September 2, 1987

Dear Mr. Sundquist:

Thank you for our meetings of early and later August. We have appreciated the use of the tapes for the regulation of exercise programs. We have found them to provide an excellent feedback to our patient population. I think that their utility will only increase as we learn to use them as a valuable tool in the future.

I think that their utility has a broader spectrum of use in a general rehabilitation setting. This may prove particularly true in the rehabilitation of patients with strokes and other communication impairments where music is a meaningful feedback loop. As we spoke, the reconditioning of head injury patients may prove another area of usefulness.

I look forward to a mutually productive relationship in testing the rehabilitation value of this technique.

Sincerely,

Bruce E. Becker, M.D.
SCI EX, Incorporated
Eugene, Oregon

July 26, 1990

re: SCIEX/JAMES SUNDQUIST MEDICAL TESTING OF PERSONALIZED PACE EXERCISE MUSIC

WHO:	Bruce Becker, M.D. Principal Investigator	Rehabilitative Medicine
	Julian Larson	Licensed Massage Technician and Hydrotherapist Instructor, National Arthritis Foundation

WHERE: SCIEX, INC. Laboratories
677 East 12th Avenue, Suite 170
Eugene, OR 97401

WHEN: September 2, 1987 through July 26, 1990

PURPOSE OF TEST:

To determine the following information **with the consistent use of the metronomically developed and produced music by James Sundquist:**

Exercise pacing levels in reduced gravity water tanks for rehabilitation;

Patients improved self-monitoring (independent) rehabilitative exercise capabilities;

Subjective motivation of patient population;

Individual patients' heart rates through monitoring during exercise.

PATIENT POPULATION:

SELECTION CRITERIA: All patients included in this study were referred for management.

DIAGNOSIS:

*	lumbar disc herniation
*	fusions low back
*	lumbo-sacral dysfunction
*	post-laminectomy
*	arthritis
*	degenerative disc disease
*	fibrositis
*	cervicalgia

Excluded were patients with metastic disease, acute fractures and major disability.

Operative Status: Non-operative 86%
Post-operative 14%

Patient Demographics: Male/Female Radio 3:2

Male 99
Female 71
Total Patients = 170

Age Range 20 – 62 years old
Mean = 34.5
Standard Deviation = 9.2

PACE DETERMINATION:

- Beginning 100-120 bpm (Steps/Min)
- Intermediate 130- 146 bpm

Borg Scale of Perceived Exertion
(adjunct to determining target heart rate during exercise):

- Light 1-2 100 bpm (introduction)
- Moderate 3 110 bpm
- Somewhat Hard 4 120-126 bpm
- Hard to Very hard 5-7 130-150 bpm

METHOLOGY:

Tools:

1. Sports Walkman, stereo playback system and stereo speakers
2. Aqua Arks

   Depth: 6.5 feet
   Temperature: 82-91 Degrees F.

3. Aqua-jogger
4. Spartas Quartz Clock

5. James Sundquist's original music personalized pace audio tapes ranging from 100 bp to 220 bpm (64 different tapes, all of which are same music score put compressed and expanded to accommodate ranger of tempos or bpm (steps per min. walking or running in the water)

Type of Exercise Employed:

1. Water walking, jogging, running, cross-country
2. Specific stretching, strengthening, flexibility exercises

Duration of Exercise: 45-minute sessions
Number of Sessions: 18

Frequency of patient's tempo increases (faster music tapes):

Once every six weeks
Three sessions/level without increase in pain.

Restrictions:

Range of motion
Temp (pace: steps per minute)

Further restrictions dependent upon patient condition
and pace of recovering, which varied somewhat from patient to patient.

RESULTS:

Results were determined by the ability of the patient to increase exercise activity speed (pace) where noted, accompanied by increased flexibility, duration, and intensity of workout. James Sundquist's music pace tapes reinforced and substantiated compliance.

DESCRIPTION/SUMMARY:

This is a description of the Sciex experience in the use of James Sundquist's audio pace pates. Sciex, Inc., is a sports injury and medical rehabilitation facility developed for the rehabilitative management and scientific testing of patients with a broad variety of musculoskeletal disabilities. We began using the precise-paced music tapes in the late Fall of 1987 and have used them quite extensively over the several years since that time. The patients that have benefitted from this particular management technique have included patients with lumbar disk herniation, low back fusions; multiple types of post-op low back surgical patients; patients with arthritis, patients with a broad range of acute and chronic musculoskeletal disabilities including stress fractures of the lower extremities and pelvis; patients with lower extremity fractures, trauma, and amputations; and patients with multiple sclerosis.

TECHNIQUES:

The patients are brought to the deep water hydro-therapy facility and taken into the water where they are suspended by one, two or four-point suspension in the tanks. They are then taken through an instructional set of exercises in the water, beginning with gentle background music. After a very brief period of acclimatization, they are begun on a program of rhythmic exercises. Typically we will begin the patients with 1100 to 120 beats per minute (bpm) tapes. We will then progress)incrementally) as their clinical situation mandates to the intermediate level of tapes (130- 146 bpm). IT is rare for us to us the advanced stage tapes (150 to 220 bpm), as most patients are discontinued from hydro-therapy to land-based exercise therapy or community-based programs and these are not addressed in this paper. *Footnote: Because of the resistance of moving legs while in water, slower tempos are required then walking or running on ground-based exercise.

We have utilized the Borg Scale of Relative Perceived Exertion, as it is adapted for water exercise for our program. Patients are begun at a light level of exercise tolerance utilizing “ease music.” They are then advanced to moderate levels of Relative Perceived Exertion, which typically fall into the 110 bpm range. We progress patients then to the “somewhat hard” range, typically using the 120 to 126 bpm range tapes. Most patients proceeding beyond this into the 130 to 142 bpm range tapes find this to be exercising at the “hard” to “very hard” Relative Perceived Exertion levels. A few patients have been exercised in the “very, very hard” range of Relative Perceived Exertion utilizing tapes in the 146-150 bpm range.

Patients have exercised at a particular pace for three sessions with no increase in their pain prior to proceeding to the next pace increase level. It was determined that approximately 18 sessions (3x/wk for six weeks) were required to increase the pace of each patient's workout level from baseline to a typical discharge level of an average of 126 bpm.

SUMMARY AND CONCLUSION:

We have found the tapes to provide meaningful guidance to the patient on structural program stability, and to be quite systematic in their approach, thus allowing us to standardize our exercise levels from patient to patient and within a specific patient's treatment course. The combination of music and exercise using James Sundquist' personalized pace original music tapes has provided a systematic method of progressing a patient from a beginning level of exercise in quite controlled surroundings to a substantial progression through moderate, hard and into very hard ranges of exertion in an aquatic environment. **Bruce E. Becker, M.D**