dependent on the sensitivity and specificity of the assay. Additionally, the observed incidence of any antibody positivity in an assay is highly dependent on several factors including assay sensitivity

and specificity, assay methodology, sample handling, timing of sample collection, concomitant medications, and underlying disease. For these reasons, comparison of the incidence of antibodies to ENBREL<sup>®</sup> with the incidence of antibodies to other products may be misleading.

#### Autoantibodies

Patients with RA had serum samples tested for autoantibodies at multiple timepoints. In RA Studies I and II, the percentage of patients evaluated for antinuclear antibodies (ANA) who developed new positive ANA (titer  $\geq$  1:40) was higher in patients treated with ENBREL<sup>®</sup> (11%) than in placebo-treated patients (5%). The percentage of patients who developed new positive anti-double-stranded DNA antibodies was also higher by radioimmunoassay (15% of patients treated with ENBREL<sup>®</sup> compared to 4% of placebo-treated patients) and by *Critidia luciliae* assay (3% of patients treated with ENBREL<sup>®</sup> compared to none of placebo-treated patients). The proportion of patients treated with ENBREL<sup>®</sup> who developed anticardiolipin antibodies was similarly increased compared to placebo-treated patients. In Study III, no pattern of increased autoantibody development was seen in ENBREL<sup>®</sup> patients compared to MTX patients.

The impact of long-term treatment with ENBREL<sup>®</sup> on the development of autoimmune diseases is unknown. Rare adverse event reports have described patients with rheumatoid factor positive and/or erosive RA who have developed additional autoantibodies in conjunction with rash and other features suggesting a lupus-like syndrome.

#### Other Adverse Reactions

Table 10 summarizes events reported in at least 3% of all patients with higher incidence in patients treated with ENBREL<sup>®</sup> compared to controls in placebo-controlled RA trials (including the combination methotrexate trial) and relevant events from Study III. In placebo-controlled plaque psoriasis trials, the percentages of patients reporting injection site reactions were lower in the placebo dose group (6.4%) than in the ENBREL<sup>®</sup> dose groups (15.5% in Studies I and II). Otherwise, the percentages of patients reporting adverse events in the 50 mg twice a week dose group were similar to those observed in the 25 mg twice a week dose group or placebo group. In psoriasis Study I, there were no serious adverse events of worsening psoriasis following withdrawal of study drug. However, adverse events of worsening psoriasis including three serious adverse events were observed during the course of the clinical trials. Urticaria and non-infectious hepatitis were observed in a small number of patients and angioedema was observed in one patient in clinical studies. Urticaria and angioedema have also been reported in spontaneous post-marketing reports. Adverse events in psoriatic arthritis, ankylosing spondylitis, and plaque psoriasis trials were similar to those reported in RA clinical trials.

Table 10:  
Percent of RA Patients Reporting Adverse Events  
in Controlled Clinical Trials\*

| Event                                       | Placebo Controlled<br>(N = 152) |                     | Active Controlled<br>(Study III)<br>(N = 415) |                                  |
|---|---------------------------------|---------------------|---|----------------------------------|
|   | Percent of patients             | Percent of patients | MTX<br>(N = 217)                              | ENBREL <sup>®</sup><br>(N = 415) |
| Injection site reaction                     | 10                              | 37                  | 7   | 34                               |
| Infection (total)**                         | 32                              | 35                  | 72  | 64                               |
| Non-upper respiratory infection (non-URI)** | 32                              | 38                  | 60  | 51                               |
| Upper respiratory infection (URI)**         | 16                              | 29                  | 39  | 31                               |
| Headache                                    | 13                              | 17                  | 27  | 24                               |
| Nausea                                      | 10                              | 9                   | 29  | 15                               |
| Rhinitis                                    | 8                               | 12                  | 14  | 16                               |
| Dizziness                                   | 5                               | 7                   | 11  | 8                                |
| Pharyngitis                                 | 5                               | 7                   | 9   | 6                                |
| Cough                                       | 3                               | 6                   | 6   | 5                                |
| Asthenia                                    | 3                               | 5                   | 12  | 11                               |
| Abdominal pain                              | 3                               | 5                   | 10  | 10                               |
| Rash  | 3                               | 5                   | 23  | 14                               |
| Peripheral edema                            | 3                               | 2                   | 4   | 8                                |
| Respiratory disorder                        | 1                               | 5                   | NA  | NA                               |
| Dyspepsia                                   | 1                               | 4                   | 10  | 11                               |
| Sinusitis                                   | 2                               | 3                   | 3   | 5                                |
| Vomiting                                    | —                               | 3                   | 8   | 5                                |
| Mouth ulcer                                 | 1                               | 2                   | 14  | 6                                |
| Alopecia                                    | 1                               | 1                   | 12  | 6                                |
| Pneumonitis ("MTX lung")                    | —                               | —                   | 2   | 0                                |

\*Includes data from the 6-month study in which patients received concurrent MTX therapy.

†The duration of exposure for patients receiving placebo was less than the ENBREL<sup>®</sup>-treated patients.

\*\*Infection (total) includes data from all three placebo-controlled trials. Non-URI and URI include data only from the two placebo-controlled trials where infections were collected separately from adverse events (placebo N = 110, ENBREL<sup>®</sup> N = 213).

In controlled trials of RA and psoriatic arthritis, rates of serious adverse events were seen at a frequency of approximately 5% among ENBREL<sup>®</sup>- and control-treated patients. In controlled trials of plaque psoriasis, rates of serious adverse events were seen at a frequency of < 1.5% among ENBREL<sup>®</sup>- and placebo-treated patients in the first 3 months of treatment. Among patients with RA in placebo-controlled, active-controlled, and open-label trials of ENBREL<sup>®</sup>, malignancies (see **WARNINGS: Malignancies**, **ADVERSE REACTIONS: Malignancies**) and infections (see **ADVERSE REACTIONS: Infections**) were the most common serious adverse events observed. Other infrequent serious adverse events observed in RA, psoriatic arthritis, ankylosing spondylitis, or plaque psoriasis clinical trials are listed by body system below:

Cardiovascular: heart failure, myocardial infarction, myocardial ischemia, hypertension, hypotension, deep vein thrombosis, thrombophlebitis

Digestive: cholecystitis, pancreatitis, gastrointestinal hemorrhage, appendicitis

Hematologic/Lymphatic: lymphadenopathy

Musculoskeletal: bursitis, polymyositis

Nervous: cerebral ischemia, depression, multiple sclerosis (see **WARNINGS: Neurologic Events**)

Respiratory: dyspnea, pulmonary embolism, sarcoidosis

Skin: worsening psoriasis

Urogenital: membranous glomerulonephropathy, kidney calculus

In a randomized controlled trial in which 51 patients with RA received ENBREL<sup>®</sup> 50 mg twice weekly and 25 patients received ENBREL<sup>®</sup> 25 mg twice weekly, the following serious adverse events were observed in the 50 mg twice weekly arm: gastrointestinal bleeding, normal pressure hydrocephalus, seizure, and stroke. No serious adverse events were observed in the 25 mg arm.

#### Adverse Reactions in Patients with JIA

In general, the adverse events in pediatric patients were similar in frequency and type as those seen in adult patients (see **WARNINGS** and other sections under **ADVERSE REACTIONS**). Differences from adults and other special considerations are discussed in the following paragraphs.

Severe adverse reactions reported in 69 JIA patients ages 4 to 17 years included varicella (see also **PRECAUTIONS: Immunizations**), gastroenteritis, depression/personality disorder, cutaneous ulcer, esophagitis/gastritis, group A streptococcal septic shock, Type 1 diabetes mellitus, and soft tissue and post-operative wound infection.

Forty-three of 69 (62%) children with JIA experienced an infection while receiving ENBREL<sup>®</sup> during three months of study (part 1 open-label), and the frequency and severity of infections was similar in 58 patients completing 12 months of open-label extension therapy. The types of infections reported in JIA patients were generally mild and consistent with those commonly seen in outpatient pediatric populations. Two JIA patients developed varicella infection and signs and symptoms of aseptic meningitis which resolved without sequelae.

The following adverse events were reported more commonly in 69 JIA patients receiving 3 months of ENBREL<sup>®</sup> compared to the 349 adult RA patients in placebo-controlled trials. These included headache (19% of patients, 1.7 events per patient-year), nausea (9%, 1.0 events per patient-year), abdominal pain (19%, 0.74 events per patient-year), and vomiting (13%, 0.74 events per patient-year).

In open-label clinical studies of children with JIA, adverse events reported in those aged 2 to 4 years were similar to adverse events reported in older children.

In post-marketing experience, the following additional serious adverse events have been reported in pediatric patients: abscess with bacteremia, optic neuritis, pancytopenia, seizures, tuberculous arthritis, urinary tract infection (see **WARNINGS**), coagulopathy, cutaneous vasculitis, and transaminase elevations. The frequency of these events and their causal relationship to ENBREL<sup>®</sup> therapy are unknown.

#### Patients with Heart Failure

Two randomized placebo-controlled studies have been performed in patients with CHF. In one study, patients received either ENBREL<sup>®</sup> 25 mg twice weekly, 25 mg three times weekly, or placebo. In a second study, patients received either ENBREL<sup>®</sup> 25 mg once weekly, 25 mg twice weekly, or placebo. Results of the first study suggested higher mortality in patients treated with ENBREL<sup>®</sup> at either schedule compared to placebo. Results of the second study did not corroborate these observations. Analyses did not identify specific factors associated with increased risk of adverse outcomes in heart failure patients treated with ENBREL<sup>®</sup> (see **PRECAUTIONS: Patients with Heart Failure**).

#### Adverse Reaction Information from Spontaneous Reports

Adverse events have been reported during post-approval use of ENBREL<sup>®</sup>. Because these events are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to ENBREL<sup>®</sup> exposure.

Additional adverse events are listed by body system below:

Body as a whole: angioedema, fatigue, fever, flu syndrome, generalized pain, weight gain

Cardiovascular: chest pain, vasodilation (flushing), new-onset congestive heart failure (see **PRECAUTIONS: Patients with Heart Failure**)

Digestive: altered sense of taste, anorexia, diarrhea, dry mouth, intestinal perforation

Hematologic/Lymphatic: adenopathy, anemia, aplastic anemia, leukopenia, neutropenia, pancytopenia, thrombocytopenia (see **WARNINGS**)

Hepatobiliary: autoimmune hepatitis

Musculoskeletal: joint pain, lupus-like syndrome with manifestations including rash consistent with subacute or discoid lupus

Nervous: paresthesias, stroke, seizures and central nervous system events suggestive of multiple sclerosis or isolated demyelinating conditions such as transverse myelitis or optic neuritis (see **WARNINGS**)

Ocular: dry eyes, ocular inflammation

Respiratory: dyspnea, interstitial lung disease, pulmonary disease, worsening of prior lung disorder

Skin: cutaneous vasculitis, erythema multiforme, Stevens-Johnson syndrome, toxic epidermal necrolysis, pruritus, subcutaneous nodules, urticaria

**Rx Only. This brief summary is based on ENBREL prescribing information v. 33: 03/2008**

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