RABBI EFROIM STEIN
1157 53RD STREET
BROOKLYN, N.Y. 11219

633-8441

Dr. Max Green
THE WHITE HOUSE
Office of Public Liaison
Old Executive Office Building
Washington, D.C. 20500

Dear Dr. Green:

As per our discussions enclosed please find descriptive literature of the TIKVAH LAYELED FOUNDATION FOR CEREBRAL PALSY CHILDREN IN ISRAEL.

I sincerely hope that you can help us in obtaining a letter from the President in support of this extraordinary expedition.

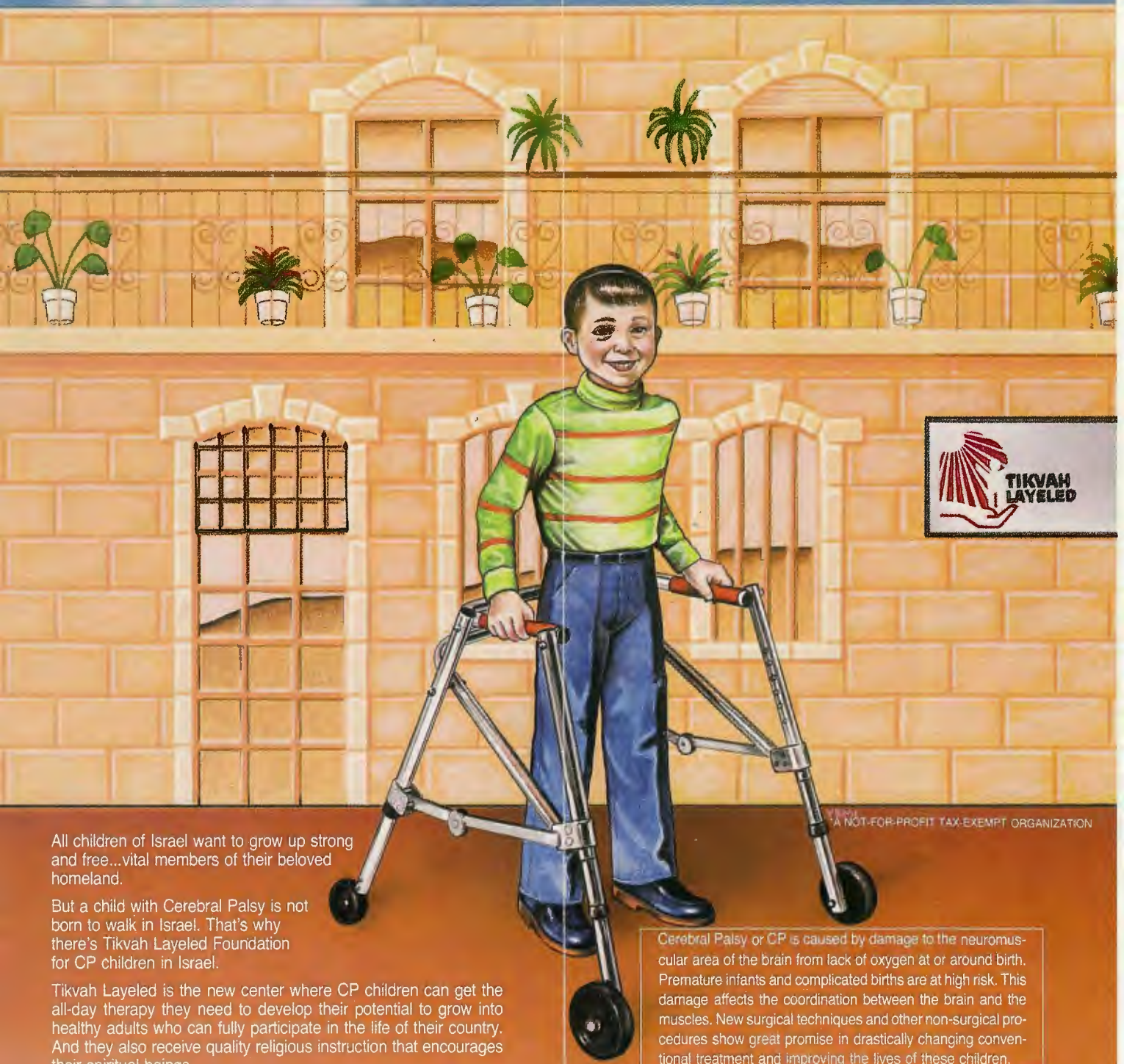
I thank you for your kind consideration.

Sincerely yours,

Efroim Stein

September 10, 1987

NOW THERE IS TIKVAH LAYELED FOUNDATION FOR CEREBRAL PALSY IN ISRAEL*



*A NOT-FOR-PROFIT TAX-EXEMPT ORGANIZATION

All children of Israel want to grow up strong and free...vital members of their beloved homeland.

But a child with Cerebral Palsy is not born to walk in Israel. That's why there's Tikvah Layeled Foundation for CP children in Israel.

Tikvah Layeled is the new center where CP children can get the all-day therapy they need to develop their potential to grow into healthy adults who can fully participate in the life of their country. And they also receive quality religious instruction that encourages their spiritual beings.

Cerebral Palsy or CP is caused by damage to the neuromuscular area of the brain from lack of oxygen at or around birth. Premature infants and complicated births are at high risk. This damage affects the coordination between the brain and the muscles. New surgical techniques and other non-surgical procedures show great promise in drastically changing conventional treatment and improving the lives of these children.

The Tikvah Layeled Center opened in Jerusalem in January, 1987, but the dream for these children began a year earlier, in New York. Zvi Braitstein, a Jerusalem educator active in community affairs, came to the U.S.A. to help children in Israel with CP get medical attention. Their anguish caused him to sound an alarm to the Jewish community in America. He formed a committee of dedicated individuals from among whom Ernest Rothman, a noted educator in the field of learning disabilities and a community leader, was chosen to spearhead the committee to alleviate the problem. Actually three problems:

First, special equipment to enable children with CP to sit and stand, which is widely used in the United States, was virtually non-existent in Israel. The expense coupled with shipping costs, as well as the many months it could take to arrive, put it beyond the reach of hospitals and clinics—let alone individual families with a CP child. For example, a basic therapeutic stand and chair costing $1,000 could triple in price by the time it arrived in Israel.

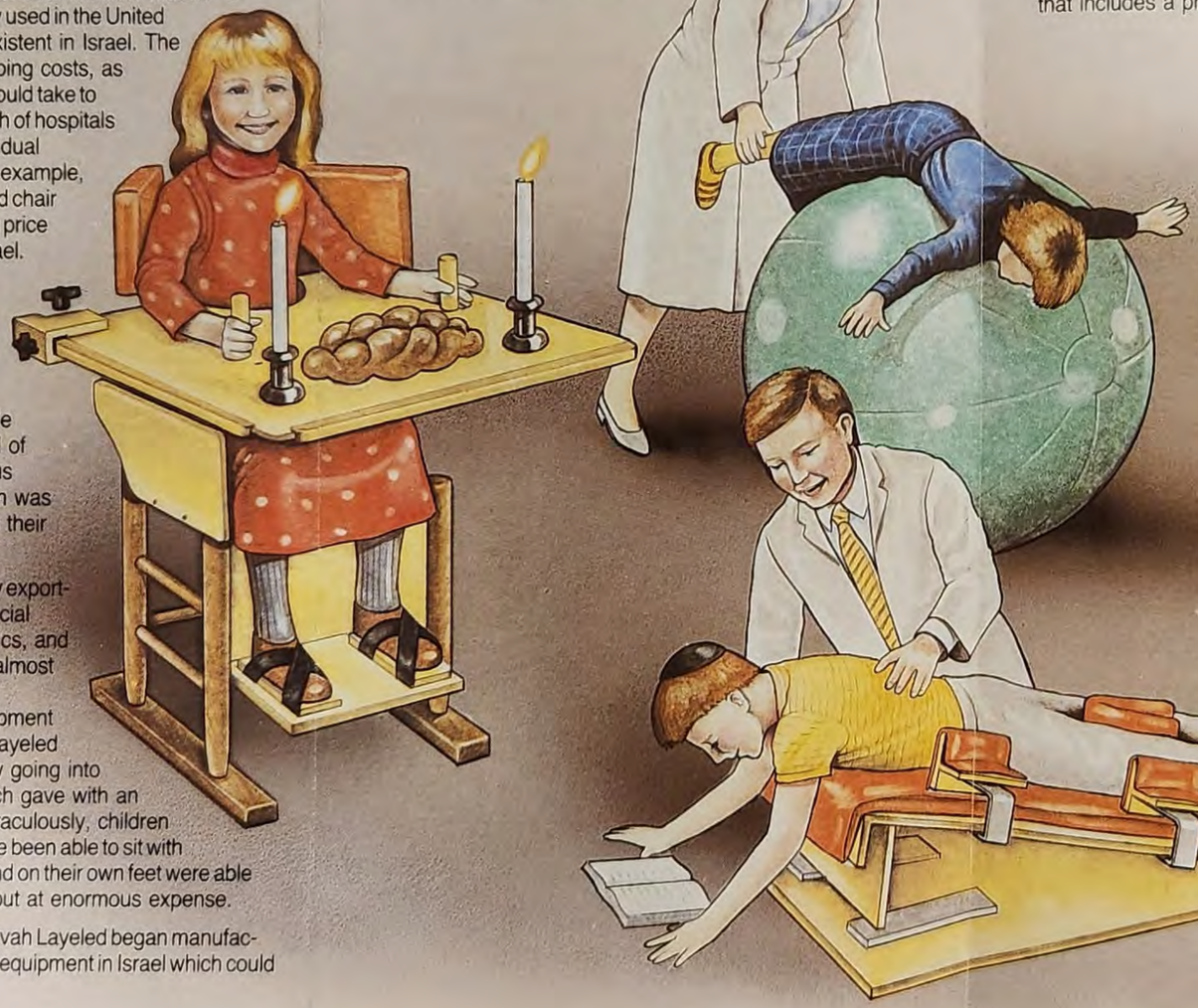
Next, hospitals in Israel could accommodate children for therapy only a half hour or so a day, once or twice a week—far too little time to make an appreciable difference, if any at all. And of course, secular and religious instruction for these children was simply not available, due to their unique physical problems.

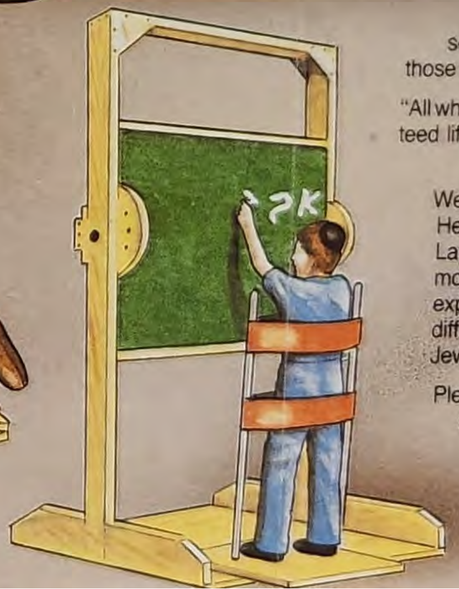
So Tikvah Layeled started by exporting and distributing this special equipment to hospitals, clinics, and individuals in Israel. If it cost almost $50,000 to supply a dozen children with the basic equipment they needed, then Tikvah Layeled would raise it. And it did. By going into the Jewish community, which gave with an endless generosity. And miraculously, children in Israel who had never before been able to sit with their family at the table or stand on their own feet were able to do so for the first time—but at enormous expense.

To reduce the huge costs, Tikvah Layeled began manufacturing and distributing its own equipment in Israel which could be used in hospitals or at home. Sturdy chairs and standing work stations that help a child to read and write, work and play...units that were custom-made and hand-crafted of strong, durable woods.

But children with CP need more than equipment. They need modern physical therapy, occupational therapy, and speech therapy. And above all, they need a classroom setting where they can keep up their education.

Helping these courageous children to achieve their maximum is an overwhelming task. It's too great for even the strongest of families. Too great for hospitals. Helping children with CP to master even a small accomplishment, like lifting a spoon or combing their hair, can take more energy than most human beings have to give. So with the generous support of the Jewish community, Tikvah Layeled took on the task. Starting with ten children and a dedicated staff that includes a physical, an occupational, and a speech therapist, in addition to qualified educators, Tikvah Layeled began a fully self-contained center for CP on David Yellin Street near the central section of Jerusalem.





Now these children can begin to live, and with continued training, eventually fulfill their promise in the Promised Land.

The spiritual growth of handicapped children can be every bit as important to them as learning to read and write in enabling them to develop. That is why Tikvah Layeled helps these children experience their Jewish faith. It is simple for a "normal" child to tie a fruit on a succah or spin a dreidel or join the family for Passover seder. Now, imagine the joy of a child who is able to enjoy these childhood wonders for the first time.

This is only part of what Tikvah Layeled does. Tikvah Layeled acts as a liaison between doctors and the multitudes of children with CP, so that they can receive the sophisticated revolutionary surgeries and therapeutic techniques that do so much for them. In an innovative program, Tikvah Layeled videotapes these children, sends the tapes to neurosurgeons and researchers for study, and gets back critical information about where to go next with treatment. Also, Tikvah Layeled is an important and far-reaching information bank. It disseminates literature and holds forums and seminars in Israel that draw dedicated, world-famous specialists. What's more, in time the goal is to expand Tikvah Layeled's services to include many more children, including those with problems similar to those of CP.

"All who walk four cubits in the land of Israel are guaranteed life in the world to come."

(Talmud)

We are giving these children hope for a fulfilled life! Help us help them by being a friend of The Tikvah Layeled Foundation. Each dollar you send helps more children on Tikvah Layeled's waiting lists and expands our activities. Your support makes the difference between hope and despair for these Jewish children and their anguished parents.

Please open your heart to these children and take a moment to fill out the enclosed reply form, giving as generously as you can to Tikvah Layeled.

ISRAELI MINISTRY OF HEALTH

"We were overjoyed by your eagerness to assist the hospitals and clinics. Those in the far north and south are in dire need of your services..."

ALYN ORTHOPEDIC HOSPITAL

"Our heartfelt gratitude to you for the chairs and standing frames... These gifts will bring significant benefit to our children and improve the quality of their lives."

DR. PAUL JORDAN, PROF. ASSOCIATE
DEPT. OF PHYSICAL MEDICINE AND REHABILITATION
NEW YORK HOSPITAL, CORNELL MEDICAL COLLEGE

"Tikvah Layeled is a multi-disciplinary facility employing state-of-the-art equipment, evaluation, and treatment techniques, designed for the needs of each child."

BIKUR CHOLIM HOSPITAL, JERUSALEM

"Thanks...The equipment received, made specifically for brain-damaged children, was put to use by our Rehabilitation Center."

TIKVAH LAYELED'S MEDICAL ADVISORY BOARD IN ISRAEL

Dr. David Segal—Chairman of Orthopedics, Hadassah Hospital
Professor G. Rubin—Dept. of Orthopedics, Hadassah Hospital
Professor Eldad Melamed—Dept. of Neurology, Hadassah Hospital
Dr. S. Mayer—Director, Alyn Orthopedic Hospital

TIKVAH LAYELED'S MEDICAL ADVISORY BOARD IN THE UNITED STATES

Dr. R. Paul Jordan, Prof. Associate
Dept. of Physical Medicine and Rehabilitation
New York Hospital, Cornell Medical College

Dr. Fred J. Epstein, Director
Dept. of Pediatric Neurosurgery
New York University Medical Center

TIKVAH LAYELED
THE FOUNDATION FOR CEREBRAL PALSY CHILDREN IN ISRAEL

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ZVI BRAITSTEIN, FOUNDER AND DIRECTOR

12 DAVID YELLIN STREET
JERUSALEM, ISRAEL
02-243-326

BECAUSE A STRONG, HEALTHY ISRAEL STARTS WITH STRONG, HEALTHY CHILDREN...

What everyone should know

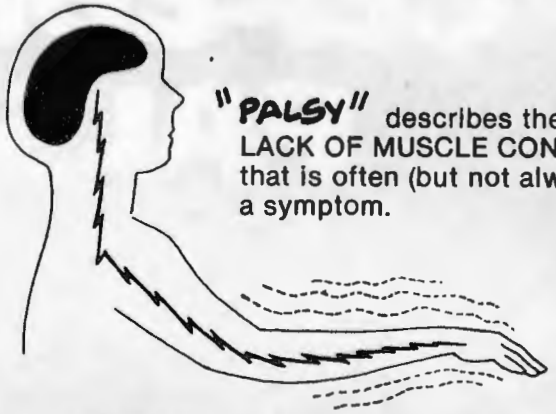
ABOUT CEREBRAL PALSY

TIKVAH LAYELED

THE FOUNDATION FOR CEREBRAL PALSY CHILDREN IN ISRAEL

What is CEREBRAL PALSY?

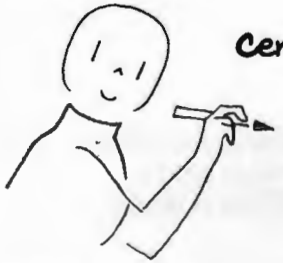
It's a GROUP of DISABLING CONDITIONS that result from DAMAGE to the CENTRAL NERVOUS SYSTEM.



"CEREBRAL" refers to the brain.

"PALSY" describes the LACK OF MUSCLE CONTRO that is often (but not always) a symptom.

- It can be **SEVERE** --for example, total inability to control body movements.
- It can be **MILD** --for example, slight speech impairment.



Cerebral palsy is **NOT**

-- hereditary
-- contagious
-- progressive
-- a primary cause of death.

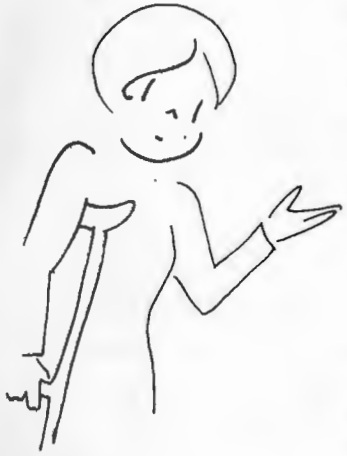
This booklet is not a substitute for an informed discussion of the procedures or medications described in this booklet between a patient and his or her physician

A SCRIPTOGRAPHIC BOOKLET by CHANNING L BETE CO., INC. South Deerfield, MA 01373 U.S.A.

Tel 1-413-665-7611 1987 Edition 1175G-12-84

Why is it IMPORTANT to know about CP?

Because it causes **MAJOR DISABILITIES.**



APPROXIMATELY 700,000 AMERICANS have some degree of CP (1/3 are under age 21).

SOME 5,000 BABIES are born each year with central nervous system disorders resulting in CP. Another 1,500 acquire it in the first few years of life as a result of head injuries.

BILLIONS OF DOLLARS PER YEAR are spent on care for people with CP (and millions more in lost productivity).

The more we **KNOW**, the more we can **DO**

-- to reduce the occurrence of cerebral palsy
-- to help those who have CP.

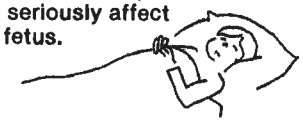
CP is caused by

DAMAGE to the BRAIN--

① BEFORE or DURING BIRTH due to --

MOTHER'S ILLNESS

Certain virus diseases (such as German measles) in the mother can seriously affect the fetus.

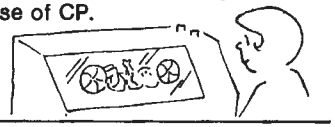


"RH INCOMPATIBILITY"

A blood conflict between mother and fetus may occur if a certain element -- RH factor -- is missing in the mother's blood and is present in the father's blood.

LACK OF OXYGEN

Complications in pregnancy and labor may cause lack of oxygen in the brain. It is the major cause of CP.



PREMATURE BIRTH

Breathing problems caused by premature birth can deprive brain of oxygen.

LESCH-NYHAN SYNDROME

This rare genetic defect causes one type of cerebral palsy.

② EARLY IN LIFE due to --

ACCIDENTAL INJURY

LEAD POISONING

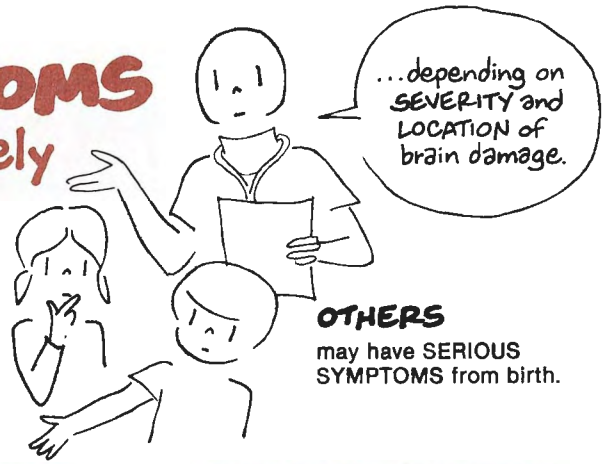
ILLNESS

(for example, meningitis)

CHILD ABUSE

(repeated shakings or beatings)

SYMPTOMS vary widely



SOME children with CP may show NO OBVIOUS SIGNS for a long time.

OTHERS may have SERIOUS SYMPTOMS from birth.

PHYSICAL SYMPTOMS

Difficulty in sucking; poor muscle control.

Poor coordination.

Problems with seeing, hearing, etc.

Muscle spasms, seizures.

BEHAVIORAL SYMPTOMS

Unusual tenseness; irritability as an infant.

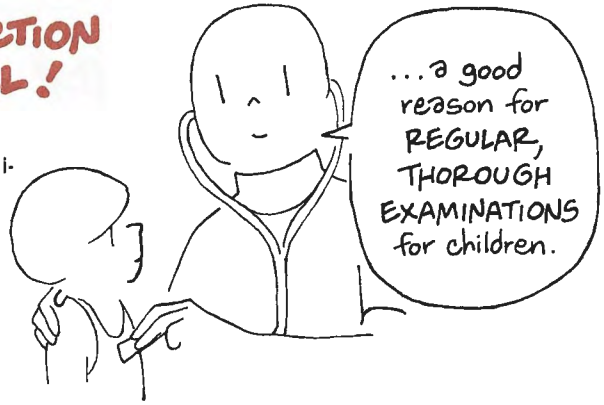
Poor ability to concentrate.

Emotional problems.

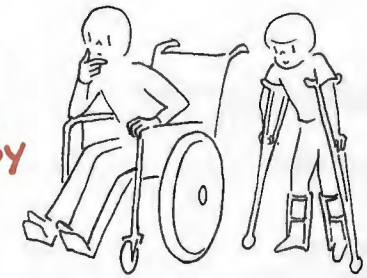
Mental retardation (a small minority of people with CP).

EARLY DETECTION of CP is VITAL!

- It can often reduce developmental handicaps to a minimum.
- It leads to early treatment, better adjustments in life.



TYPES of cerebral palsy



1 SPASTIC
-- tense, contracted muscles (most common type of CP).

2 ATHETOID
-- constant, uncontrolled motion of limbs head, eyes.

3 ATAXIC
-- poor sense of balance, often causing falls and stumbles.

4 RIGIDITY
-- tight muscles that resist efforts to make them move.

5 TREMOR
-- uncontrollable shaking, interfering with coordination.

These problems VARY

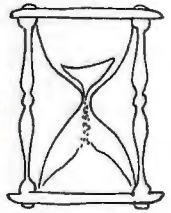
-- from severe to mild
-- from person to person
-- from time to time in the same person.

Some people have more than one type of CP.

Cerebral palsy may have

LONG-TERM EFFECTS

on the life of the person who is affected.



FOR EXAMPLE--

PRACTICAL PROBLEMS

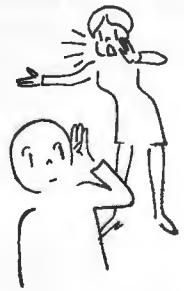
Many people with CP face difficulties

-- LEARNING, because of perceptual problems and mental retardation (although many people with CP have average or above-average intelligence).

-- MAKING A LIVING, because of physical limitations, society's misunderstandings, etc.

SOCIAL PROBLEMS

Forming relationships with other people, making progress in school, at work, etc., may be difficult -- due to impaired speech, hearing, or other physical handicaps.



PERSONAL PROBLEMS

Stress and psychological problems often result

-- indirectly, from frustration due to physical limitations

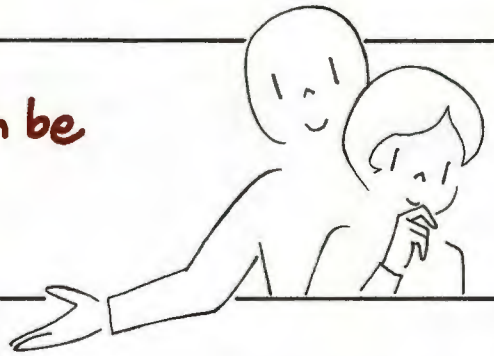
-- from overprotectiveness, hostility, etc., of others

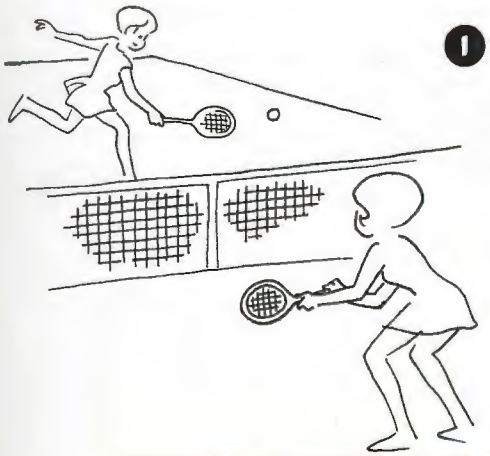
-- directly, from brain damage.

FAMILIES are affected, too:

- **GUILT** ("we're to blame").
- **ANXIETY** (need to plan for future).
- **RESENTMENT** (great demands on time, money).
- **UPSETS** (brothers and sisters, parents, spouse denied attention).

Many cases of cerebral palsy can be **PREVENTED** through...



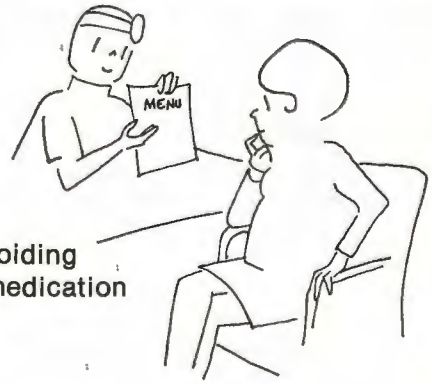


❶ GOOD HEALTH BEFORE PREGNANCY

Habits of GOOD NUTRITION and sensible EXERCISE should be formed long before childbearing years.

Testing and immunization for GERMAN MEASLES should be done during childbearing years, at least 3 months before pregnancy.

❷ PRENATAL CARE



REGULAR CHECKUPS throughout pregnancy help avoid complications.

SELF-CARE should include good diet; adequate rest; avoiding smoking, non-prescription medication and exposure to viruses.

❸ PRECAUTIONS DURING AND IMMEDIATELY FOLLOWING CHILDBIRTH

Many hospitals have special equipment for safety's sake.

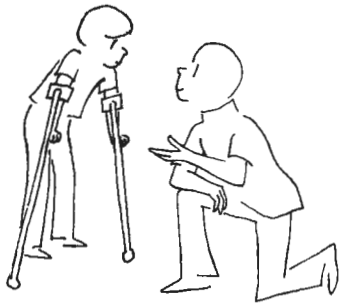
- FETAL MONITORING during labor helps avoid problems that can lead to brain damage.
- SPECIAL FACILITIES for high-risk newborns can help maintain oxygen flow or diagnose other problems.

❹ EARLY CHILDHOOD HEALTH CARE

Schedule regular PHYSICAL EXAMINATIONS and IMMUNIZATIONS against childhood disease.

Take SAFETY PRECAUTIONS against lead poisoning, vehicle accidents, household hazards, etc.

MANAGING cerebral palsy



There's no "cure" for C.P.
BUT a lot can be done to help people with cerebral palsy become self-reliant and fulfilled.

❷ MEDICATION

-- can be effective in controlling seizures and muscle spasms.

❸ SURGERY

-- helpful for some specific problems, such as certain eye and ear difficulties, gait problems.

Brain surgery, though still experimental, may be helpful to some.

❺ OCCUPATIONAL THERAPY

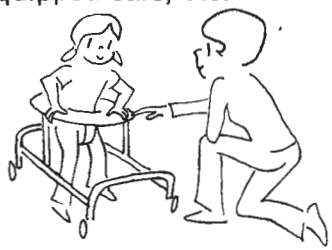
-- learning coordination, daily routines (eating, writing, etc.) -- to help gain self-sufficiency, better relationships with others.

❻ SPEECH THERAPY

-- training for better communication, social, educational and vocational opportunities.

❶ MECHANICAL AIDS

-- communications devices, special eyeglasses and hearing aids; walkers, page turners, specially equipped cars, etc.

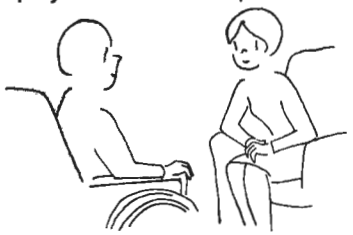


❹ PHYSICAL THERAPY

-- motor education to make self-care possible; exercise programs to train people to use braces, other aids.

❼ COUNSELING

-- either individual or group -- to help those with CP deal with emotional, social, practical problems related to physical handicaps.



For the **FAMILIES** of people with CP, **SPECIAL ASSISTANCE** is needed.

SPECIAL TRAINING in home care skills to teach family members to attend the disabled.

Group or individual COUNSELING to help families relieve the stress that may result from living with a handicapped person.

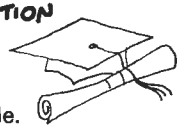
RESPITE CARE relieves families of care responsibilities and provides new living experiences for the person with CP.

ASSISTANCE

for people with CP and their families is available from many sources.

FOR EXAMPLE--

SPECIAL EDUCATION PROGRAMS
-- integrated with regular programs whenever possible.

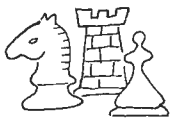


DIAGNOSTIC and TREATMENT CENTERS
-- providing a wide range of services.

VOCATIONAL TRAINING and GUIDANCE
-- to teach skills, help find employment.

ADAPTED WORK SITUATIONS
-- providing an opportunity to work equally with other people.

RECREATIONAL FACILITIES
-- giving opportunities to make friends, enjoy sports, games, hobbies, etc.



LIVING ARRANGEMENTS
-- providing or adapting a home, daily living assistance to encourage independent, normal living.

TO FIND OUT about CP services in your community, contact your physician, state or local health, education and social agencies, or your United Cerebral Palsy affiliate.

Sources of FINANCIAL AID

- Social security, medicaid, social services and other government programs
- Private insurance
- Trust funds -- money set aside for continuing support.

REMEMBER...

people with cerebral palsy have the same **GOALS** as people everywhere...

to GET THE MOST FROM LIFE physically, mentally, emotionally

to achieve INDEPENDENCE and a sense of personal worth

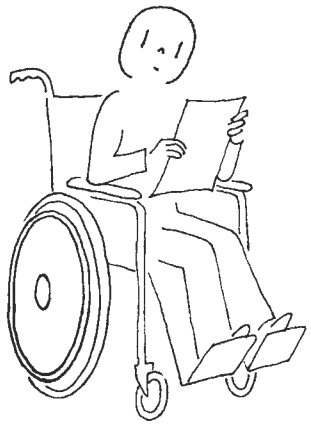
to find opportunities for FRIENDSHIP, SOCIAL LIFE, INTERESTING ACTIVITIES

to get a GOOD EDUCATION

to have a chance for SATISFYING EMPLOYMENT

to be productive and CONTRIBUTING CITIZENS

to have access to PUBLIC TRANSPORTATION and BUILDINGS



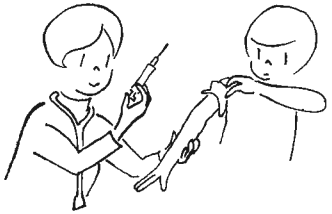
Scientists, doctors and therapists are making impressive strides through

RESEARCH.

Important advances have been made in --

PREVENTION

-- immunization against viruses; maternal and child health care; investigating environmental causes of CP; identification of high-risk situations.

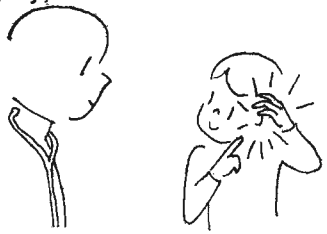


DETECTION

-- early identification of babies with brain damage; better techniques for testing the learning potential of cerebral palsied children.

TREATMENT

-- drug research to find effective, safe medicine to relieve CP symptoms; the possibility of functional regeneration of the central nervous system; improved mechanical aids; surgery; biofeedback.



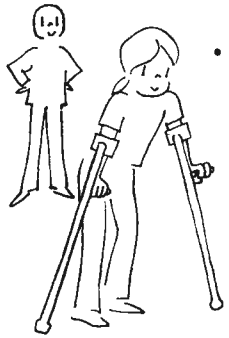
SERVICES

-- diagnosis and management; improved educational, vocational programs; foster care, day care centers.

SOO--

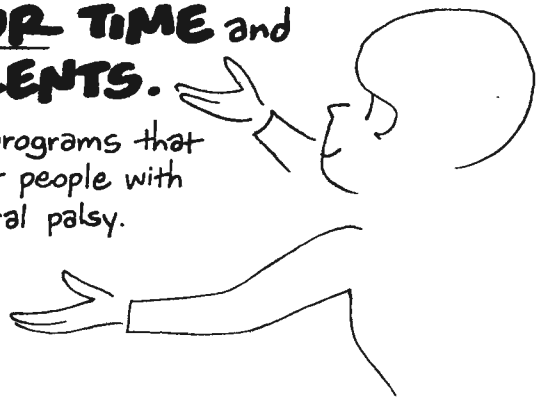
YOU CAN HELP

- ☑ **KNOW** what cerebral palsy is and what causes it.
- ☑ **HELP PREVENT** CP; promote good health practices, especially for pregnant women.
- ☑ **SUPPORT** community services for all handicapped people.
- ☑ **ACCEPT** the handicapped as employees and in schools, social activities, church, neighborhood.
- ☑ **GIVE** to organizations that fight cerebral palsy.
- ☑ **WORK** to eliminate architectural and transportation barriers.



...and **VOLUNTEER YOUR TIME** and **TALENTS.**

Join programs that assist people with cerebral palsy.



Tikvah Layeled Medical Advisory Board In Israel

Dr. David Segal
Chairman of Orthopedics, Hadassah Hospital
Professor G. Rubin
Dept. of Orthopedics, Hadassah Hospital
Professor Eldad Melamed
Dept. of Neurology, Hadassah Hospital
Dr. S. Mayer:
Director Alyn Orthopedic Hospitol

Tikvah Layeled Medical Advisory Board In The U.S.

Dr. Warwick Peacock
Chief of Pediatric Neurosurgery
UCLA Medical College

Dr. Fred J. Epstein
Director
Dept. of Pediatric Neurosurgery
New York Uuniversity Medical Center

Dr. R. Paul Jordan
Prof. Associate
Dept of Physical Medicine and Rehabilitation
New York Hospitol-Cornell Medical College

American Friends of Tikvah Layeled Inc.

Ernest Rothman, *National Director*

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The Inside Story Of

TIKVAH LAYELED

THE FOUNDATION FOR CEREBRAL PALSY CHILDREN IN ISRAEL

Tikvah Layeled Activities

* *Center for Cerebral Palsy-Jerusalem*
  Educational instruction in a specialized classroom setting
  Physical,speech, and occupational therapy
* ***Manufacturing of specialized therapeutic chairs***
* ***and stands which are distributed to hospitals***
* ***and clinics throughout Israel***
* ***Family counseling***
* ***Forums and seminars with distinguished visiting***
* ***medical specialists***
* ***Family counseling***
* ***Informative lectures***
* ***Liaison between doctors and patients with***
* ***handicaps***

Letter by Dr. Paul Jordan on behalf of the Tikvah Layeled Center - January, 1987

This letter is being written in strong support for Tikvah Layeled, a specialty Center directing it's efforts to enhance the lives of disabled children throughout Israel. This unique Center, incorporating the untireing efforts and dedication of it's founders and directors, is a multi-disciplinary facility employing the state-of-the art equipment, evaluation, and treatment techniques specifically designed to meet the individual needs of each child. The special services offered by such a center will be of value to the health care professional faced with the most difficult to manage children.

I am honored and graciously accept the invitation by the Center to serve on the Medical Advisory Board of Tikvah Layeled.

Medical Expedition To Israel-Fall 1987

Participants

Neurosurgical Group

Headed by Dr. Warwick Peacock,

Chief of Pediatric Neurosurgery,
U.C.L.A. School of Medicine, California

Scientific Orthopedic Group

Headed by Dr. Paul Jordan,

Professor of Orthopedic Sciences,
N.Y. College of Podiatric Medicine

Professor of Physical Medicine & Rehabilitation,
N.Y. Hospital -Cornell Medical College

Director of Biomechanics & Rehabilitative Medicine,
Langer Institute of Orthopedic & Neurological Medicine, N.Y.

Consultant to the United Cerebral Palsy of America

Pediatric Neurological Group

Headed by Dr. Leila Arens,

Capetown Childrens Hospital, South Africa

Outline of Medical Themes To Be Promulgated

* *Demonstration of Selective Posterior Rhizotomy (a revolutionary neurosurgical procedure)*
* *Alcohol Block (a non-surgical simulation of rhizotomy)*
* *Selection & screening of C.P. patients*
* *Postoperative management and long term results of rhizotomy*
* *Dynamic Electomyography in surgical decision making*
* *Post rhizotomy orthosis*
* *Foot & ankle deformities in C.P. and orthosis as an aid to physical & surgical therapies*
* *Casting techniques and the fitting of Dynamic foot and ankle casts*

1011 Grand Boulevard Deer Park, New York 1172
Telephone: (516) 667-20
Toll Free: 1 (800) 645 552
In N Y State 1 (800) 821 258
Telex: 961437 LANGER DEE

March 4,1987

Ernest Rothman
Director, Tikvah Layeled
11 Harrison Ave.,
Brooklyn, N.Y. 11211

Dear Mr. Rothman,

This letter is being written on behalf of Dr.Peacock and myself, to express a committment for lecture, clinical evaluation and neurosurgical demonstration for the management of spasticity in cerebral palsy. As you know, Dr. Peacock is an Associate Professor anc Chief of Pediatric Neurosurgery at the University of California, Los Angeles Medical Center. I continue to be an attending and clinical associate instructor at the New York Hospital, Cornell Medical College, in the Department of Physical Medicine and Rehabilitation.

In general, the lecture-workshop would be open to health care professionals interested in and actively working with cerebral palsied children. Initially a two to four hour general overview of patient selection for the posterior rhizotomy procedure developed by Dr. Peacock would be offered and include video tapes of pre and post rhizotomy children. The audiences would include health care individuals interested in learning about this neurosurgical procedure to reduce spasticity, and the parents of the children to be evaluated for such a procedure are encouraged to attend.

Since the evaluation and selection process to determine the appropriate candidates for this procedure is most important, a variety of children would be evaluated in a small clinical workshop. The participants ideally would include the neurosurgeons, neurologists, physiatrists, pediatricians and physical therapists. To allow the child to feel as comfortable as possible this group should be limited to no more than ten. A group of 10 to 15 children could then be screened and evaluated to see if they are suitable candidates for the selective posterior rhizotomy. Pre and post surgical considerations will be addressed more specifically.

Dr. Peacock would then offer demonstration of the surgical procedure in the operating room with the neurosurgical physicians in attendance.

I would offer a lecture and a hands on workshop to the physical therapists regarding the rise of dynamic ankle orthoses and foot orthoses as an adjunct to the post-operative management. Also a portion of the program would include inhibitive casting workshops for those children who may not be neurosurgical candidates. Objective, dynamic electromyographic evaluations will be demonstrated in visual slide format.

A more detailed and specific outline of the program will be offered if the physicians in Israel are interested in these innovative procedures to manage their spastic cerebral palsied children.

If I or Dr. Peacock may be of any further assistance in this matter, please do not hesitate to contact either one of us.

Warwick J. Peacock, M.D.
Pediatric Neurosurgery
UCLA Medical Center
74-137 CHS

R. Paul Jordan, D.P.M.
4 Medical Plaza
Glen Cove, N.Y. 11542

Sincerely,

R. Paul Jordan, D.P.M.

RPJ:rb
Enc.
cc W. J. Peacock, M.D.

hadassah university hospital kiryat hadassah בית החולים האוניברסיטאי של הרסה קרית הרסה

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Dr. Warwick J.Peacock, M.D.
Pediatric Neurosurgery
U.C.L.A. Medical Center
Los Angeles, California
U.S.A.

date תאריך: April 5, 1987

our reference מספרנו:

unit יחידה: Orthopaedic

Dear Dr. Peacock:

I am inviting you to visit the Orthopaedic Department in Hadassah University Hospital, Jerusalem and demonstrate your surgical approach of elective posterior rhizotomy. I will try and arrange for you to have C.P. children also at the "Asaf Harofeh" Hospital.

This visit, if possible, will take place sometime after the Passover Holidays. I plan to be in Boston toward the end of April and will contact you.

It is my understanding that you work closely with Dr. Jordan who has a special way of postoperative "boot" fitting. We will be pleased to have him too at the same time and I am extending my invitation to both of you.

Hopefully I will be able to finalize the dates soon during my visit to U.S.A. "Tikva-Layeled" organization is willing to support your visits and I am grateful for their cooperation.

Sincerely,

D.Segal, M.D.
Chairman of the Orthopaedic Department

DS/hk
cc Dr.R.Paul Jordan

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WARWICK J. PEACOCK, M.D.
HEAD OF PEDIATRIC NEUROSURGERY
UCLA SCHOOL OF MEDICINE
LOS ANGELES, CALIFORNIA 90024

TELEPHONE: (213) 206-6677

July 30, 1987

Professor Shalit, Chairman
Dept. of Neurosurgery
Hadassah Medical Center
Ein Kerem
Jerusalem, ISRAEL

Dear Dr. Shalit:

I am writing to you as I have been invited by the Tikvah La Yeled Foundation for Cerebral Palsy Children in Israel to visit your country and to demonstrate a technique that I have found effective in reducing spasticity in patients with cerebral palsy and spinal cord injury. Although the invitation was initiated by the parents of a child with spastic cerebral palsy and reached me via the orthopedic surgeons in Jerusalem, the procedure is essentially a neurosurgical one and I hope it will prove of interest and value to you.

I am a pediatric neurosurgeon at the University of California, Los Angeles. I began my training as a neurosurgeon at the University of Cape Town and completed it at the University of Toronto in Canada working at the Hospital for Sick Children. I returned to Cape Town to develop the first pediatric neurosurgical service in Southern Africa and eventually became Professor of Pediatric Neurosurgery at the University of Cape Town. It was there that my interest in cerebral palsy and spasticity developed and I have now used selective posterior rhizotomy on over 150 patients suffering from spasticity with very pleasing results.

It has been proposed by Tikveh Le Yeled, and I would be honored, if you are interested in this technique, to accept this invitation to visit Israel and then demonstrate to you how I select patients that are suitable for the procedure and the surgical technique that I use. In order to make the program as complete as possible, two other people would also participate in this program: Dr. Leila Arens, the pediatric neurologist who worked with me from the beginning in Cape Town, and Dr. Paul Jordan, a doctor of physical medicine in New York who specializes in orthotics and post-rhizotomy management of patients as well as offering alternatives to those patients who are not suitable candidates for rhizotomy.

continued...

The program that I feel would be most efficient would be for the following talks to be given to medical professionals only (i.e., neurosurgeons, orthopedic surgeons, pediatricians, neurologists, etc.) on Sunday, Sept. 13:

1) "The rationale and technique of selective posterior rhizotomy for reducing spasticity in cerebral palsy"
W.J. Peacock, M.D. - 1 hr. + 45 minutes for questions & discussion
(slide projector and ½-inch VHS video player needed)

2) "Selective posterior rhizotomy: Selection of patients, postoperative management and long-term results"
L.J. Arens, M.D. - 1 hr. + 45 minutes for questions & discussion
(overhead projector needed)

3) "Dynamic EMG - An aid to surgical decision-making" and "Current concepts in post-rhizotomy orthosis management"
P. Jordan, D.P.M. - 2-2½ hrs. including questions & discussion
(slide projector needed- he will bring his own carousel)

These lectures would run approximately from 8:00 a.m.-1:00 p.m.

On Monday, September 14th, I suggest holding a clinic where ten to fifteen patients with spastic cerebral palsy are seen and assessed for the suitability for rhizotomy. It would be of value to see a spectrum of patients from the mildly affected intelligent spastic diplegic child to the severely affected, retarded spastic quadriplegic child. The correct selection of patients is obviously by far the most important factor in achieving good results. Cerebral palsy is a multi-faceted complex disorder and only certain carefully chosen patients will benefit from a procedure that reduces spasticity. Before the clinic begins, I would suggest giving a lecture to the families of the children (and therapists, if you feel that would be appropriate) so that the technique, etc. does not have to be explained to each individual family.

On Tuesday, September 15th I would like to demonstrate the procedure on one or two patients (one, apparently, is already selected - Yoel Braitstein, a child I saw here in Los Angeles specifically for this purpose). Prior to surgery it would be necessary to discuss intraoperative EMG stimulation and recording with a neurologist or an experienced EMG technician. I will bring the specially designed "rhizotomy hooks" which are used for the procedure. Basically what is done is the cauda equina is exposed and each individual rootlet of each posterior root from L2 to S1 is stimulated via two insulated microneurosurgical hooks which are attached via long sterile electrical cords to the stimulating component of the EMG machine. Needle or surface electrodes are then used to monitor the motor responses in the muscle groups being stimulated. Those rootlets associated

continued...

what is considered to be an abnormal response are divided. I am sure you will find the procedure interesting, straightforward and effective. Please find enclosed a copy of my Curriculum Vitae and two publications related to rhizotomy. The review of 60 cases will be published in Pediatric Neuroscience in the next issue.

In addition, the way the program was envisioned was that Wednesday and Thursday (as much time as is necessary) would be spent by Dr. Jordan explaining his therapeutic techniques post-rhizotomy, orthotic construction, etc. for physical therapists and anyone else who might be interested in the subject.

I look forward to meeting you as a neurosurgical colleague in Israel.

With my very best wishes,

Yours sincerely,

Warwick Peacock

Warwick J. Peacock, M.D.
Head, Pediatric Neurosurgery

WJP:ke
encl.
P.S. As Tikvah La Yeled will be sponsoring the entire week's activities, they will be making all the flight arrangements for the three of us (as well as my wife who will be accompanying me). When we have more definite flight arrangements, I will forward them to you. We all should be arriving in Israel on or around the 10th of September and leaving between the 18th and 22nd.
cc: Dr. David Siegal
Rabbi Ernest Rothman

DRAFT OF LETTER FROM PRESIDENT REAGAN

THE TIKVAH LAYELED FOUNDATION FOR CEREBRAL PALSY:

IT GIVES ME GREAT PLEASURE TO GREET YOU TONIGHT AT THIS MEDICAL CONVOCATION IN JERUSALEM WHICH HAS BEEN CONVENED ON BEHALF OF CEREBRAL PALSY.IT IS THIS EXCHANGE OF IDEAS AND DISCOVERIES BETWEEN FREE COUNTRIES OF THE WORLD WHICH ALLOWS FOR THE GLOBAL DISSEMINATION OF EXCITING AND INNOVATIVE TECHNIQUES TO BENEFIT THE WELFARE OF MANKIND.

I ALSO WOULD LIKE TO EXTEND GREETINGS TO ALL THE ESTEEMED PROFESSIONALS WHO HAVE GIVEN GRACIOUSLY OF THEIR TIME AND EFFORT IN MAKING THIS PROJECT A REALITY.

I SALUTE THE TIKVAH LAYELED FOUNDATION FOR THEIR NOBLE ACCOMPLISHMENTS AND WISH THEM GOOD LUCK AND GREAT SUCCESS IN ALL THEIR FUTURE ENDEAVORS FOR THE ENHANCEMENT OF THE LIVES OF OUR HANDICAPPED CHILDREN.

TIKVAH LAYELED
THE FOUNDATION FOR CEREBRAL PALSY CHILDREN IN ISRAEL

AMERICAN FRIENDS OF TIKVAH LAYELED, INC.
ERNEST ROTHMAN
DIRECTOR

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ZVI BRAITSTEIN
FOUNDER AND DIRECTOR

12 David Yellin Street
Jerusalem, Israel
02-243-326

Dear Rabbi Stein 1/6/82

Enclosed you'll find some info on Tikvah Layeled in general and the Medical expedition in particular.

I believe the letter (or letters) should say something like:

" TO TIKVAH LAYELED FOUNDATION FOR CEREBRAL PALSY

It gives me great pleasure to greet you tonight and to acknowledge the wonderful work you are doing for Cerebral Palsy children. It is the exchange of ideas and techniques between free countries that allows for new and innovative medical treatment to be disseminated and to enable disabled children to receive the maximum opportunity to benefit from state-of the-art medical procedures.

I greet all the professionals who ~~were involved and~~ took part in this monumental expedition and wish Tikvah Layeled Foundation success and good luck in all their future endeavors for the welfare of handicapped children.

Bold New Surgery Aids Young People With Cerebral Palsy

New York Times, 7/22/86

By SANDRA BLAKESLEE

Special to The New York Times

LOS ANGELES, July 21 — A bold new surgical procedure greatly reduces the muscle spasticity of selected young people with cerebral palsy.

Although many treatments involving drugs and physical therapy are available for spasticity, it remains a major problem for those afflicted with cerebral palsy, which leaves many of those who have it with an ungainly, scissoring walk, stiff muscles and slurred speech.

The new approach is an improved version of an older surgical technique. It seeks to reduce spasticity by severing selected nerve fibers in the spinal cord. In this way impulses to and from nerve cells that control muscle action are put in proper balance.

The neurosurgical technique has proved successful in 118 cases so far, with no recorded failures. All patients have continued to improve up to five years after surgery.

An estimated 500,000 to 600,000 Americans manifest one or more symptoms of cerebral palsy. The majority have some degree of spasticity.

The new procedure "is an innovative approach that seems very promising," said Fred Epstein, chief of pediatric neurosurgery at New York University Medical Center. "It makes a lot of sense to me and I intend to try to reduplicate the work."

"It's absolutely marvelous," said Dr. Marion L. Walker, chairman of the division of pediatric neuroscience at the University of Utah. "It's one of the most exciting neurosurgical techniques to come along in a long time."

The operation, selective posterior rhizotomy, was developed by Warrick Peacock, chief of pediatric neurosurgery at the University of California at Los Angeles Medical Center. Dr. Peacock emigrated from South Africa to the United States earlier this year, bringing with him new ideas on how to treat cerebral palsy patients. He performed 114 rhizotomies in South Africa and, in recent weeks, has done 4

Continued on Page C12

Bold New Surgery Aids Young People With Cerebral Palsy

Continued From Page C1

more in the United States.

Dr. Peacock stressed in an interview that not all cerebral palsy patients would benefit from the surgery and that patient selection was critical. Those who are candidates, he said, can be made more comfortable and less irritable. "The child who never sat up is able to sit and the child who could only walk supported is able to walk better," Dr. Peacock said. The ideal age for the operation, he said, is 4 years.

He said his greatest success thus far involved an intelligent child who walked with a toe-to-heel gait and slightly flexed knees. After the operation, the child's gait was so improved that he won a running race at school.

Cerebral palsy is a group of disorders typified by incoordination and loss of muscle control. It is caused around the time of birth, when for a variety of reasons blood and oxygen fail to reach one or more of the brain's main areas that regulate muscle control, resulting in permanent damage to brain cells.

Patients fall into three categories. In the spastic form, children walk on their toes in a scissoring motion, holding their arms up for balance. Their muscles are stiff. In the dystonic form, muscle movements are smooth and writhing, while the ataxic form is characterized by clumsiness and lack of balance.

The best surgical candidates, Dr. Peacock said, are young intelligent children who are purely spastic and who have some ability to walk forward. Dystonic and ataxic children are better helped with drugs and physical therapy, he said.

Spasticity is loosely defined as increased muscle tone. "When you bend your arm, you contract your biceps muscles and relax your triceps muscles," Dr. Peacock said. "In spasticity, both muscles are contracted."

On a cellular level, spasticity occurs when signals from the brain are not synchronized with signals from the external environment. After a muscle is activated, it sends stimulatory messages to a neuron, a nerve cell, in the spinal cord. The same nerve cell simultaneously receives inhibitory messages sent by the brain. The body strikes a balance between stimulation and inhibition so that normal muscle tone is achieved.

When the neurons are damaged by stroke, cerebral palsy or spinal cord injury, said Dr. Peacock, this balancing act is thrown out of kilter. There is too much stimulation and not enough inhibition. Muscle tone increases.

Drawing on a long tradition of research that has mapped the nerves throughout the spinal cord, Dr. Peacock perfected a technique to surgically correct this imbalance. Earlier attempts to relieve spasticity by cutting nerves in the spinal cord often led to loss of sensation, paralysis or pain. The efforts were abandoned.

The new technique is made possible, he said, by better understanding of the nervous system and by modern tools for manipulating it. Nerve fibers can now be isolated, identified by function and precisely snipped.

In the operation, after anesthesia, a small incision exposes the spinal cord in the lower back. Nerves there break up into roots and, in turn, rootlets that control different physiological functions.

Dr. Peacock finds the posterior root, involved in muscle tone. He then carefully lifts up each of 50 posterior rootlets with an instrument resembling a crochet hook. Each rootlet is then stimulated by an electric probe, to test how well the neurons are balancing brain and muscle signals.

When normal rootlets are stimulated by a probe, associated muscles contract and relax normally. But a rootlet not properly inhibited by the brain, as in cerebral palsy victims, reacts very differently. The muscles become stiff and rigid; for instance, on the operating table, the patient's leg may swing violently into the air and remain rigidly suspended until the probe is turned off.

Dr. Peacock snips anywhere from 6 to 30 rootlets thus found to be coordinating brain and muscle signals in an imbalanced way, allowing the other posterior rootlets to achieve better muscle tone. Since motor nerves are not touched, the patient does not lose muscle strength, as happened with earlier efforts, he said.

The results depend on the severity of the patient's spasticity. Children who walk on their tiptoes in a scissoring motion tend to walk flat-footed after the operation. Continuing physical therapy further aids their improvement.

Severely spastic children are made more comfortable. They cry less often and can sit up, Dr. Peacock said. The operation does not, however, enable nonwalkers to walk.

In some instances, arm spasticity and speech have improved as a happy byproduct of the operation, said Dr. Peacock.

Other modern techniques for treating spasticity include selectively placing lesions in the spinal cord and externally stimulating nerves with radio waves or electrical signals.

Dr. Walker said that although the new technique works, "it will be reasonable to catch on" because orthopedic surgeons will need to be educated about its usefulness and learn how to do it.

SELECTIVE POSTERIOR RHIZOTOMY

Selective posterior rhizotomy is a neurosurgical procedure that has proved helpful to many patients who have the spastic form of cerebral palsy. If spasticity is interfering with the patient's function, by reducing the spasticity, functional gains can be made.

The rationale behind the procedure is as follows: Normal muscle tone (state of contraction or degree of resistance to movement) is maintained by the interaction of two opposing nervous influences (Diagram 1). Within all skeletal muscles there are many muscle spindles which stretch within the muscle belly. When the muscle spindle is stretched an impulse is generated in the nerve that runs back to the spinal cord in what is called the posterior root. This nerve then stimulates a motor nerve (anterior horn cell) that runs out to a muscle, making the muscle contract, thereby increasing muscle tone. At the same time there are descending motor tracts (nerve fibres) which run down the spinal cord from the brain to the anterior horn cells. These tracts help coordinate muscle contraction but also inhibit the activity in the anterior horn cell thereby decreasing muscle tone. If, as occurs in the spastic form of cerebral palsy, there is a loss of nerve fibres in the descending motor tracts, inhibition of the anterior horn cells becomes less efficient. The stimulatory effect of the nerve fibre coming in from the muscle spindle in the posterior root is then less opposed so that it stimulates the muscle to contract more than it should and the muscle tone rises. Spasticity is increased muscle tone.

In selective posterior rhizotomy the stimulatory influence of the posterior nerve root fibres is decreased. The second lumbar to the first sacral posterior nerve roots are exposed via limited laminectomies of the second to fifth lumbar vertebrae. The rootlets which comprise each of these posterior roots are separated and stimulated individually (Diagram 2). The motor response is monitored in the legs and those rootlets associated with an abnormal response are sectioned and the remainder left intact.

Immediately after surgery the muscle tone is reduced but functional gains are dependent on intensive postoperative therapy.

The patient is admitted the day prior to surgery and is usually operated on as the first case the following morning (7:45 a.m.). The surgery itself takes about 4 hours and postoperatively the discomfort requires treatment with analgesics for about 2 days. The patient remains flat in bed for 6 days and is then slowly mobilized to be discharged on the 8th day.

Prior to surgery and again after surgery a video recording is made of the patient's posture and movement. This helps with the planning of therapy and keeps a permanent record.

Diagram 1.

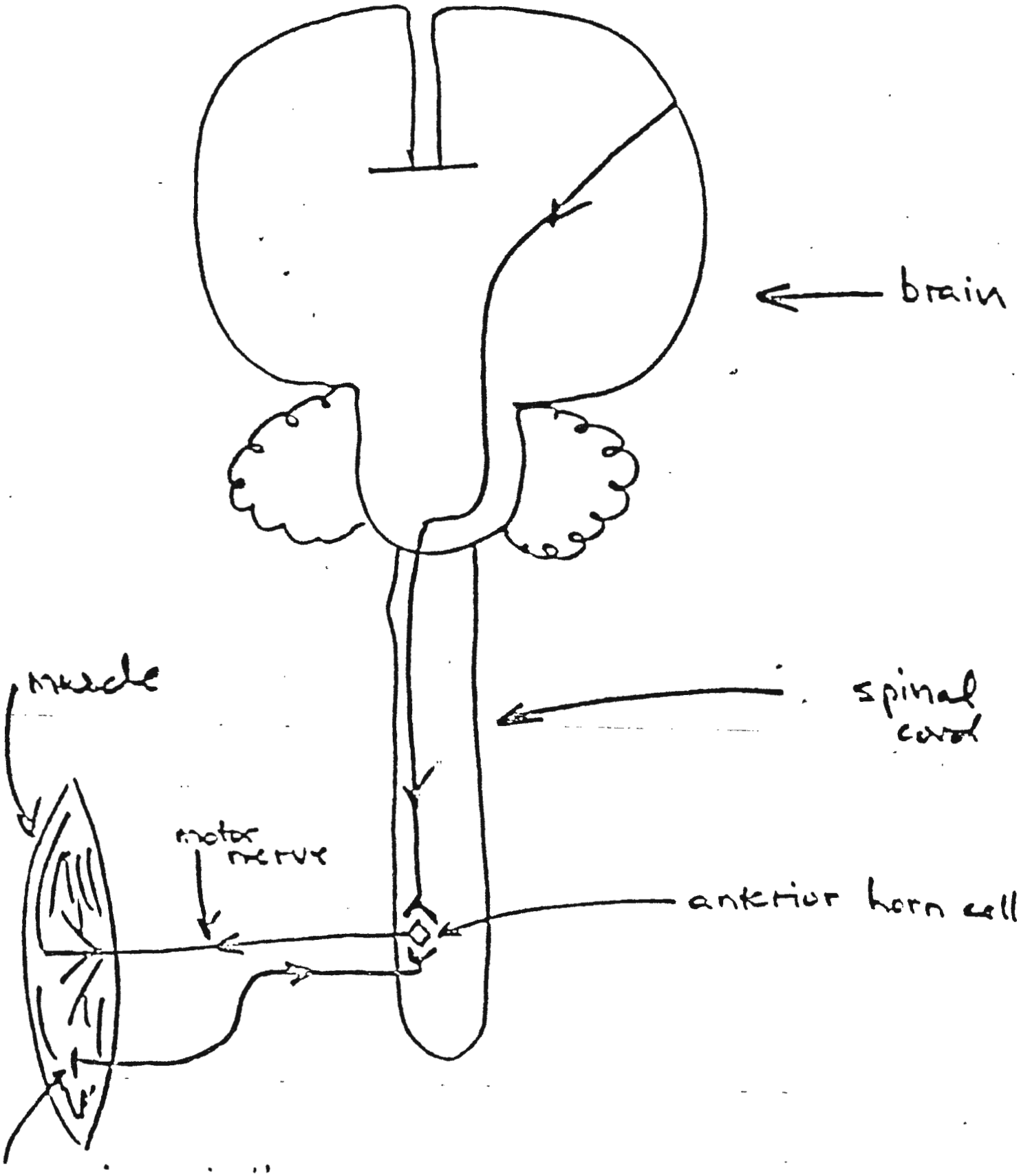
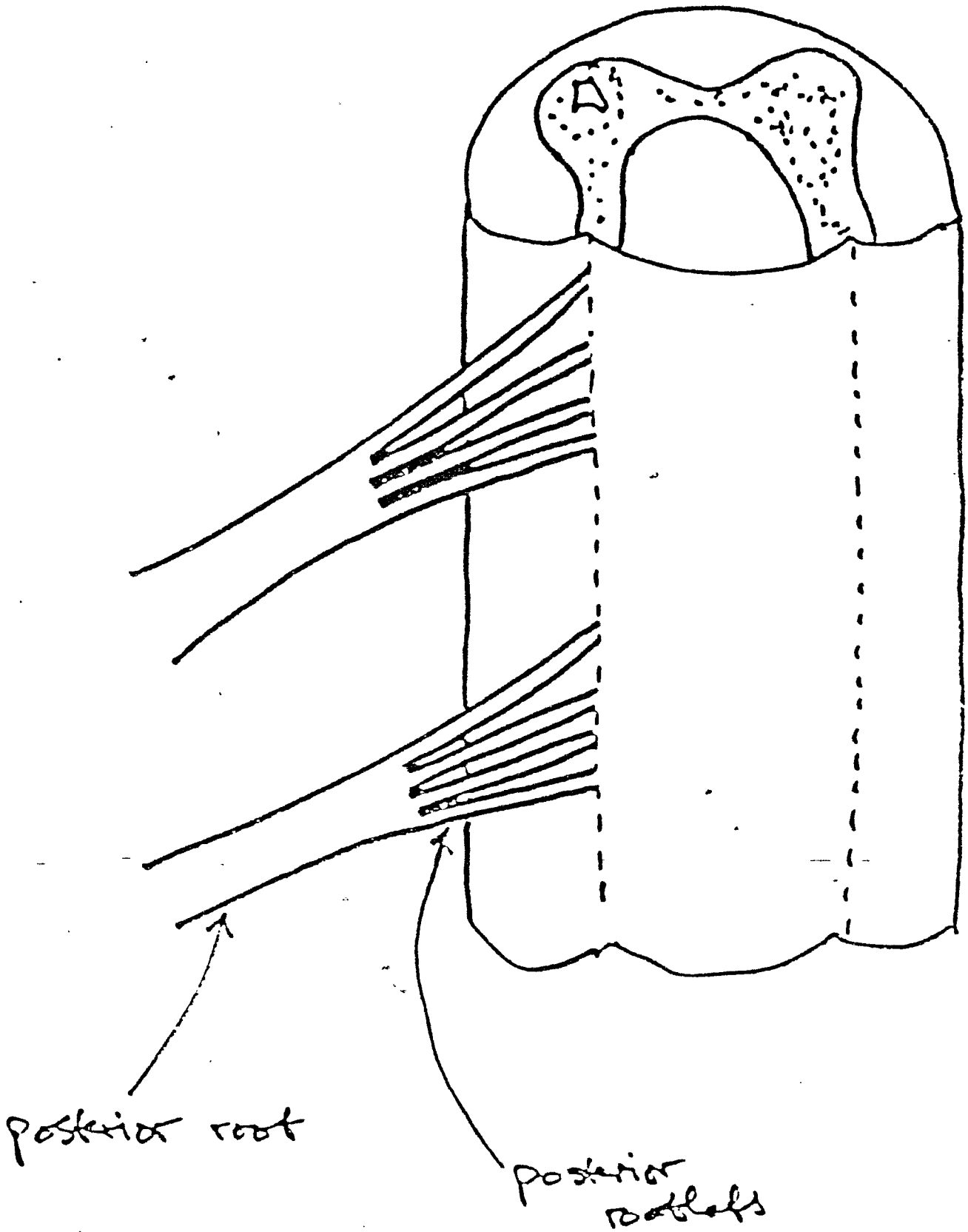


Diagram 2.



Selective posterior rhizotomy for the relief of spasticity in cerebral palsy

W. J. PEACOCK, LEILA J. ARENS

Summary

Twenty children with increased muscle tone of cerebral origin have been subjected to selective posterior spinal rootlet section. A significant reduction in tone resulting in improvement in motor function was achieved in every case. The first 15 cases are reviewed in detail. The procedure is of value not only in the intelligent ambulant patient but also in the mentally retarded and severely spastic child because handling is facilitated and bladder and bowel control improved. Speech and hand function were improved in a number of patients in whom they had previously been major problems.

S Afr Med J 1982, 62: 119-124.

Resistance to movement due to increased muscle tone is a major problem in the child with spastic cerebral palsy. The aim of treatment has always been reduction of tone and facilitation of normal movement. In many cases this cannot be achieved by physiotherapy alone. Orthopaedic surgery plays a valuable role in the correction of fixed deformities and, to a lesser extent, reduces muscle tone, but does not affect the basic neurological imbalance. Neurosurgical procedures can normalize tone, thus improving function. The purpose of this article is to show that selective posterior nerve rootlet section reduces spasticity and improves function in spastic cerebral palsy.

Pathophysiology

Skeletal muscle is composed of large extrafusal force-generating fibres which make up the main contracting mass of the muscle and small intrafusal fibres of the muscle spindles which lie scattered throughout the muscle belly.[1] When the extrafusal fibres contract the muscle shortens and movement occurs. The muscle spindle is an adjustable sensory receptor which measures length and is involved in the subtle regulation of muscle tone and fine movement. The extrafusal fibres are innervated by large type Ia motor neurons arising from alpha anterior horn cells.

The intrafusal fibres of the muscle spindles respond to stretch by increasing the frequency of action potentials in their afferent sensory neurons. This afferent fibre connects directly or indirectly with the alpha anterior horn cell and facilitates its activity. Any increase in length of the muscle belly will therefore stretch the intrafusal muscle spindle fibres and via the spinal reflex the whole muscle will be forced to contract, thereby decreasing the stretch stimulus of the muscle spindle. The sensitivity of the muscle spindle can be altered. A small anterior horn cell, the gamma motor neuron, controls the length of the intrafusal fibres. The degree of stretch to which the muscle must be subjected before reflex contraction of the muscle as a whole occurs can therefore be adjusted. The afferent impulses from the muscle spindle are a major source of facilitatory influences on the alpha anterior horn cell. These impulses are continuous; it is only their frequency which varies, and this can be increased until the threshold of the alpha anterior horn cell is reached and an action potential is achieved.

The afferent neuron from the muscle spindle influences segments above and below its spinal cord segment to maintain agonist-antagonist balance according to Sherrington's law of reciprocal innervation.[2] Activity in distant segments is also affected to alter muscle tone and produce postural fixation. This is achieved by ascending or descending collaterals from the afferent neuron and via intersegmentary interneurons.

Suprasegmentary control from centres in the brainstem, cerebellum and cerebral hemispheres co-ordinates movement patterns, tone and posture. These influences are mediated via the pyramidal and extrapyramidal tracts. The descending tracts co-ordinate alpha anterior horn cell activity and inhibit gamma anterior horn cells, thereby suppressing tone in skeletal muscles.

There are therefore two opposing influences on anterior horn cells. Facilitation is brought about by the afferent fibres from the muscle spindle on the one hand, and on the other inhibition is the result of descending tracts from the higher centres. These two opposite forces must be precisely balanced to produce optimal muscle tone and posture.

In cerebral palsy the balance is upset. Descending motor tracts have been damaged so that inhibition is reduced, leaving facilitation dominant; the excessive anterior horn cell activity produces spasticity.

Treatment

It should therefore be possible to relieve spasticity either by increasing inhibition or decreasing facilitation.[3] Theoretically, inhibition can be improved by stimulating the remaining neurons of the descending tracts; this is the rationale for the implantation of cerebellar stimulators. Ivan *et al.*[4] of the University of Ottawa School of Medicine carefully analysed their experience with 12 patients in whom these stimulators had been implanted. They found that 'chronic cerebellar stimulation did not noticeably alleviate symptoms and signs of cerebral palsy nor did it improve activities of daily living in a significant number of patients'.

If attempting to increase inhibition is ineffective, the alternative is to reduce facilitation. The most obvious and effective way of reducing spasticity is of course simply to divide the anterior spinal roots, but this has the disadvantage of causing flaccid paralysis and marked muscle wasting.

In 1898 Sherrington,[5] the great British neurophysiologist, rendered cats spastic by transecting their midbrains. This of course divided the descending tracts and removed the inhibitory influences on the anterior horn cells. He then sectioned the

Departments of Neurosurgery and Paediatrics, University of Cape Town and Red Cross War Memorial Children's Hospital, Cape Town
W. J. PEACOCK, F R C S
LEILA J. ARENS, M B C H B

Date received: 19 April 1982

posterior nerve roots and the spasticity disappeared. Foerster, a German neurosurgeon, adapted this experimental work for clinical use in 1908 by dividing whole posterior nerve roots in the lumbar or cervical regions and successfully reducing spasticity in the leg or arm respectively.

Facilitation of the motor neurons can also be reduced by dividing the afferent neurons or the interneurons within the cord before they reach the anterior horn cell. Bischof[7] first described this technique in 1951. It consisted of a longitudinal section of the spinal cord in the coronal plane between the pyramidal and spinothalamic tracts from T12 to S1. Spasticity and flexor spasms were reduced, but because axons passing forwards from the pyramidal tracts to the anterior horns were also severed this procedure was not suitable for paraparetic patients who retained some useful movements. Bischof later modified his technique[8] to use a dorsal midline incision and a specially designed knife which could be rotated to produce a longitudinal coronal cut from within the cord, preserving the axons of the pyramidal tracts. Yamada *et al.*[9] used this technique in 14 paraplegic or tetraplegic patients, relieving mass spasms and hyperactive reflexes. Because the posterior rootlets are left undivided in this operation their ascending collateral branches remain intact to facilitate anterior horn cells at higher levels with incomplete reduction of spasticity.

In 1978 Fasano *et al.*[10] reported their results following selective stimulation of the rootlets which comprise a posterior spinal root. Rootlets which were associated with an abnormal muscular response were then divided. The reduction in spasticity was significant and functional improvement dramatic. This technique appeared logical and specific, and it was therefore decided to modify it and make use of it in Cape Town.

Methods

Twenty children (aged between 22 months and 16 years) have been operated on, but only the first 15 will be reviewed because the follow-up period in the last 5 cases is considered to be too short to justify inclusion. The children belonged to all ethnic groups, Black, Coloured and White.

General anaesthesia with intubation is used and anaesthesia maintained without muscle relaxants, which would interfere with the response to electrical stimulation. The patient is placed in the prone position and recording electrodes are inserted into muscle groups of both lower limbs. Via a midline lumbar incision limited laminectomies are performed from the second to the fifth lumbar vertebrae, staying well medial to the posterior joints, which are essential for spinal stability. The dura is opened, exposing the filum terminale and the cauda equina. Using anatomical landmarks the second lumbar nerve root is isolated on one side and the posterior root is carefully separated from the anterior root.

With an electrophysiological system the posterior nerve roots are stimulated by placing two electrodes on the root at a distance of about 1 cm from each other, and the action potentials from the quadriceps and hamstring muscles are recorded. The nerve stimulator used has special intensity and pulse duration settings for applying both single and tetanic stimuli. Electromyographic potentials are recorded from the muscle groups using two concentric autoclavable needle electrodes and are displayed on an oscilloscope. The legs are exposed so that the contracting muscles can be identified and the type of movement observed. Any diffusion of contraction to other muscle groups of the same leg or even the opposite leg or trunk are noted. The responses in the muscles due to dorsal root stimulation fall into two groups. The type A or normal response is characterized by: (*i*) a single muscular contraction at 50 stimuli per second, and (*ii*) no diffusion of muscular contraction to muscle groups other than those being stimulated. In the type B or abnormal response there is (*i*) a tetanic muscular contraction at 50 stimuli per second, and (*ii*) a diffusion of muscular contraction to muscle groups other than those being stimulated.

If stimulation of the whole posterior root was associated with a type B response the root was gently split into its constituent rootlets and each rootlet then individually stimulated. It is believed that the rootlets showing the type A responses are not directly responsible for spasticity and that by saving them the afferent fibres useful for sensation and further motor re-education are preserved. The rootlets associated with the type B response, on the other hand, are probably part of abnormal circuits responsible at least in part for the maintenance of spasticity. These rootlets may contain more gamma afferent fibres from muscle spindles, or alternatively may influence anterior horn cells that are inhibited by fewer intact descending tracts than the rootlets with normal responses.

Nerve rootlets showing the type A response are left intact and those showing the type B response are divided. The posterior nerve roots from L2 to S1 are dealt with in this manner on both sides.

Patients and results

Twenty patients have been operated on, all with good results. The 15 patients reviewed have been followed up for periods ranging from 4 to 16 months. Fasano *et al.*,[10] with their 7-year follow-up, had virtually no significant recurrence, and to date our experience coincides with theirs.

Quantitative analysis of spasticity is extremely difficult, so for this purpose experienced doctors and physiotherapists assessed the children before and after rhizotomy. Pre- and postoperative cinematographic records were made of each child, showing various motor functions such as sitting, standing, walking and hand movements. In addition each child was graded for independence, intelligence and motivation — the latter two factors were important for determining the rate of postoperative improvement. The patients were divided into two groups.

Group 1

This was composed of 7 heavily handicapped, dependent children with high muscle tone who were very difficult to manage. The aim of rhizotomy in this group was to reduce tone and facilitate handling. Each child's pre- and postoperative status is shown in Table I.

Four of the children in this group had spastic quadriplegia. Patients 2 and 13 had dystonic athetosis in addition to spasticity, while patient 4 had dystonic athetosis with no spasticity (he was selected because he was a severely handicapped but fairly intelligent child whose parents wished to institutionalize him because they could no longer manage him at home). All were of below average intelligence. Two patients (Nos 2 and 6) were profoundly retarded, and patient 1 had very limited understanding.

In every case there was considerable improvement, and reduction in muscle tone made care and handling easier. Although the dystonic spasms were not abolished, tone was reduced even in the 3 children with athetosis. Most of the parents reported that the children were less irritable. Bladder control was achieved in 2 cases (Nos 2 and 4). Both children, who had some speech before the operation showed considerable improvement. An unexpected gain occurred in patient 3 — pre-operatively he had had 3 - 4 seizures per week despite carefully planned anticonvulsant therapy, and in the 11 months since the operation there have been no further seizures. The parents of patient 4 were so pleased with his improvement after the rhizotomy, which had made feeding and handling easier, that they decided not to have him institutionalized.

TABLE I. GROUP 1 — SEVERELY HANDICAPPED CHILDREN

Patient No	Sex	Age	Diagnosis	Pre-operative status	Postoperative status	Conclusions
1	M	8 3/12	SQ	*Spasticity:* Very marked — both legs and left arm, marked scissoring *Locomotion:* Nil *Sitting:* Supported in chair only *Supported standing:* In standing frame only *Hand usage:* Grasp and release with right hand *Speech:* Few single words	*Spasticity:* Greatly reduced in legs, no scissoring *Locomotion:* Nil *Sitting:* Independent in side-sitting, much better posture in chair *Supported standing:* Less easy to maintain *Hand usage:* As before *Speech:* More words, short sentences	General reduction of tone, improved sitting and speech, markedly easier to nurse (12 mo. postop.)
2	F	10	SDQ	*Tone:* Very high, mixed spasticity-dystonia *Locomotion:* Nil *Chair sitting:* Needed moulded seat *Suppported standing:* Marked scissoring *Toiletting:* No sphincter control	*Tone:* Greatly reduced, no extensor spasms *Locomotion:* Nil *Chair sitting:* Moulded seat discarded *Supported standing:* No scissoring *Toiletting:* Full control	Died of unrelated pneumonia 3 weeks after discharge home. Prior to death was much easier to handle
3	M	4	SQ	*Spasticity:* Very marked all limbs *Locomotion:* None *Long sitting:* None *Stool sitting:* Sacral *Supported standing:* In extension, scissoring *Arm function:* Minimal, hand only *Seizures:* 3 - 4 per wk	*Spasticity:* Greatly reduced in lower limbs *Locomotion:* Moves across floor, rolls prone to supine *Long sitting:* Maintains with flexed knees *Stool sitting:* Not sacral *Supported standing:* Less support, normal tone *Arm function:* Uses for support, grasp, feeding and play *Seizures:* None since op.; on same medication	Improved in all aspects, much easier to manage, striking disappearance of seizures (10 mo. postop.)
4	M	10 4/12	DQ	*Tone:* Fluctuating from low to very high, marked dystonic spasms *Head control:* Very poor *Locomotion:* Rolls using primitive kicking *Supported standing:* Total extensor pattern *Arm function, speech:* Nil *Feeding:* Very difficult — sloppy food only *Toiletting:* No sphincter control	*Tone:* Fluctuates from low to moderate, dystonic spasms still present *Head control:* Improved *Locomotion:* Achieves rolling without primitive kicking *Supported standing:* As before *Arm function, speech:* Nil *Feeding:* Much easier — can chew, gained 5 kg in 7 mo. *Toiletting:* Full control	Small but definite gains, easier to dress and nurse, child much happier — indicates that he feels looser, parents no longer wish to institutionalize him (9 mo. postop.)
5	M	6 3/12	SQ	*Spasticity:* Very marked, all limbs *Head control:* Minimal *Locomotion:* Nil *Supported sitting:* Only in push-chair, sacral *Supported standing:* Nil	*Spasticity:* Greatly reduced in lower limbs *Head control:* Lifts head in supine position, better control in pull-to-sit and sitting *Locomotion:* Nil *Supported sitting:* With much less support, not sacral *Supported standing* Wearing leg-gaiter support	Child less irritable, easier to position, nursing easier; mother very happy with improvement (7 mo. postop.)

TABLE I CONTINUED OVERLEAF

TABLE II. GROUP 2 — MILDLY TO MODERATELY HANDICAPPED CHILDREN

Patient No.	Sex	Age	Diagnosis	Pre-operative status	Postoperative status	Conclusions
5	F	6 3/12	SQ	*Spasticity:* Very marked in all limbs *Creeping:* On forearms, legs extended *Long sitting:* Nil *Chair sitting:* Not stable *Supported standing:* Not able to maintain *Tricycle riding:* On level surface *Hand usage:* Could not hold pen	*Spasticity:* Greatly reduced in legs, slight reduction in arms *Creeping:* As before, but also beginning to crawl *Long sitting:* Good except for fixed flexion deformity of both knees *Chair sitting:* Sits well *Supported standing:* Maintains briefly *Tricycle riding:* Up easy slope *Hand usage:* Writes, slowly but clearly	General improvement, especially in reciprocal leg movements and hand usage; fixed flexion contractions at knees and ankles will need orthopaedic correction (7 1/2 mo. postop.)
7	M	8 9/12	SQ	*Spasticity:* Very marked — all limbs *Creeping:* Forearms with extended legs *Sitting:* Sacral, needed triangular seat with abduction post *Supported standing:* With extensor spasm and scissoring *Supported walking:* With extensor spasm and scissoring *Arm function:* Poor, total grasp, limited supination *Toiletting:* Urination only in supported standing, constantly wet	*Spasticity:* Greatly reduced in lower limbs, somewhat reduced in upper limbs *Creeping:* No change *Sitting:* Not sacral, regular chair with chest strap *Supported standing:* No spasticity but maintains momentarily only *Supported walking:* Good active movements, no scissoring *Arm function:* Improved, pincer grasp, increased supination *Toiletting:* Can urinate sitting, remains dry	Considerable gains in sitting, supported walking and toiletting; poorly motivated — hinders progress (6 1/2 mo. postop.)
11	M	7 9/12	SD	*Spasticity:* Marked in legs *Long sitting:* Sacral *Standing:* Flexed knees and hips, lumbar lordosis *Walking:* Side-sway, lordosis, small stride, internal rotation of thighs, equinus feet *Running:* Severe lordosis and toe-drag *Hand usage:* Very functional	*Spasticity:* Greatly reduced *Long sitting:* Still sacral because of fixed contractures of hamstrings *Standing:* Less lordosis, better balance *Walking:* Less sway, less lordosis, bigger stride, no equinus, less internal rotation *Running:* Greatly improved *Hand usage:* Subjective improvement	Child much happier, feels much looser, is more mobile, can jump and hop. Previously needed new boots with metal toe-caps every 4 weeks, now wearing sandals (5 1/2 mo. postop.)
12	M	7 9/12	SD	*Spasticity:* Marked in legs *Sitting:* Poor position and balance (floor and stool) *Crawling:* Legs too extended *Supported standing:* Flexed knees, internally rotated thighs, equinus feet *Supported walking:* Flexed hips and knees, equinus feet. Can use walking aid *Riding tricycle:* Up slope	*Spasticity:* Greatly reduced *Sitting:* Improved position and balance *Crawling:* Improved mobility *Supported standing:* Feet now flat *Supported walking:* Longer stride; feet flat *Riding tricycle:* Poor after operation but now rides well	In general moves more easily. Weak quadriceps for first months but strength has increased. Well motivated (6 mo. postop.)

TABLE II CONTINUED OVERLEAF

TABLE I. CONTINUED

Patient No.	Sex	Age	Diagnosis	Pre-operative status	Post-operative status	Conclusions
9	M	9	SQ	*Spasticity:* Very marked in all limbs, mass patterns *Locomotion:* Rolling with difficulty *Long sitting:* Supported sacral *Chair sitting:* Shoots into extension *Hand usage:* Minimal *Speech:* Almost unintelligible	*Spasticity:* Greatly reduced in legs, fewer mass patterns *Locomotion:* Much easier rolling *Long sitting:* Maintains, not sacral *Chair sitting:* More secure *Hand usage:* Much improved *Speech:* Greatly improved, intelligible	General improvement in tone and reduction of mass patterns, more interested and motivated, dramatic improvement in speech (6 mo. post-op.)
13	F	8	SDQ	*Tone:* Lower limbs very spastic, additional dystonic posturing upper limbs, marked dystonia, mass patterns. Dislocation of right hip *Rolling:* To one side, with difficulty *Side-sitting:* Maintained briefly *Sitting in pushchair:* Not secure *Supported walking:* Nil *Upper limb function:* Some grasp and release *Speech:* Nil	*Tone:* Much reduced, less dystonic posturing and more voluntary movement, still mass patterns when excited *Rolling:* Easier, to both sides *Side-sitting:* Maintains well when relaxed *Sitting in pushchair:* More secure *Supported walking:* Reciprocal stepping, hampered by shorter right leg *Upper limb function:* More con-control *Speech:* Nil	Much easier to handle, function generally improved but supported walking hampered by dislocated hip, still very handicapped by mass dystonic patterns when excited (4½ mo. post-op.)

SQ = spastic quadriplegia; SDQ = spastic dystonic quadriplegia, DQ = dystonic quadriplegia.

Group 2

This group was composed of 8 children who were less dependent but had high muscle tone and were functionally handicapped because of spasticity. In these cases it was hoped to reduce muscle tone and improve function. The pre- and postoperative status of the children in this group is shown in Table II.

Three of the children had spastic quadriplegia and 4 spastic diplegia. One patient (No. 15) was a 17-year-old monoplegic who had been left with a severely spastic right leg because of brain damage caused by a motor vehicle accident at the age of 12; later subluxation of the right hip occurred and osteo-arthritis developed. Prior to rhizotomy the leg was drawn up in painful spasm and the patient could no longer voluntarily extend it. Patient 14 showed little spasticity on passive movement, but had a typically spastic diplegic gait.

Two children (patients 11 and 15) were of average to above-average intelligence; the remainder were slightly or moderately retarded.

Spasticity was reduced in all cases and greater mobility achieved. The patients who were able to walk independently (Nos 11 and 13) walked with a better pattern, and patient 15 regained the ability to walk unaided and is now able to play golf and dance. In 2 cases standing was improved, but 3 patients who had been able to stand with support using extensor spasm before the operation could no longer maintain supported standing because of quadriceps weakness. In these cases standing has been improved with a leg-gaiter support, and further improvement in muscle power is expected. In no case was the ability to walk with support lost. Hand usage was improved in 4 patients, and sphincter control improved markedly in 1 patient (patient 7). One child patient 14 showed fewer gains

Comments

Fasano *et al.*[10] make the point that it is better to carry out rhizotomy before undertaking orthopaedic surgery to relieve fixed contractures. This is probably a sound principle, but the majority of our patients (10 out of 15) had undergone orthopaedic procedures prior to neurosurgery. A few will still need release of fixed contractures.

Voluntary muscle power must be carefully assessed before the operation. If voluntary power is poor spasticity may be useful in helping the patient to maintain the standing position, and its relief is then questionable.

Sensory loss as a result of posterior rootlet section was not a problem. A few of the children complained of 'numbness' in the legs during the first week or two after the operation. Clinical testing could not confirm any decrease in sensation, and the numbness soon disappeared.

Complications

There were no serious complications. The length of stay in hospital was 10 days on average, and the only complication which occurred was in patient 2, who developed postoperative urinary retention. With the aid of expression this was overcome.

Conclusions

Intensive physiotherapy and carefully planned orthopaedic procedures may not be sufficient for the relief of spasticity or its complications in cerebral palsy. This is probably because the fundamental imbalance within the central nervous system

TABLE II. CONTINUED

Patient No.	Sex	Age	Diagnosis	Preoperative status	Postoperative status	Conclusions
14	M	7 [illegible]	SD	*Spasticity:* Very little on passive movement except for calf muscles *Knee walking:* Severe lordosis, thighs internally rotated, shoulders retracted *Walking:* Typical diplegic walk — flexed hips, internally rotated thighs, feet equinus. Lordosis and arm retraction	*Spasticity:* Reduced in calf muscles *Knee walking:* Less lordosis and internal rotation, no change in shoulder retraction *Walking:* Less internal rotation, right foot flat, left toe-heel. Still lordosis and arm retraction	Small gains in walking patterns, very poorly motivated, no negative postoperative factors (3 mo. postop.)
8	M	$8^7/_{12}$	SD	*Spasticity:* Marked in legs, minimal in arms *Crawling:* Creeping only, with extended legs *Chair sitting:* Sacral, slips off. Dragged himself from prone to wheelchair, using spasms *Supported standing:* Using extensor spasm *Supported walking:* With severe scissoring and equinus *Hand usage:* Slightly clumsy, difficulty in dressing	*Spasticity:* Greatly reduced in legs *Crawling:* Crawling reciprocally *Chair sitting:* Good position maintained. Transfers well from prone to wheelchair *Supported standing:* Cannot maintain *Supported walking:* No scissoring, better active movements *Hand usage:* Improved, manages shoes, socks, buttons	Much improved functionally even though supported standing no longer maintained, well motivated — further improvement expected (6 mo. postop.)
10	M	$5^1/_2$	SQ	*Spasticity:* Very marked both legs, left arm *Creeping:* On right forearm, legs stiffly extended *Long sitting:* Supported only, sacral *Stool sitting:* Sacral, legs shoot into extension *Supported standing:* With extensor spasm, scissoring, equinus feet *Hand function:* Grasps and releases with right hand only *Speech:* Nil, facial muscle high-toned	*Spasticity:* Greatly reduced at rest, still high (extensor) tone when creeping *Creeping:* No change *Long sitting:* Achieves and maintains well, plays without support *Stool sitting:* Not sacral, legs remain flexed *Supported standing:* Momentarily only. No scissoring, feet flat *Hand function:* No change *Speech:* Attempting words. Dribbling more	Considerable gains, especially in sitting; much easier to handle and treat, happier; quadriceps power insufficient for standing; handicapped by severely spastic left arm; poor motivation has limited progress ($5^1/_2$ mo. postop.)
15	M	17	RLM	Right lower limb drawn up in painful spasm, very difficult to examine. Good balance on left leg. Walks with crutches, hopping. Right hip subluxation, osteo-arthritis	Can now bear weight on right, pain much less severe, can walk unaided but prefers crutches. Can play golf and dance	Great improvement; much happier and more confident. Will still need orthopaedic treatment for hip ($3^1/_2$ mo. postop.)

SD = spastic diplegia; SQ = spastic quadriplegia; RLM = right lower monoplegia.

remains unaffected. In certain selected cases it may therefore be reasonable to use selective posterior rhizotomy in an attempt to equalize the facilitatory and inhibitory influences on the anterior horn cell and reduce spasticity.

With an electrophysiological system posterior nerve rootlets which are involved in spasticity-producing circuits can be selected and divided, leaving intact sufficient rootlets for normal cutaneous sensation and proprioception. We have found that selective posterior rhizotomy reduces spasticity and improves function not only in the local segments but also, because of ascending collaterals, in segments higher up the cord and in brain-stem centres. Not only the intelligent, mildly spastic child can be helped, but also the retarded and severely handicapped child in whom handling is a problem.

We wish to thank Dr Roland Eastman for his help and Mrs Kay B[illegible] and Mr Martin Petersen for their extremely valuable and competent electrophysiological assistance. Our thanks also go to the physiotherapists for their painstaking assessments, filming and treatment of the patients.

The support and encouragement of Professor J. C. de Villiers is greatly appreciated.

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THE NEW YORK HOSPITAL
Chartered 1771
525 EAST SIXTY-EIGHTH STREET
NEW YORK, N.Y., 10021

January 29, 1987

To Whom It May Concern:

This letter is being written in strong support for Tikvah Layeled, a specialty center, directing its efforts to enhance the lives of disabled children throughout Israel. This unique center, incorporating the untiring efforts and dedication of its founders and directors, is a multi-disciplinary facility employing the state-of-the-art equipment, evaluation and treatment techniques specifically designed to meet the individual needs of each child. I expect that the special services offered by such a Center will be of value to the health care professional faced with the most difficult to manage children.

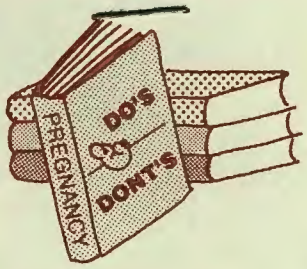
Second, I am honored and graciously accepting the invitation by the Center to serve on the Medical Advisory Board of Tikvah Layered.

Sincerely,

R. Paul Jordan, D.P.M., F.A.C.F.O.
Prof. Associate
Dept. of Physical Medicine & Rehabilitation

RPJ/mdc

BOOKMARK



Prenatal Precautions

How can a mother help her unborn child toward a healthier future? United Cerebral Palsy Associations offer these important do's and don'ts.

- *Do* consult a physician or prenatal clinic not later than your third missed period.
- *Do* attend prenatal classes if available.
- *Do* inform your obstetrician of any unusual symptoms such as headaches, vaginal spotting, sudden weight change.
- *Do* discuss the birth process with your doctor so that you understand and can cooperate in labor, delivery and the post-partum period.
- *Do* follow his instructions faithfully.
- *Do* get adequate rest, moderate exercise, and a balanced diet.
- *Don't* associate with people who have German measles, influenza, chicken pox or other contagious diseases.
- *Don't* place yourself in situations that could easily lead to accidents or injuries.
- *Don't* expose yourself to known or suspected toxic substances: lead paints or lead-contaminated air, chemicals (cleaning fluids), animal (especially cat) feces, unnecessary X-rays.
- *Don't* use tobacco or alcohol excessively.
- *Don't* take any drugs or medications not specifically prescribed by your doctor.

Watch your language!

No No's for the media regarding the disabled.

AFFLICTED—Very negative and a definite downer! Person *who has* or *is affected by* is much better.

CEREBRAL PALSIED—Sounds like an inanimate object instead of a person. Why not *person* or *people with cerebral palsy?*

C.P.—OK to describe the condition but NOT a person. This puts all people in a neat little package and deposits them in a file drawer. Please use *who has* or *who have cerebral palsy* when referring to people.

CRIPPLED OR CRIPPLER—This paints a mental picture no one wants to look at.

DISEASE—Cerebral palsy is NOT a disease. People with cerebral palsy are as healthy as anybody else. Better to say *condition.*

DRAIN AND BURDEN—We wouldn't touch these two words with a 10-foot pole. *Added responsibility* is much better.

POOR—Physical handicaps have nothing to do with how wealthy someone is. Love and self-esteem are priceless qualities. A person's character determines the richness of his or her life.

SUFFERS FROM—If someone with a disability is independent and copes with life as well as most of us, then this phrase definitely doesn't apply.

UNFORTUNATE—What's unfortunate is that this word is often used to describe people with physical disabilities. Don't offend with this one.

VICTIM—A person with physical disabilities was neither sabotaged nor necessarily in a plane, train or car crash. There's no way to rephrase this turkey.

WHEELCHAIRBOUND—Leaves the impression that the *wheelchair user*—a better descriptive term—is glued to his or her transportation.

This List is provided as a public service.

Your help is needed to keep people with cerebral palsy—or with other disabling conditions—from sounding pitiful, inhuman or like beings from outer space in your stories.

People with cerebral palsy and other disabilities have the same rights as everyone else in this world—the right to fall in love, to marry, to hold down a competitive job, to acquire an adequate and appropriate education. Above all, they have a right to self-esteem.

Please insure these rights by referring to the disabled in terms that acknowledge ability, merit, dignity. In turn, we hope your readers and listeners will follow suit.

For a fact sheet and other information on cerebral palsy, contact:

American Friends of Tikvah Layeled Inc.

Ernest Rothman, *National Director*

NYC Office
36 West 37th Street
New York N.Y. 10018
(212)962-7714

Brooklyn Office
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TIKVAH LAYELED

THE FOUNDATION FOR CEREBRAL PALSY CHILDREN IN ISRAEL

Passed SAC - Dec 3 '87

sional financing allocations shall be submitted through the regular notification procedures of the Committees on Appropriations: *Provided further*, That funds appropriated under this heading shall be expended at the minimum rate necessary to make timely payment for defense articles and services.

FOREIGN MILITARY CREDIT SALES DEBT REFORM

(a) Notwithstanding any other provision of law, the President is authorized to transfer existing United States guaranties of outstanding Foreign Military Credit Sales debt to loans, bonds, notes or other obligations made or issued (as the case may be) by private United States financial institutions to finance the prepayment at par of existing Foreign Military Credit Sales loans, loan guaranties and arrearages, or to issue new guaranties for new loans, bonds, notes or other obligations made or issued by private United States financial institutions to finance such prepayment, and to accept such prepayments, as long as such guaranties which are transferred or extended cover no less and no more than 90 per centum of the debt prepaid, as long as they are made or issued in conjunction with private, non-United States-guaranteed loans, notes, bonds or other obligations issued to refinance the amount not guaranteed by the United States Government, and as long as the repayment schedule for the United States-guaranteed debt and the amount not guaranteed by the United States are tied together in such a way

both sums are repaid concurrently. No sums in addition to the payment of the outstanding principal balance of the loan (or advance), plus any unpaid accrued interest, shall be charged by the lender or the United States Treasury as a result of such prepayment or purchase against the borrower or the Guaranty Reserve Fund, except that the lender may include in the interest rate charged a standard fee to cover costs which shall be set at prevailing market rates, and no guaranty fee shall be charged on guaranties transferred or issued pursuant to this provision. The terms of guaranties transferred or issued under this section shall mirror the terms of the existing loans or guaranties, except that the repayments of the newly issued debt may be consolidated into two payments per year according to standard industry practice. Any loans, bonds, notes or other obligations made or issued or guaranties transferred or issued pursuant to this section shall be fully and freely transferable.

(b) Any country which is in default during a period in excess of one year in payment to the United States of principal or interest on any loan made to such country guaranteed by the United States pursuant to this section shall be deemed to be in default pursuant to a program for which funds are appropriated annually under an Act making appropriations for foreign assistance and related programs.

(c) For the purposes of sections 23 and 24 of the Arms Export Control Act, the term "defense services" shall be deemed to include the refinancing of Foreign Military Credit Sales debt outstanding at the date of the enactment of this Act.

(d) Not later than thirty days after the date of enactment of this subsection, the Secretary of Defense only shall issue regulations to carry out the purposes of this subsection. In issuing such regulations, the Secretary of Defense shall: (1) facilitate the prepayment or purchase of loans and loan advances hereunder; (2) provide for full processing of each prepayment or purchase request within thirty days of its submission to the Secretary of Defense; and (3) except as provided in subsection 24(a) of the Arms Export Control Act, as amended, impose no restriction that increases the cost to borrowers of obtaining private financing for prepayment or purchase hereunder or that inhibits the ability of the borrower to enter into prepayment or purchase arrangements hereunder.

(e) The Secretary of State shall transmit to the Committee on Foreign Affairs of the House of Representatives, the Committee on Foreign Relations of the Senate, and the Committees on Appropriations of the House of Representatives and Senate, a copy of the text of any agreement entered into pursuant to this section no less than thirty days prior to its

entry into force, together with a detailed justification of the interest of the United States in the proposed agreement.

GUARANTY RESERVE FUND

There are hereby appropriated, whenever required after the date of enactment of this Act, such amounts as may be necessary from time to time to meet the requirements of the Federal Financing Bank for payments from the Guaranty Reserve Fund of claims under guaranties issued under the Arms Export Control Act: *Provided*, That none of the funds appropriated under title III of this Act may be used to provide assistance to any country which, in the absence of an agreement to which the United States is a party for the rescheduling of debt, is more than ninety days in arrears on the repayment of principal or interest on loans providing credits for Foreign Military Sales.

SPECIAL DEFENSE ACQUISITION FUND

(LIMITATION ON OBLIGATIONS)

Not to exceed $250,000,000 may be obligated pursuant to section 51(c)(2) of the Arms Export Control Act for the purposes of the Special Defense Acquisition Fund during fiscal year 1988: *Provided*, That section 632(d) of the Foreign Assistance Act of 1961 shall be applicable to the transfer to countries pursuant to chapter 2 of part II of that Act of defense articles and defense services acquired under chapter 5 of the Arms Export Control Act.

DEFENSE BUSINESS

JOURNAL OF DEFENSE & DIPLOMACY VOL. 5, NO. 4, 1987 Pg. 21

Middle East Air Power

BY JAY H. GOLDBERG

Exacerbated by numerous political and military factors, the last few years have seen a furiously paced arms race in the Middle East, with much of the new acquisitions going to the air forces. Virtually every country in the region, including Bahrain and Qatar, now has in its inventory, or has on order, the most advanced combat aircraft, air force materiel and air defense systems.

This certainly has a negative effect on the region's stability, but it is not clear that the near-term balance of power will dramatically shift. Despite the omnilateral accumulation of lethal modern weaponry, most nations in the region do not currently possess the trained military personnel, technicians, systems integration and servicing capabilities necessary to effectively operate their equipment. While the Israeli air force has proven itself capable of the most brilliant and perfectly executed military operations, it is clearly the exception. The highly sophisticated aircraft of the Iranian and Iraqi air forces, for example, have thus far had conspicuously little effect in the Gulf War beyond the terrorizing of civilians.

Nevertheless, air power is seen as the key to military strength. Air forces are obtaining the largest shares of military procurements, most countries have foreign advisers training personnel, and an increasing number of suppliers are becoming involved in the lucrative Middle East arms trade. Both regional political/military factors and country-specific situations guide the strategies and development trends in Middle East air forces.

Conflicts Affecting Defense Strategies

Despite the world focus on it, the Arab-Israeli conflict is only one of several disputes making an impact on air force development strategies. Most of the current influx of arms into the area is attributable to the Gulf War. Various other regional rivalries and conflicts have also stimulated arms acquisitions summarized here:

Middle Eastern Conflicts

Conflict/Area	*Countries Directly Affected*	*Countries Indirectly Affected*
Arab-Israeli Conflict	Israel, Syria, Jordan	Egypt, Saudi Arabia
Gulf War	Iran, Iraq	Gulf States, Syria
South Arabia	Saudi Arabia, Yemens, Oman	Egypt
Border Tensions	Egypt-Libya Syria-Jordan	
Inactive Disputes	Saudi Arabia-Iraq Kuwait-Iraq	

The current development strategies for the air forces of the Middle East have been largely shaped by events within the past decade. Beginning in 1978, a series of destabilizing events upset a trend toward reducing tensions in some of the most potentially explosive trouble spots.

From 1974 to 1978, real progress toward peace was achieved in most of the conflict areas listed above. The Sadat-Begin meetings and Camp David Accords dramatically reduced the prospects of a fifth Arab-Israeli war. In the Gulf area, the shah's Iran and Iraq settled their differences over borders and support of each other's Kurdish resistance movements. Iraq resolved border disputes with Saudi Arabia and Kuwait, and Iran and Saudi Arabia drew closer through mutual interests in oil prices and the survival of conservative regimes in the area. The South Arabian peninsula saw an end to the Dhofar rebellion in Oman, and South Yemen was moderated, coaxed by Saudi cash.

The next four years saw a dramatic reversal of the trend toward reduced tensions, and the strategic setting of the area today is defined by four major upheavals from this period:

■ **The Iranian revolution:** The toppling of the shah upset the balance of power in the Gulf area. Iran, a promoter of conservative regimes, abruptly became an instigator of fundamentalist extremism and revolution. The occupation of the Grand Mosque of Mecca by Shiite extremists, Iran's support of subversive activity in Kuwait and Bahrain and Iran's promotion of terrorism has threatened the entire Gulf Arabian Peninsula area.

■ **The Gulf War:** Iraq's move to exploit the perceived weakness and chaos in Iran has helped to contain the "Islamic Revolution" and has moderated friction between Iraq and the Arabian nations. However, the war threatens to spill over to the peninsula, and the prospects of a decisive victory by either side deeply worry all nations in the area. In fact, most of the world is content to see these two unsavory regimes entangled with each other, and the flow of arms from literally dozens of suppliers (at least 15 countries selling to *both* sides) has helped maintain a stalemate.

■ **Soviet/Soviet proxy interference:** The 1978 coup in South Yemen by a hardline pro-Soviet faction and alternating threats of war and unity between the two Yemens have serious implications for Saudi Arabia and Oman. Both the Saudis and Egyptians felt threatened by the possible emergence of a strong pro-Soviet regime in Ethiopia and its threat to Somalia. Supplemented by these events, the Soviet invasion of Muslim Afghanistan sent tremors throughout the Middle East. Superpower involvement in the area has intensified, notably increasing the United States's attempts to strengthen its allies. This has meant, particularly for the Reagan administration, increased arms sales. Most countries in the area have reacted by try-

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ing to avoid publicly embracing either superpower.

■ **The Lebanese War:** This conflict has led to the constant threat of war between Israel and Syria and frequent aerial confrontations. Furthermore, Lebanon has become a base of diverse radicals and terrorist organizations, supported by various nations. As such, any conflagration could easily expand beyond Israel vs. Syria.

The most immediate effect of these events on the present situation has been the dramatic flow of the most modern arms into the area, particularly combat aircraft and air defense systems. Saudi Arabia and the small conservative nations of the peninsula have felt particularly threatened, and all have used their considerable wealth to bolster their defense capabilities significantly. In 1981, Saudi Arabia, Kuwait, Oman, the United Arab Emirates (UAE), Bahrain and Qatar formed the Gulf Cooperation Council (GCC), ostensibly for economic cooperation but, in practice, largely for military coordination. The GCC has held joint air force exercises, and the smaller states have added sophisticated U.S. and French weaponry to their inventories.

As air forces have become a symbol of military power (in no small measure influenced by the Six-Day War), the past 20 years have seen the steady buildup of air power in the Middle East. Politically, economically and militarily, the nations of the Middle East have developed very rapidly in that time, and superpower interest in the area has steadily increased.

The inflow of huge sums of money, attempts by rulers to appease armed forces, military power as a symbol of national prestige and implicit threats have supplemented strategic factors in influencing military procurements. In examining air force developmental trends in this period, both quantitative and qualitative improvements need to be considered. A third aspect of strong significance has been suppliers of air force equipment. A final factor with potentially major impact is the development of indigenous arms industries.

In 1967, the major air powers were the major combatants in the Arab-Israeli conflict: Israel, Egypt and Syria. Israel had 290 combat aircraft, compared to 550 for Egypt and Syria combined. By 1977, Israel had 543, compared to 928 for the two Arab nations. Today, though Egypt's total has dropped since Camp David, Israel's inventory has grown to about 700, Syria's to over 500.

The growth of Gulf area air forces began in earnest with the windfall of oil money, following the 1973 oil price rise. Wary of the shah's plan to build a military colossus, Iraq and Saudi Arabia began to bolster their armed forces using their extensive oil revenues. The 1979 revolution put an end to the shah's dream; most of Iran's aircraft today are not serviceable. Meanwhile, Iraq today has the largest number of combat aircraft in the Arab world (about 580). More recently, the most dramatic increases have been in the air forces of the smaller Gulf states. Recent years have also seen more purchases of other military aircraft—helicopters, transports and reconnaissance/early warning aircraft.

Much more impressive than the raw numbers has been the qualitative upgrading of air force equipment. Until the 1970s, Middle East air forces mainly consisted of second-hand aircraft from the major powers, with few features. Today, state-of-the-art air force materiel can be found throughout the region.

There have been three leaps in the quality and sophistication of Middle Eastern air inventories. The first major qualitative advance came with the introduction of supersonic jet fighters in the early 1960s (Mirages, Mystères to Israel; MiG-17s and -19s to Egypt and Syria). This extended the range of aerial operation well beyond immediate borders, most notably manifested in Israel's bombing of air bases as far away as Iraq and deep inside Egypt at the outset of the Six-Day War.

The second phase, largely in reaction to the Israeli Air Force's dominant role in the Six-Day War, was the addition of "high-tech" features, notably avionics, to combat aircraft. The Soviets, embarrassed by their clients' poor showing, sought to provide more effective equipment. The Arabs began to acquire surface-to-air missiles (SAM 2s and 3s) and more combat-capable aircraft; the Israelis sought to evade the SAMs and maintain their air superiority. The early 1970s thus saw the introduction of guided air-launched missiles, electronic warfare and radars that permitted all-weather and night operations.

In the third phase, beginning approximately in the mid- to late 1970s, Middle Eastern air forces began to acquire the most technologically advanced aircraft in their suppliers' inventories. In large part, this was due to increased superpower involvement in the area: the United States seeking to provide the means for its allies to protect themselves (the so-called Nixon Doctrine), and the Soviets responding to their clients' calls for weapons to improve performance against the Israelis or to match the new U.S.-supplied weapons. It also reflected the desire to obtain, and the ability to pay for, the most advanced weapons money could buy. By the late 1970s, F-14, F-15, MiG-25 (Foxbat) and MiG-27 (Flogger) aircraft were in Middle East air inventories. The trend has continued, to include other types of military aircraft, such as refueling tankers (Israel, Saudi Arabia), air warning/control (several countries have or are ordering AWACS or E-2Cs) and attack helicopters. Today, with even Bahrain soon purchasing F-16s, the crucial qualitative factors are human—leadership, personnel and support staff.

Since nearly all aircraft and air force equipment in the area are imported, an important parameter in evaluating air power is the suppliers. Additionally, the motives of the suppliers affect the balance of power and stability in the region. Until 1956, the region's air forces consisted of old British, French and, to a lesser extent, U.S. aircraft. The Soviets found they could build their influence in the area by providing arms and by solidarity with "radical" or Arab nationalist regimes. By the mid-1960s, Egypt, Syria, Iraq and Yemen possessed Soviet aircraft. The United States did not become a major supplier of combat aircraft to the Middle East until the 1970s (though they sold

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many transport aircraft and helicopters). After the French embargo on military equipment to Israel in 1968 and the inflow of oil revenues to Iran and Saudi Arabia after 1973, these three countries sought U.S. arms, as did Egypt following its peace with Israel. This complemented the previously mentioned U.S. interest in providing arms to anticommunist allies.

Recently, many other suppliers have entered the market. This is due in part to a conscious effort of Middle Eastern nations to be independent of the United States and the USSR, who have often used arms sales as bargaining chips or have put restrictive con-

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ditions on proposed sales. The French, with a new generation of aircraft (Mirage F-1, Mirage 2000, Super Etendard), have been particularly successful, and the "Eurojets"—AlphaJets, Tornados and Jaguars—have entered several air forces. The Gulf War has seen Chinese, Brazilian, Italian and Swiss aircraft used by Iran and/or Iraq.

Finally, a potentially important parameter is indigenous arms industries, primarily those of Israel. The Israelis have a highly sophisticated and innovative arms industry, which produces military hardware of the highest quality. Israeli-built combat aircraft, missiles, drones, electronics and guidance systems and radars are in many cases at the leading edge of technology. Israel's mastery of military technology has been the key to its military superiority in the Middle East, which is all the more critical with the current influx of high technology war materiel. The only Arab country to have a significant arms industry is Egypt, which assembles combat aircraft, helicopters and engines.

To examine the air forces of the Middle East on a country-by-country basis, the area can be divided into three groups; the Arab-Israeli confict sector (Egypt, Israel, Syria, Jordan), the Gulf War sector (Iran, Iraq) and the Arabian Peninsula sector.▶

Arab-Israeli Conflict Sector

The Camp David Accords have rendered the Egyptian-Israeli border one of the calmest in the region. However, they have not reduced the threat of war in the north, where Israel and Syria are building up their forces with eyes on the Lebanese powderkeg. Israel's air force dominates the skies, but the Israelis fear an Arab alliance with Syria.

A. Egypt. Egypt's armed forces have been in flux since the death of Gamal Nasser. At that time, Egypt, in the forefront of the battle with Israel, was the undisputed Arab leader, allied with and armed by the USSR. Since then, the ouster of the Soviets has meant diversification of arms suppliers, while Camp David has resulted in an escape from the arms race and a different strategic milieu. The military has been cut back as Egypt's strategic objectives and concerns have been pared, and economic factors have intensified. The air force is being trimmed, but modernized (e.g., E-2Cs) with the help of U.S. military sales credits. Egypt currently also has purchased 40 F-16 As and Bs and 40 F-16 Cs and Ds, with another 40 Cs and Ds expected for delivery.

With the elimination of the threat of war with Israel, Egypt's major military concern has shifted to Africa, particularly Libya and its meddling in unstable Sudan and Chad. Egypt has also sought to support moderate Arab regimes against communist or Islamic fundamentalist threats and has been discretely sought out for help. It has sold off many surplus aircraft and other military equipment (mainly Soviet-made) to Iraq, Somalia and others. Despite the common media perception of Egypt being isolated, it has more allies than most of the area's other nations!

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Following the ouster of the Soviets and with the financial backing of the Saudis, the UAE and Qatar, Egypt established the Arab Organization for Industrialization to produce Arab armaments. The financial backing was cut in the wake of Camp David, but Egypt defiantly continued the project in an attempt to become at least partially self-sufficient. It has successfully arranged several coproduction agreements and now assembles Mirage 2000s, AlphaJets, Tucanos (a Brazilian fighter-trainer) and French helicopters, as well as aircraft engines.

Egypt is probably the most technologically advanced of the Arab countries, with the largest number of trained technicians and well-trained officers who serve throughout the Arab world. As such, it is probably the most able to integrate military technology.

B. Israel: Israel has the largest number of combat aircraft and the most sophisticated materiel support structure (including refueling tankers, E-2Cs, drones and attack helicopters) in the area. Its air force is far and away the most effective in the area, as exemplified by its dominance in the Six-Day War and the rout of the Syrian air force in the Lebanese War. Operations such as the rescue at Entebbe and the bombing of Iraq's Osirak nuclear reactor have left even Israel's most ardent admirers in awe.

The strategic threat to Israel needs no elaboration. Because of its unyieldingly hostile neighbors and physically vulnerable position, air power has always been a necessary national priority. From the time of independence, Israel has seen an effective, efficient air force as critical to protect the nation until army reserves could be mobilized. Today the air force remains central to the military strategy of a less precariously positioned Israel to quickly control the skies, then to support the advance of ground forces. Israel considers the maintenance of such air superiority as the most important strategic imperative until peace with its neighbors is achieved.

Despite its peace treaty with Egypt, Israeli military doctrine is based on war against a united Arab front, including the Iraqis and Saudis. As such, the ability to rout the Syrian air force is considered to be the absolute minimum. Perhaps Israel's greatest fear is an Iraqi victory in the Gulf War, inspiring the Iraqis to turn their firepower on Israel. Israel has always considered militantly anti-Zionist Iraq as a frontline state. Hence, its provision of supplies to Khomeini's Iran.

Israel's air power superiority is due largely to its personnel. It has the best-educated and trained populace in the area, with scientific and military technology capabilities on par with the most technologically advanced Western countries. It is clearly the only Middle Eastern country that can absorb and operate the high-tech military equipment flooding the area to its full potential. The air force, held in high esteem, has always attracted the best and bright-

"The Saudis, Egyptians, Israelis and Americans fear that South Yemen might provide military bases to the Soviets . . . ."

est young Israelis who are superbly trained and encouraged to be imaginative and flexible as well as disciplined. Support staff, maintenance and repair crews are also well-trained professionals.

The air force has been supplied first by France, then largely by the United States, but a state-of-the-art indigenous industry is rapidly evolving as the Israelis seek military independence. Israel Aircraft Industries (IAI) is the nation's largest employer, with 22,000 people at several facilities and annual sales of $1 billion. Starting as an aircraft repair shop in the 1930s, today it manufactures, modifies, tests and overhauls aircraft; designs and produces missiles, drones, remotely piloted vehicles (RPVs), and produces other military and civilian hardware. Israel also produces first-class military elec-

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tronics, radars and guidance systems.

In 1975, IAI unveiled the Kfir, a vastly improved Mirage V with a U.S. engine. If not the equal of an F-15 or F-16, the Kfir has been a successful workhorse and, with constant upgrades, is one of the fastest, most maneuverable and accurate combat aircraft produced. With several Arab countries now receiving F-16s, Mirage 2000s and MiG-29s, the Israelis are looking to the next-generation aircraft. This time, it is attempting to develop the next generation itself with the Lavi. Two prototypes have been completed, and both are in the process of flight testing, but funding and political snags may derail or modify the project. Intended to be a symbol of Israeli independence, the Lavi is being largely financed by U.S. military sales credits, and major components (including the engine and wings) are being produced in the United States. However, the project has established Israel as a first-rate aircraft designer.

C. Syria: Syria, like Israel, is surrounded by hostile neighbors and Lebanon. It has battled Israel and Jordan, is strongly hostile to Iraq and has had uneasy relations with Turkey, which is wary of Syria's Soviet connection. Even its major "allies," Iran and Libya, have fanatically religious regimes antithetical to Syria's secularist regime and "heretic" Alawite rulers. Syria's air and ground forces are by necessity well distributed around the country. The threat of war with Israel over Lebanon is very real, and the Syrians cannot expect much help. Since the Camp David accords, Syria sees itself as the vanguard of the Arab struggle against Israel and gears its plans toward a one-on-one confrontation.

Since the late 1950s, the radical nationalists and leftists who have dominated Syria have looked to the USSR as a benefactor and arms provider. Syria's combat aircraft inventory is entirely Soviet, including the most advanced MiG and Sukhoi fighters outside Soviet inventories. The Syrians have consistently pressed the Soviets for more advanced weaponry to use against Israel, but they have been reluctant to employ the highest-performance aircraft in dogfights. Given Israel's dominance of the skies, the Syrian air force has generally operated in a defensive, if often provocative, mode. Syria still lacks the technical skills to fully utilize and effectively integrate the more advanced electronic warfare features.

D. Jordan: Surrounded by more powerful neighbors and with a large Palestinian population creating a delicate internal balance, Jordan has pursued a strategy of offending as little as possible. It has cordial relations with Iraq and the Arabian countries, and its border with Israel has been conspicuously calm and open to discrete business transactions.

The favorite soliders of colonial Britain, the Jordanians have always been among the best-trained air and ground troops in the Arab world and have performed well when tested (notably, against the Syrians in 1970 and 1971). Nonetheless, without a superpower sponsor (by choice), vast oil wealth or a large population, the Jordanian air force has remained a relatively small defensive force.

Jordan, though anticommunist, has kept its distance from the United States, in large part so as not to offend Palestinians or neighbors. Jordan's strongest Western ties remain with the British, its traditional main arms supplier. In recent years, the air force has diversified suppliers, and its most modern stock are U.S. F-5Es and French Mirage F-1s. Recently, however, proposed sales of more modern U.S. aircraft and weaponry raised opposition in congress due to lack of progress toward peace with Israel. The Jordanians are reportedly examining European options such as the Tornado.

Gulf War Sector

Iran and Iraq have been enemies for most of this millenium; twentieth century points of contention include border disputes, shipping lanes, support of each other's Kurdish rebels and rivalry for hegemony. In the 1960s and 1970s, Iraq supported radicals, while Iran supported conservative regimes; in the 1980s, this trend has been largely reversed.

In the Gulf War, given the chaos in the Iranian military and the loss of the United States as a parts supplier, the Iraqi air force should have dominated the skies. Despite their advantage on paper (i.e., far more serviceable aircraft), the Iraqis have never made effective use of their air power. Neither side has been able to mobilize advanced weapons or coordinate and integrate weapon systems and logistics, and air power generally has not been coordinated with ground forces or with intelligence. In fact, air forces have been used chiefly against population centers. The Iraqis have had some recent successes in bombing industrial and military targets, though this has not had a major bearing on the course of the war. The increased usage of the air force and better performance have been enough to be of concern to the Israelis. Though both sides have modern air defense equipment, this has not been used effectively either, though the recent sale of Hawk systems to Iran has apparently improved Iranian air defense performance.

A. Iran: Under the shah, the military buildup was seen as a symbol of modernity and national prestige, as well as a basis of hegemony in the Gulf area. The shah also had an eye toward the Soviets and protection of Gulf shipping lanes. He sought and received the most modern U.S. equipment, such as F-14 jets and Phoenix air-to-air missiles, not available outside the United States. By 1978, the Iranian air force, with 75,000 personnel, was the largest in the Middle East. Since the Khomeini revolution, this powerful air force has disintegrated. The break with the United States severely impacted supplies, spare parts and serviceability, while the extensive purging of real or imagined pro-U.S. or pro-Israeli elements eliminated many of the best-trained personnel. The air force is now in sorry shape. It has perhaps 70 serviceable combat aircraft and less than 10 F-14s among them. Uncoordinated air defenses have been responsible for Iran shooting down over 50 of its own aircraft since the start of the war (*Aviation Week*, Feb. 23, 1987). Islamic Revolutionary Guards are reportedly on all aircraft missions to prevent desertions.

Iran has been looking to other sources to supplement its air force, including China, Brazil and Italy, though these cannot supply the equivalent of Iraq's modern MiGs. As such, the Iranians have proven willing to deal with the "Great Satan" and the "Zionist Germ" to obtain spare parts and other supplies. But it will be a long time before the air force recovers to its prerevolution strength.

B. Iraq: Given its location, Iraq's most immediate preoccupation has generally been Iran, while hegemony over the Gulf-area Arabs has been a secondary aim. Until the Gulf War, however, Iraq's air force had been used only against Israel and Iraqi Kurds. Iraq has always been militantly anti-Zionist and has sent aircraft to the Syrian front in 1967 and 1973. Israel has taken Iraq seriously enough to bomb Iraqi air bases in 1967 and the nuclear reactor in 1981. Since its 1958 revolution, Iraq's air force has been supplied mainly by the USSR and, to a lesser extent, by France. The Soviets have tried to unite the rival Ba'ath parties of Syria and Iraq but have succeeded only in earning the mistrust of both of the still implacable enemies. Since the beginning of the Gulf War, the Iraqis have gradually dis-

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tanced themselves from the Soviets, due to the invasion of Afghanistan, the apparent Soviet preference for Syria and Soviet overtures to the Khomeini regime. France has been the main alternative, and Iraq's 580 combat aircraft (the most in the Arab world) now include a large contingent of Super Etendards and Mirage F-1s, while its helicopter fleet contains Super Frelons.

Arabian Peninsula

Midway between the Arab-Israeli conflict and the Gulf War, the Arabian Peninsula countries have long appeased their larger, militant neighbors with oil money and neutrality within the Arab world. They have not yet been directly involved in the Arab-Israeli wars, and the peninsula countries have thus far avoided serious conflict with Iran or Iraq. The most direct threat has been from domestic leftist challenges to the mainly conservative regimes and more recently from religious fundamentalists. In the 1960s and 1970s, Iraq supported radicals in South Yemen and the Dhofar rebellion against the sultan of Oman, earning the enmity of the Saudis and other peninsula regimes. However, with the shah's and Saudis' support, most of the conservative emirates and sheikhdoms maintained only nominal defense forces and cautiously avoided close ties with either superpower. Since the Khomeini revolution, however, the threat of subversion by Shiite extremists has been more severe than anything that local communists could pose. The formation of the GCC, though formally based on economics, was in large part to foster common defense. Of late, the smaller sheikhdoms, as well as Saudi Arabia, have been rapidly arming themselves, hoping to deter a spillover of the Gulf War, or at least to reduce the need for intervention by external powers. The ability of the armed forces to utilize the sophisticated military imports remains to be seen.

A. Saudi Arabia: Before the 1973 oil price increases, the Saudi air force was small and relatively primitive. Direct conflict with Israel was (and largely still is) seen as posing unnecessary danger to oil fields, economic development programs and the regime itself. The more direct concern was political instability on the peninsula.

The most immediate mission of the Saudi military has been to protect the Islamic holy places, the oil fields and political order. The Saudis have also considered their security to depend on the survival of friendly regimes among its smaller neighbors. Since the 1960s, the most significant danger has come from radicals in the Yemens and Oman. By the early 1970s, the Saudis had accepted the Republican regime in the Yemen Arab Republic (YAR, or North Yemen) and, with U.S. assistance, have swayed and kept the YAR away from Soviet influence. However, between border conflicts, both Yemens speak of unity, and the Saudis remain very restive about the prospect of a united, communist nation on its border. The problems in the Horn of Africa, such as the still simmering dispute over the Ogaden border region between Ethiopia and Somalia, have only heightened that peril, and the Saudis have generously aided the Somalis and Muslim anti-Mengistu forces in Eritrea, Ethiopia. Ironically, their major ally in this effort has been Egypt, which had promoted Yemeni revolutionaries in the 1960s and which has been officially reviled because of Camp David.

With the tremendous inflow of "petrodollars" after 1973, the Saudis have sought to rapidly modernize their armed forces, particularly their air force. A major objective has been to be able to defend the kingdom in any credible attack scenario and thus to deter, or prevent the need for, any superpower intervention in the area. The buildup was also due in no small part to competition with the growing Iranian and Iraqi stocks. Unlike many of the countries in the area, the Saudis have not been shy about buying U.S. products and employing Americans for training and construction projects. This is seen as a symbol of U.S. commitment to Saudi security.

The Saudi air force is rapidly improving both in terms of equipment quality and effectiveness. The Saudis have also sought and obtained the most advanced U.S. air force weaponry. Unlike most other Middle East nations that have so rapidly accumulated sophisticated arms, the Saudis have also invested in extensive personnel training and U.S. military consultants. As such, their air force (and other military) development programs have been well planned and coordinated, with far better infrastructure and support facilities than other Mideast nations have. The combat aircraft, including F-15s and F-16s, are supported by AWACS, refueling tankers, reconnaissance aircraft and modern airfield facilities. With large numbers of the population receiving Western education and training, the Saudis should soon possess an air force with among the best technical capabilities in the area.

With air superiority fighters and peripherals such as air-to-air missiles and refueling pods, the Saudi air force probably has respectably good offensive capabilities. In its one air battle in recent years, a Saudi F-15 downed an intruding Iranian jet in 1985. It is not clear how Israel might regard the Saudis and their capabilities in the event of another conflagration. The Saudis may still not want to risk Israeli strikes against them, but Israel and its supporters have been quite alarmed by U.S. arms sales to the Saudis. The Saudis recently canceled a deal to buy 40 F-15 fighters when the United States sought guarantees that they would not be used against Israel. Instead, in September 1985, Saudi Arabia and Britain signed a deal for $7 billion for the purchase of aircraft and the training of personnel. The Saudis will receive 72 Tornado fighters and fighter-bombers, 30 Hawk trainers and 30 Swiss-built Pilatus PC-9 trainer aircraft.

B. The GCC: The GCC, formed in 1981, consists of Saudi Arabia, Kuwait, Oman, the UAE, Bahrain and Qatar. The immediate strategic threat seen by the smaller states was subversion inspired by Iran and potential spillover from the Gulf War. The leftist/communist threat was a secondary concern, given the situations in Yemen, the Horn of Africa and Afghanistan (particularly to the Saudis and Omanis). Though military matters are not mentioned in the GCC charter, the six members have held joint air exercises and maintain a joint air defense system.

Due to its proximity to the Gulf War, the GCC, particularly Kuwait, is perhaps the one party with a keen interest in seeing the war end. However, an outright victory by either side would be highly undesirable. While officially supporting Iraq, the GCC countries still regard Iraq with great mistrust, noting its former support of leftists and border disputes with the Kuwaitis and Saudis.

The defense forces of the GCC countries have, until recently, been little more than police forces for internal security and border patrol. Other than Saudi Arabia, only Oman has conceivable external capabilities, having built up its armed forces to fight the Dhofar rebels since the 1960s. Though the others have been rapidly purchasing combat aircraft, their capabilities to operate them effectively is questionable. As late as 1985, Bahrain's air force consisted of one squadron of helicopters. The country has since purchased F-5Es and is ordering F-16s to boost its air power.

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India plans top-level spending on superconductor research

New Delhi

INDIA's prime minister, Rajiv Gandhi, has set up a a Cabinet-level committee under his own chairmanship to promote research related to ceramic superconductivity. This development is a measure of India's confidence that its researchers have much to contribute to (and that India stands to gain something from) the international excitement over the new phenomenon.

The members of the new panel include the ministers of science, finance and human resource development, the cabinet and finance secretaries and the heads of the science agencies supporting research on superconductivity. The committee's members also include Professor M. G. K. Menon, Gandhi's science adviser, Professor Yash Pal, chairman of the University Grants Commission, and four prominent industrialists.

Dr Vasant Gowariker, secretary of the Department of Science and Technology (DST), a member of the panel, says that the formation of the panel under the prime minister is a sign of the government's commitment to research in superconductivity. Gandhi has also set up a Programme Management Body under Professor C. N. I. Rao, the director of the Indian Institute of Science and Technology at Bangalore and chairman of the government's science advisory committee, to coordinate research at government and industrial laboratories. This body will have the executive power and financial muscle to pursue the project to its ultimate goal. Gowariker says that the equivalent of several million dollars has been allocated to the coordinated programme.

Seven Indian research groups are engaged in superconductivity research: the Indian Institute of Science (Bangalore), the Tata Institute of Fundamental Research (Bombay), the Bhabha Atomic Research Centre (Trombay), the Madras Indian Institute of Technology, the Indira Gandhi Centre for Atomic Research (also at Madras), the National Physical Laboratory (New Delhi) and the National Chemical Laboratory (Pune). Each of these laboratories claims to have produced ceramic material superconducting up to 120 K, and the National Physical Laboratory claimed room-temperature superconductivity just a week ago.

Despite excitement about the potential of the field, Gandhi's panel will have to talk tough to make the groups work together. The DST, referring to the "varying levels of accomplishment" at the different laboratories, says that these efforts "will come to nothing" unless there is a purposeful direction and a pooling of talent.

Unhappily, the atmosphere is already a little sour. Vulgar quarrels have erupted among the research groups, which are rivals. For example, the Bombay and Trombay groups, originally partners, have already split up. One scientist at the National Physical Laboratory asks how, if we have "rivalries within this institute", we can "expect cooperation on a national scale". K.S.Jayaraman

● The formula for the room-temperature superconductor was cited wrongly last week: the correct stoichiometry is $Y_1(Ba,Sr)_2Cu_3O_x$.

AIR POWER...CONTINUED

The chief impetus for the purchases appears to be general deterrence and a desire to avoid the need for outside "protection." In fact, most of the GCC, though conservative, has made a point of avoiding close ties with the United States. Kuwait, the most vulnerable due to its proximity to Iran and Iraq, has been conspicuously diverse in its arms purchasing (from the United States, USSR, France and Britain).

Despite the expressions of a joint defense capability, the member states have not coordinated well, notably in equipment procurements—Oman has bought Tornados and Jaguars; Bahrain, F-16s; the UAE, Hawk trainers and Mirage 2000s and Kuwait and Qatar, Hawks and Mirage F-1s. The UAE has not entirely integrated the forces of the individual emirates.

C. The Yemens: The greatest significance of the Yemens in the Middle East strategic picture is their political instability and the threat of a united, communistic Yemen. The Saudis, Egyptians, Israelis and Americans fear that South Yemen might provide military bases to the Soviets, though the Soviets would probably prefer a more politically stable environment.

Both countries have small air forces, composed largely of 1960s vintage Soviet combat aircraft, though the YAR has distanced itself from the USSR and has purchased U.S. and French equipment since the early 1970s. In border skirmishes between the two countries, the air forces have not made much of an impression; neither could be considered a true offensive force.

Power Buildup to Continue

Air power is a major determinant of overall military power and has been the basis of military buildups in virtually all Middle East countries since the turn of this decade. The extensive accumulation of air and other military materiel is likely to persist throughout the area due to several factors:

- Continuation of conflicts: The Iran-Iraq War is unlikely to end in the foreseeable future due to the intransigence of both sides and the interest of other powers in seeing it continue. A victory by either side would most likely cause neighboring nations to arm further. In addition, the unstable situations in Lebanon and in the south of the Arabian Peninsula (note the 1986 civil war in South Yemen) are unlikely to be resolved soon.
- The interest of outside powers in the area; the superpowers seeking to bolster their allies, and a host of others seeking to boost arms sales.
- The perceived threats to nearly all countries in the area, plus their ability to pay for and will to obtain the most sophisticated weaponry.

In addition to acquiring combat aircraft, the trend is toward qualitative improvements in support aircraft and equipment, weaponry and other peripherals. Given the sophistication of equipment in the hands of nearly all nations in the area, the balance of power will be determined by mastery of technology, infrastructure, integration of systems, coordination with other armed services and intelligence, education/training of personnel and effective military planning. In all of these areas, Israel is now superior to the rest of the region and depends on this superiority to survive. Several other countries in the area are rapidly improving their capabilities, though not necessarily with an eye toward Israel. It is the increasing capability to utilize effectively the modern equipment flowing into the region, much more so than its mere existence, that could severely undermine stability in the Middle East.

STATE OF ISRAEL BONDS
DEVELOPMENT CORPORATION FOR ISRAEL
730 BROADWAY, NEW YORK, N.Y. 10003 • (212) 677-9650

August 14, 1987

MORRIS DWECK
National Director
Public Relations

Mr. Max Green
Assistant to the President on Jewish Affairs
Room 196, O.E.O.B.
The White House
Washington, D.C. 10500

Dear Max:

Last May, at the suggestion of Malcolm Hoenlein, we requested a message from President Reagan to our International David Ben-Gurion Centennial Dinner, which was held here in New York.

You were good enough to help us secure a message from the President which was very well received by the 1,000 Jewish leaders who attended the event.

During the weekend of September 10 - 13, 1987, 400 Jewish leaders, representing some 60 major communities in the United States, will gather to launch our nationwide Israel 40th Anniversary Celebration at our annual Leadership Conference which will be held in Montreal.

We are writing to request a message from President Reagan for this occasion. A draft, which may be helpful to you, is enclosed.

Among the principal speakers at the conference will be the Finance Minister of the State of Israel, Moshe Nissim, and Israel's Ambassador to the United Nations, Benyamin Netanyahu.

If you have any questions, please call me at 212-677-9650 Ext. 221 or 226.

We look forward to hearing from you.

Cordially,

Morris Dweck

MD/es
encl.

SUGGESTED MESSAGE FROM PRESIDENT REAGAN TO ISRAEL BOND CONFERENCE

DAVID B. HERMELIN
INTERNATIONAL CHAIRMAN
STATE OF ISRAEL BONDS
NORTH AMERICAN LEADERSHIP CONFERENCE
QUEEN ELIZABETH HOTEL
MONTREAL, CANADA

BEST WISHES TO YOUR NORTH AMERICAN LEADERSHIP CONFERENCE AS YOU LAUNCH YOUR ISRAEL 40TH ANNIVERSARY CELEBRATION IN JEWISH COMMUNITIES ACROSS THE LAND.

FEW NATIONS IN OUR TIME CAN EQUAL ISRAEL'S REMARKABLE NATION-BUILDING ACHIEVEMENTS IN LITTLE MORE THAN ONE GENERATION.

IN THE FACE OF MANY OBSTACLES, ISRAEL'S ADVANCEMENT IN SO MANY AREAS DEMONSTRATES ~~THE VITALITY OF THIS YOUNG DEMOCRACY,~~ THE DEDICATION AND ENERGY OF HER CITIZENS, AND THE STEADFAST BACKING OF FRIENDS LIKE YOU WHOSE DEDICATION AND SUPPORT HAS HELPED ISRAEL MEET AND OVERCOME THE MOST DAUNTING CHALLENGES.

ISRAEL'S 40TH ANNIVERSARY IS NOT ONLY A HISTORIC MILESTONE FOR HER COURAGEOUS PEOPLE. IT IS ALSO AN INSPIRATION FOR THAT NATION'S FRIENDS EVERYWHERE.

CONFERENCE OF PRESIDENTS OF MAJOR AMERICAN JEWISH ORGANIZATIONS

Morris B. Abram
Chairman

Malcolm I. Hoenlein
Executive Director

4 so ... [illegible]

Contact: Richard Cohen, Press Officer
Jericho Room, Jerusalem Hilton
Tel. 536151
FOR IMMEDIATE RELEASE

STATEMENT BY MORRIS B. ABRAM, CHAIRMAN, CONFERENCE OF PRESIDENTS OF MAJOR AMERICAN JEWISH ORGANIZATIONS, MARCH 2, 1988, JERUSALEM, ISRAEL AT THE CONCLUSION OF A MISSION TO ISRAEL

The Conference of Presidents of Major American Jewish Organizations has completed a mission to Israel that was planned months ago to celebrate this nation's 40th anniversary -- years of unparalleled achievement by a nation attacked at its birth and still surrounded by neighbors who have never accepted its consistent plea for face-to-face negotiations without preconditions.

We came with anguish at the news clips of riots in the territories, and sadness at the criticism of Israel's response to the latest threat to the state -- a threat aimed at the most vulnerable point in Israel's armour, the moral sensitivity of the Jewish people.

We have had intensive discussions with scores of Israelis -- officials, soldiers, academics, experts -- men and women of all views and persuasions. We have listened and learned, asked questions and received frank answers, and we have stated our own views.

We have learned how complex are the issues that confront Israel's leaders as they seek an arrangement that will meet the country's vital security needs and its ever-sought goal of peace with all its neighbors, We know that Israel has

(MORE)

the absolute responsibility under international law to restore order in the territories for the sake of all the inhabitants. We accept the assurances we were given by government officials and military commanders that Israel's policy is to exercise restraint in responding to the acts of violence its soldiers face each day in keeping order. Indeed, there are few armies in the world that have the moral strength to punish their own men for crimes committed against the enemy in the heat of battle -- and these are battles, not acts of civil disobedience.

It may be providential that our visit coincided with that of George P. Shultz, the United States Secretary of State, a trusted friend, on an American mission of peace. We welcome the American peace initiative, recognizing that the current situation can, in the final analysis, be resolved only by political means. We are convinced that the current situation is unacceptable -- indeed, no Israeli told us otherwise -- and that time is on nobody's side.

We regard the dedication of Secretary Shultz to his peace mission as a highly positive and hopeful new development. His presence in the region has created a rare opportunity to widen the circle of peace, first drawn by the signing of the Egyptian-Israeli peace treaty on the White House lawn nine years ago this month.

We are pleased that Israel has engaged itself to assure the success of Secretary Shultz's mission. We call on the Palestinian Arabs and the Arab states that surround Israel not to let the opportunity provided by American leadership in the peace process slip by.

We return home renewed and refreshed in our support for Israel as a place most precious to the Jewish people everywhere. For residents and visitors alike, life goes on normally. As always, Jerusalem is a place that delights the eye, inspires the heart and renews one's faith that the human family may yet achieve the day when -- as the Bible foretells -- "they shall sit every man under his vine and under his fig tree, and none shall make them afraid."

3/2/88 X X X

United States Senate

WASHINGTON, DC 20510

March 3, 1988

Israel
peace process

The Honorable George Shultz
Secretary of State
21st and C Streets, N.W.
Washington, D.C 20520

Dear Secretary Shultz:

We are writing to express our support for your effort to break the dangerous Middle East stalemate, a stalemate that has led to the current cycle of violence and counter-violence.

We support your mission of peace, which is based on United Nations Security Resolution 242 (as restated in Resolution 338), a resolution which has been at the foundation of United States diplomacy in the region through five Administrations and which has been endorsed by Israel and most of the Arab parties to the conflict.

The meaning of this resolution is clear. It requires the Arab states to accept Israel's right to "live in peace within secure and recognized boundaries, free from threats or acts of force...." It requires Israel to withdraw from some of the territories occupied during the 1967 war. It can be summarized in three words: land for peace.

Unfortunately, with the exception of Egypt, no Arab state has demonstrated willingness to implement this formulation. To one degree or another, the Arab states have resisted recognition of Israel and peace with it. As for the Palestinians, they not only refuse to recognize Israel, they have refused to meet with you during your visit. For some 50 years, those who have indicated a willingness to negotiate with Israel have paid with their lives. Others have been intimidated.

Israel, for its part, has manifested its commitment to Resolution 242 and the "land for peace" formula in a tangible way. In return for Egypt's recognition of Israel and its acceptance of peace, Israel returned the Sinai peninsula to Egyptian sovereignty including the oil fields located therein.

Successive Israeli leaders have declared their dedication to the Camp David Accords including Resolution 242's "land for peace" formula and have indicated that it would apply to the West Bank and Gaza. According to this formulation, Israel would contemplate the relinquishing of territory in exchange for a peace treaty guaranteeing Jordanian and Palestinian recognition and acceptance of Israel.

That has always been our understanding.

Accordingly, we were dismayed to read in the New York Times of February 26 that Prime Minister Shamir had said that "...this expression of territory for peace is not accepted by me."

We hope that the Prime Minister's statement did not indicate that Israel is abandoning a policy that offers the best hope of long-term peace. Israel cannot be expected to give up all the territory gained in 1967 or to return to the dangerous and insecure pre-'67 borders. Resolution 242 does not require it to do so. On the other hand, peace negotiations have little chance of success if the Israeli government's position rules out territorial compromise.

We are also disturbed by reports that Jordan may be backing away from the idea of a joint Jordanian-Palestinian delegation that would negotiate with the Israelis at a peace conference. These accounts indicate that Jordan may insist on an independent PLO presence at the negotiating table.

We hope that these reports are without foundation. Israel rejects negotiations with the PLO, and rightly so. However, its officials have indicated that it would negotiate with a joint Jordanian-Palestinian delegation. Jordan's abandonment of the joint delegation concept now would deal a serious blow to the peace process.

We believe that it is only through compromise by both sides that we will achieve Middle East peace.

We applaud your effort to get the peace process moving and share your determination to build a Middle East where every nation and people can live in peace, security and, ultimately, even friendship.

Sincerely,

Rudy Boschwitz

Carl Levin

Lowell Weicker Jr.

Alan Cranston

George J. Mitchell

Howard M. Metzenbaum

Brock Adams

Tom Daschle

J. Bennett Johnston

Donald Riegle Jr.

Daniel Inouye

Tom Harkin

Edward Kennedy

Warren B. Rudman

Robert Kasten Jr.

James Exon

Patrick Leahy

John F. Kerry

Mitch McConnell

William Cohen

Alan Simpson

Christopher Dodd

Dennis DeConcini

Frank R. Lautenberg

Kent Conrad

John Glenn

Timothy E. Wirth

Wendell Ford

Daniel P. Moynihan

Bob Graham

THE NEW YORK TIMES, TUESDAY, MARCH 8, 1988

ON MY MIND | A. M. Rosenthal

No Suicide for Israel

It happens to everybody from time to time. We believe certain things about a matter of important controversy and we say them. But when we hear the same points made by others, we become queasy and know something is wrong or missing.

Many of us have been saying the same things about Israel: Israel cannot go on forever being an occupying power. Jews must not break bones. Israeli use of force against young Palestinians is costing her support around the world. Israel must enter negotiations on Gaza and the West Bank.

Right, right. But sometimes when I hear or read these points, which I have made myself, made over and over by others, I find myself deeply uneasy. It is not because there is no validity in them, but because so often they are presented empty of the historic realities that brought about the crisis and must be understood to find a way out.

This is an attempt to set down the political, military and historic truths that raise fears about the road that many American intellectuals, journalists and senators are demanding Israel take.

Causes: The critics' implication is that the cause of the current crisis is Prime Minister Yitzhak Shamir's opposition to an international conference and his refusal to agree in advance to cede West Bank territory.

This is not true. The cause is 40 years of Arab refusal to accept the existence of Israel, 40 years of furious hostility and military attempts to destroy her.

You do not have to like Mr. Shamir to realize that if the Arabs had accepted Israel in the beginning or for 20 years thereafter, all of the West Bank and Gaza and other territory would today be part of a Palestinian state.

If you believe that the very existence of Israel is anathema, you are right to see her policies as the root cause of the Mideast ugliness. Otherwise not.

Occupation: Some critics also act as if it were Israeli occupation of the West Bank and Gaza in 1967 that led to so many years of unrest and skirmishing there.

This too is a historic distortion. It was the Arab countries that seized Gaza and the West Bank, which were to be part of the Palestinian state under the 1947 U.N. partition plan, and occupied them for 20 years — not in peace but with constant harassment and attack against Israel.

Finally Israel struck back. Her unhappy occupation of the West Bank is a result, not the cause, of aggression — Arab aggression.

Negotiation: With whom and for what? The U.S. proposes an international conference with the Big Five participating. Since Britain and France are cool to Israel and the Soviet Union and China are hostile, the chicken is being invited to negotiate under the sponsorship of four foxes and a lame dove. To think the major powers would not pressure Israel for Arab advantage is not only naïve but black comedy.

It is not the Big Five Israel must live with, but the Palestinians, and other Arabs. Which Arab states have promised to negotiate directly with Israel? None. Which Arab leaders are criticizing Palestinians sworn to the elimination of Israel? Where are the "moderate" Palestinians who can swerve the young men of Gaza and the West Bank away from seeking Israel's death?

Stakes: Israel is fighting for survival. The Arab states are fighting out of anti-Israel hatred and fear of the Palestinians. The young Palestinians are fighting for a new Palestinian state because they hate the ruler of a present state with a Palestinian majority: Jordan. They plan to eliminate King Hussein one day and swallow Jordan as part of their own single Palestine.

> The making of Mideast ugliness.

As things stand, any ceded West Bank territory will become a de facto state run by the P.L.O. and other Palestinians sworn to destroy Israel. Those young Palestinians would not be hurling stones from their territory but rockets.

Solutions: Open pressure on Israel to make concessions must be accompanied by open pressure on the Arabs. Palestinians must accept totally and clearly the right of Israel to live forever, secure and in peace. The U.S. and the Arab leaders can achieve this and guarantee it, if we have the will and they the courage.

Mr. Shamir may not promise in advance to cede "territory for peace." That is what direct talks are for.

But the definition of peace cannot mean Palestinians continuing war to the death. And they too must feel hard pressure to do some ceding, specifically of their demand for another Palestinian state in a region where one already exists, and to negotiate in peaceful stages for the eventual goal: a single Jordan-Palestine.

Americans have a right to criticize Israel. They have a right to suggest solutions — but not the suggestion of suicide. □