Mental and multiple disabilities

Concept of a therapy system

Remarkable progress has been made in the last 30 years by medical therapy for mentally handicapped – in comparison with a stagnation that had lasted for centuries. The impulses came from various marginal areas of medicine and pedagogy but to a lesser extent from principal areas such as neurology and psychiatry. Physiology, biochemistry and - morphology created a better understanding of the structure and functions of the nervous system; pediatricians, physiotherapists and pedagogues worked out practical techniques for treatment.

Let us again summarize the contrast between present and past. In the past, people were helpless when faced with the manifestations of mentally handicapped persons or diseases of the central nervous system. This helplessness was reflected by isolating and tranquilising the patient; that is, the central nervous system was not trained and depressed. But in our days the active principle of encouragement and training has basically found general acceptance though not everywhere in practice. In terms of historical development, we should have overcome the periods of eliminating the handicapped (in antiquity and remnants of that age in modern times), of isolating the patient (behind big walls in medieval times). The main duty of medicine in our times is the integration of handicapped people into the environment. Despite basic progress and positive trends, individual cases still nowadays point out the limitations of these possibilities – but also the limitations of quite a few erroneous developments in terms of organization. Long years of my own experience on more than 5000 cases of handicapped children have shown that the potential offered by therapy is in most instances utilized only in a unilateral and thus incomplete manner; barriers erected in terms of organization often obstruct rather than favour the development of these children. A few medical and educational examples are intended to clarify this statement.

The Drawbacks of Specialization

Certainly, *medical gymnastics, physiotherapy, stimulation-programms* have been and still are one of the most important elements of therapeutic progress. In the course of the change of designation from «infantile cerebral paresis» to «cerebral motor disturbance» remedial gymnastics – primarily through specialized methods breathing sectarian intolerance – are emphasized to such an extent – both in the projecting line of thought and in terms of time – that other methods of treatment are neglected or can no longer be accommodated in terms of time.

The *introduction of anticonvulsive agents* was a step forward which took the notion of unavoidable fate from the seizure conditions. Wherever such progress became an end in itself, where the symptom of the «convulsive cerebral attack» was made the centre of the condition and the sole target on which therapy should focused, the usefulness of symptomatical treatment may be perverted to damage to the personality of the patient; this may happen due to a neglect of other ways of treatment and the suppression of the central nerve functions. The gamut of the disadvantages of a one-sided therapy ranges from serious damage to the ske-

leton (Rachitis anticonvulsiva) to «Morbus anticonvulsivus» where the consequences of a high-dosage and unsuitable anticonvulsive medication are of a more serious pathological nature than the seizure condition proper.

The system of our *specialized pedagogy* may be compared with an excellent network of roads where, unfortunately, there are no cross-connections. The patient who, due to geographical location, is put on such a road (i.e. a special school G for Mentally handicapped, special school L for Learning handicapped, school for physically handicapped), will as a rule have to keep on that road since he is given the result of an intelligence test as a starting position to serve as an identification card.

The *field of testing* (psychological, behavioural, intelligence tests and others) is highly diversified with its more than 1000 test methods. However, practical experience shows that the result often testifies more to the abilities of the tester than to the abilities of the tested patients. A handicapped child who lives in contact with one or a few reference persons in his environment, will never show the same performance which he is able to show when confronted with strangers; often any cooperation is refused during the test. An intelligence quotient (IQ) labelled from such test situations is an unsurmountable obstacle for many children who are to be given adequate supportin their development.

Handicap as an Integral Concept

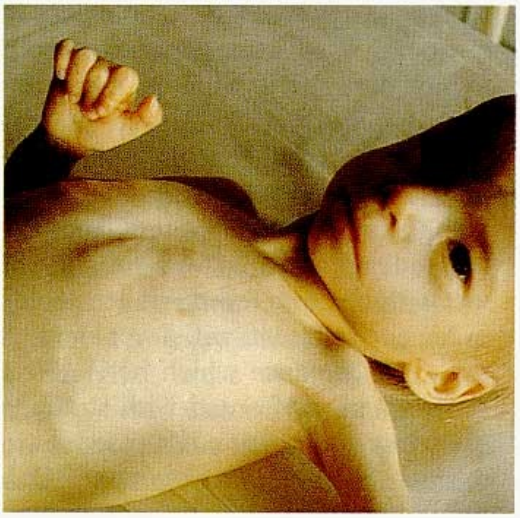
The development of the child, that is the evolution of the biological potentials contained in the genotype in accordance with the laws of nature, is a complex process composed of a somatic and an intellectual (mental) group of factors; the physical area includes anthropometric data (length of body, weight, circumference of head, growth), and statomotoric functions. The mental area consists of psychic, social and intellectual components. In handicapped patients the individual components are usually not affected in uniform manner; the assessment (often identical with diagnosis) is formed in most instances, according to the most serious deficiency (spastics, debility, numbness, speech disorder, ataxia). Here it is often overlooked that the patient is a personality who, besides his shortcomings, has also positive (and in this case often above-average) qualities (for example social attitudes, willingness to give help, tidiness, a good instinct).

An optimized therapeutic concept must be based on the integrality of the patient who is handicapped, primarily recognize the mosaic of symptoms, evaluate it and work out an individual scheme for treatment and guidance from the individual possibilities and shortcomings. The supreme therapeutic target must be the encouragement of personal development, not the elimination of a symptom.

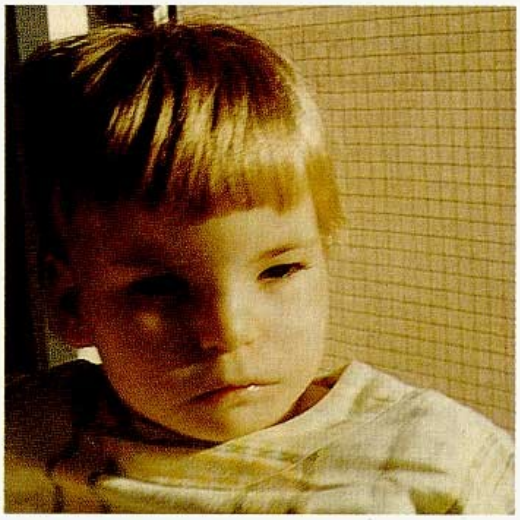
Diagnostic Requirements

Looking at the changes that have occurred in the judgment and classification of mental handicaps in the last 50 years by referring to the diagnoses used, which ranged from

«Vitium cerebri»
over
«Oligophrenia» (debility, imbecility, idiocy)
to



a



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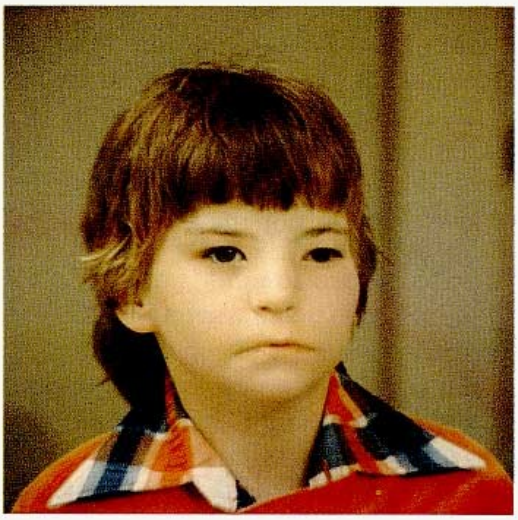


c

«Cerebral palsy»
(infantile cerebral paresis),
«cerebral motoric disorders»
and finally to
«brain damage in early childhood»,

two things are evident:

As against the general organ-related diagnosis, individual symptoms (such as the degree of intelligence, motoric handicap, seizure conditions) were given predominant attention in the course of time and promoted to « Diagnosis» status. The provisional end of this trend, the «brain damage of early childhood» is to be assigned to the period where, about 150 years ago, developments started:

Fig. 258:
Progeria series of development 710812-780523

a)
The boy of $3\frac{5}{12}$ years was admitted with 75 cm stature (-24 cm $= -25\%$), 5.56 kg bodyweight (-4.5 kg related to stature = about -75%(!) -9 kg corresponding to age = about -150%) because he was unable to ingest food. Dystrophic, senile appearance, frontal vessels as thick as pencils. No reaction to optic, acoustic stimuli, no sounds, little spontaneous movement. On polyvitamins, digestive ferments, primobolan gains in weight up to 12.9 kg, increase of stature to 80 cm in 7 months, but no static and mental progress.
At $4\frac{3}{12}$ years, implantation of 100 mg of cerebral lyophilisate. Slowly beginning, then rapidly visible motor and mental development; at $5\frac{4}{12}$ years 92 cm (-19 cm), 17.2 kg, according to age.

b)
At $5\frac{8}{12}$ years 98 cm (-16 cm), 18.4 kg. Implantation: 100 mg diencephalon, 100 mg frontal brain; grows 3 cm in 40 days; reacts to environment, sits, stands, walks, utters first sounds.

c)
At $10\frac{6}{12}$ years, the boy attends special school, speaks indistinctly owing to Moebius's syndrome, fully integrated in social respect, 126 cm (-12 cm), 30.5 kg. At 12 years, 4th class of special school, reads, writes, counts up to 20, is interested in everything; 133 cm, 31.8 kg.

Tab. 32: **Important diagnostic partial symptoms of mental retardation and multiple physical disability**

somatic		mental		Sens-organs	Peculinities
anthropo-metric	stato-motoric	psycho-social	intellectual		
general growth anomalies nanism microsomia high stature giantism dystrophy adiposis **partial growth anomalies** microcephalia macrocephalia dyscephalia hypognathia hypergnatia hypogeny hypergeny brachymelia brachycarpia brachydactylia brachy-mesophalangy acromicria dolichomelia dolichocarpia dolichodactyly acromegalia cranial hypoplasia (bird's head) caudal hypoplasia dysraphia dysmelia	**muscular hypertony** monoplegia diplegia triplegia tetraplegia (Little-S.) hemiplegia **muscular hypotonie** Foerster-S. puppet phenomenon «Floppy infant» **muscular dystony** **Dyskynesia** athetosis chorea chorea-athetosis **ataxia**	apathie hyperkinesis erethism aggressivity listlessness helplessness tyrant uncleanliness autism	debility imbecillity idiocy partially disturbed performance no abstract thinking no discrimination absent-mindedness echolalia perseveration cortical blindness cortical deafness loss of initiative	**skin** analgesia hypalgesia trophic disturbances disturbed circulation anomalous pigmentation **speech** lacking understanding of speech motoric speech disturbance (dyslalia) **hearing** hardness of hearing deficient selective pitch of voice deafness **vision** **strabism** nystagmus microphthalmy macrophthalmy opacity of lense retrolentary fibroplasia glaucoma amblyopia blindness	increased predisposition to infections lacking immunoglobulins **gastro-intestinal disorders** inappetence lack of ferments chronic obstipation chron. gastritis ulcera oesophagitis gastro-oesophageal reflux frequent vomiting **vegetative symptoms** vegetative lability disturbed peripheral circulation acrocyanosis trophic disorders lost or weakened regulation of body-temperature

There is merely a difference in degree compared with «Vitium cerebri», no basic difference. But the most dangerous attribute is the Intelligence Quotient (IQ), a figure computed with sources of error; such figure lends itself to easy processing by government offices but often entails disastrous consequences for the treatment and encouragement of the children because, in many instances, the qualification for being encouraged, the possibility of treatment and the type of schools to be attended are determined with this figure.

Starting with this negative aspect it is pointed out that the mosaic of a handicap is composed of individual symptoms which should also be covered and formulated in each single instance; otherwise we lose sight of them in our therapy. There is a momentous difference as to whether the label of a handicap reads:

a) brain damage in early childhood or
b) motoric and mental retardation;
   athetosis;
   ataxia;
   strabism;
   dyslalia.

Tab. 33: **Multifactorial damages**

anencephaly	arthromyodysplasia (arthrogryposis)
hydrancephaly	Hallervorden-Spatz degeneration
arhinencephaly	Sturge-Weber's syndrome
parencephaly	(trigeminus-angiomatosis)
microcephaly	syndrome with aniridia, cerebellar
hydrocephaly	ataxia
clefts of lips, maxilla, palate	oligophrenia
rachischisis	Pierre Robin's dysmorphia
lacunar skull	bird-face (Seckel's nanism)
dysmorphia-syndromes	Hallermann Streiff-disease
Cornelia de Lange-syndrome	(oculomandibulo-dyscephalia with
Rubinstein's syndrome	hypotrichosis)
	Many more, mostly rare, syndromes

Tab. 34: **Environmental Factors which may lead to mental damage or impairment:**

Prenatal Damage	**Natal Dangers**
Maternal Noxae:	Immaturity
Nicotine abuse	Prematurity
Alcoholic abuse	Umbilical-cord strangulation
Drug abuse	Prolonged birth
Antiepileptic therapy	Difficult birth
Cytostatica	Prolonged hypoxia
Radiation damage	Anoxia
Infections:	Artificial aids (forceps, suction cup)
Bacterial sepsis	
E. Coli	**Postnatal Damage**
Pyoceanus	Encephalo-enteritis (toxicosis)
Proteus	Encephalitis
Staphylococcos	Vaccination encephalopathy
Beta-hämol. B-Streptococcos	Meningitis
German measles	Subdural hematome-hygroma
Virus conditions	Anaesthesia accidents
Toxoplasmosis	Cerebral angiographies
Cytomegalia	Traumatic damage of central nerve system
Lues	cardiac arrest
Anemia	Chronic hypoxia
Bleedings (hemorrhages)	Cerebral seizures
Toxicosis	Athyreosis-hypothyreosis
Nidation anomalies of the fetus	Hypocalcemia – hypercalcemia
Blood group incompatibility	Hypoglycemia

Under a) there is a statement not related to any target, it does not lead to a therapeutic consequence;

Under b) there is a comprehensive stock-taking with direct therapeutic demands (see Table 32):

The diagnosis that serves as a premise for a therapy suitable for the individual case, should include the following basic elements:

Fig. 259:
Alcoholic-embryo-fetopathy: retarded development, retarded development of speech, mimic expression (a) before and (b) after two treatments with implantations 2 years later; most distinct is the progress in speech development.

Tab. 35: **Infantile cerebral paresis**

Hypertonic Forms Muscle hypertonia Spastic monoplegia diplegia triplegia tetraplegia Spastic hemiplegia	**Dyskinetic Forms** Chorea (motoric restlessness) Athetosis (motoric stiffness) Choreo athetosis (coexistence and change of motoric restlessness and spasm) Fine motor «clumsiness»
Hypotonic Forms Muscle hypotonia Stuffed doll syndrome «Floppy infant»	**Atactic Forms** Cerebellar ataxia Cerebello-spinal ataxia
Dystonic Forms Changes of hypertonia and hypotonia	**Mixed Forms** Combinations of the above listed symptoms among each other with sensory deficiencies, trophic disturbances, reduced intelligence and psychic deviations.

1. Anthropometric data (length of body, body weight, proportions);
2. Size of skull and shape of skull
   a) visual judgment;
   b) circumference of skull (= surface measurement of skull basis);
   c) Radiological skull measurements including the volume index of the skull;
3. Analysis of development (fig. 263)
   a) stato-motoric;
   b) fine-motoric, coordination;
   c) eating, drinking, speaking;
   d) social development, psychic development;
   e) intellectual performance;
4. Neurological symptoms (fig. 264).
5. Anthropological age (bone age).

6. Electroencephalogram (EEG). Additional data can be obtained for special areas, which may be relevant for therapy:
7. Echoencephalogram;
8. Computer Tomogram;
9. Audiometry;
10. Psychological tests;
11. Eye examinations;
12. Analyses of the metabolism;
13. Diaphanoscopy;
14. Cerebral angiography.

Genesis and Types

Most classification principles concerning handicapped conditions are based on the genesis and the clinical symptoms or represent a complex of criteria.

We can distinguish the following main groups based on the genesis:

1. *Hereditary metabolic disorders (Tab. 31);*
2. *Chromosomal aberrations (Tab. 23);*
3. *Environmental handicaps (Tab. 34);*
4. *Multifactorial damages (Tab. 33).*
5. *Types of infantile cerebral paresis (Tab. 35)*
6. *Partial disturbances of performance.*

The summaries in Tab. 29–35 and in the following list give a concise survey of the total field.

Partial disturbances of performance

The probably mildest forms of consequences of brain damage in early childhood are the so-called partial disturbances of performance in various areas of the motoric system, particularly of the learning process. Such partial disturbances may be located within the mosaic of infantile cerebral palsy, but also occur as individual symptoms. The following forms must be distinguished:

1. *Disorders of reading techniques*

a) Incorrect vowels (for example I instead of A);
b) Incorrect consonants;
c) Reversals (e.g. pit/tip);
d) Omission of sounds or added sounds (for example ... un instead of sun; shipi instead of ship);
e) Substitutions (instead of saying «I live in Aschaffenburg»/«my home is in Aschaffenburg»);
f) Repetitions (for example the ca, ca, cat or the cat, cat, cat);
g) New words added or omitted (e.g. instead of saying «a dog» the child says «a vicious dog»; ...was a king instead of there was a king);
h) Refusals (e.g. the sentence «one of the most wonderful experiences ...» is spoken as follows: one of the experiences ...
i) Inability to articulate unknown words, while the other phonetic structures are degenerate;
j) Deficient differentiation of letters, parts of words and syllables (e.g. between bead and bed);
k) Lack of ability to discover differences between sounds and words;
l) Difficulty in observing lines;
m) Difficulty in proceeding from the right side to the next line below on the left;
n) Poor understanding of the material read;

2. *Writing-disorders*

a) Delayed and slow learning to write;
b) Writing in reverse;
c) Letter size cannot be coordinated;
d) Slipping characters;
e) Strikingly irregular line thickness;

f) Legasthenia;

3. Speech disorders

a) Disorders when spelling (e. g. loss of letters, telegraph style words);
b) Inability to spell, that is to differentiate the individual letters contained in a word;
c) Poor understanding of language;
d) Disturbances of language motor system (difficulty in pronouncing);
e) Difficulty in finding words;
f) Poor structure of sentences (difficulty in establishing the right word order);
g) Difficulties in orientation;
h) Stuttering and stammering.

Possibilities and limitations in biological development

The central nervous system of man is the sole organ system the «fetal stage» of which is not completed at the time of birth. Processes of fetal maturation and differentiation extend up to the 4th year of life; they are completed only upon maturation of the medullary sheath. This results in a few essential aspects for vulnerability and therapeutic possibilities and limitations. The following facts should be kept in mind (fig. 260):

1. With a maturely born child the final number of nerve cells is already present; no new ones will be added during his lifetime.
2. Despite the final cell number the weight of the brain of a mature newborn is 350 g on the average; at the end of the somatic growth it is 1250 g on an average, the number of cells being the same.
3. Without increasing the number of neurons the brain volume triples $3\frac{1}{2}$ times by way of formation of secondary structures of the neuron.
4. The main increase in brain volume (= weight) takes place in the first three years of life, that is in the «caught-up» fetal period of the central nervous system. About $\frac{3}{4}$ of the

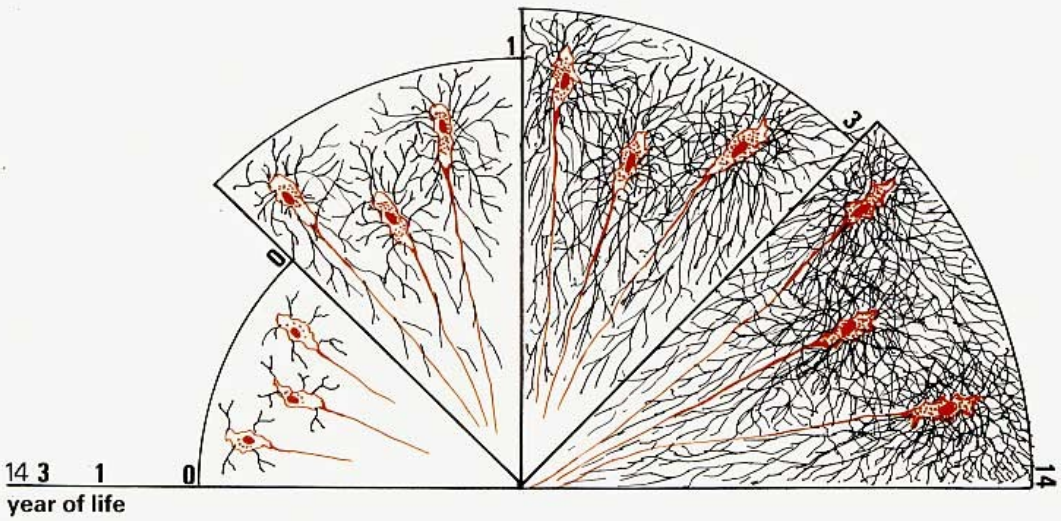


Fig. 260: Maturation of the brain from birth to the 14th year of life. By way of formation of secondary structures the brain volume (= weight) increases $3\frac{1}{2}$ fold; the number of neurons present at the time of birth is not changed.

postnatal brain growth takes place in this age period.

These biological laws result in a higher vulnerability of the central nervous system in the first four years of life but also the possibility of acting on it by way of therapy. In particular, the first three years offer chances and potentials for therapy applications with biological «building stones» and a training program from the periphery. These possibilities are no longer available after the fourth year. Possibilities of treatment not utilized in the first three years of life will remain wasted chances throughout life. Even with an increased therapeutic input and effort they can be corrected only in part.

Looking at the elementary structure of the central nervous system, the neuron, we can see basically three processes:

a) a deficit in neurons;
b) an impairment of maturation and differentiation of the neuropile;
c) destructive (degenerative) processes.

Mental impairment constitutes by far the most important proportion; it goes back to an impairment of maturation of the central nervous system on account of which the functional state of the brain remains in the stages of early childhood. Several points of approach are offered for therapy applicable to this condition, which is known clinically under names such as «brain damage from early childhood», «infantile cerebral palsy» or «cerebral motor disturbance» (fig. 261).

1. *Nonspecific Stimulation of the Metabolism* through increased supply of substrate; in most instances a better supply of blood to the brain is achieved. These agents have so far been used predominantly for elderly people and not sufficiently utilized for children. They include:

euphylin,
heart glycosides,
caffeine,
amphetamines,
complamin,
ephedrine derivatives,
camphor and others.

2. *Specific influences on metabolism* by agents which selectively stimulate individual metabolic processes in the neuron. This field has been neglected by pharmacology and clinics for a long time; it is still in its infancy since sufficient clinical experience can support the theoretical basic concept only in the case of a few substances. The biocatalysts include

a) Pyritinoldihydrochloride monohydrate (Encephatol);
b) Piracetam (Normabrain, Nootrop);
c) Centrophenoxin (Helfergin);
d) Actihaemyl;
e) Nicotinic acid derivates;
f) Membrane activators;
g) Monoamino-oxydase inhibitors;
h) Adrenocorticotropes hormone (ACTH);
i) L-Dopa.

3. *Biological Organ Therapy («Brick-Therapy»)*

Up to the present biological substances of various biochemical dimensions have not been available to a sufficiently great extent for the stimulation of the metabolism of the neurons, for repairing and synthesizing defective and unmatured neuron structures; more-

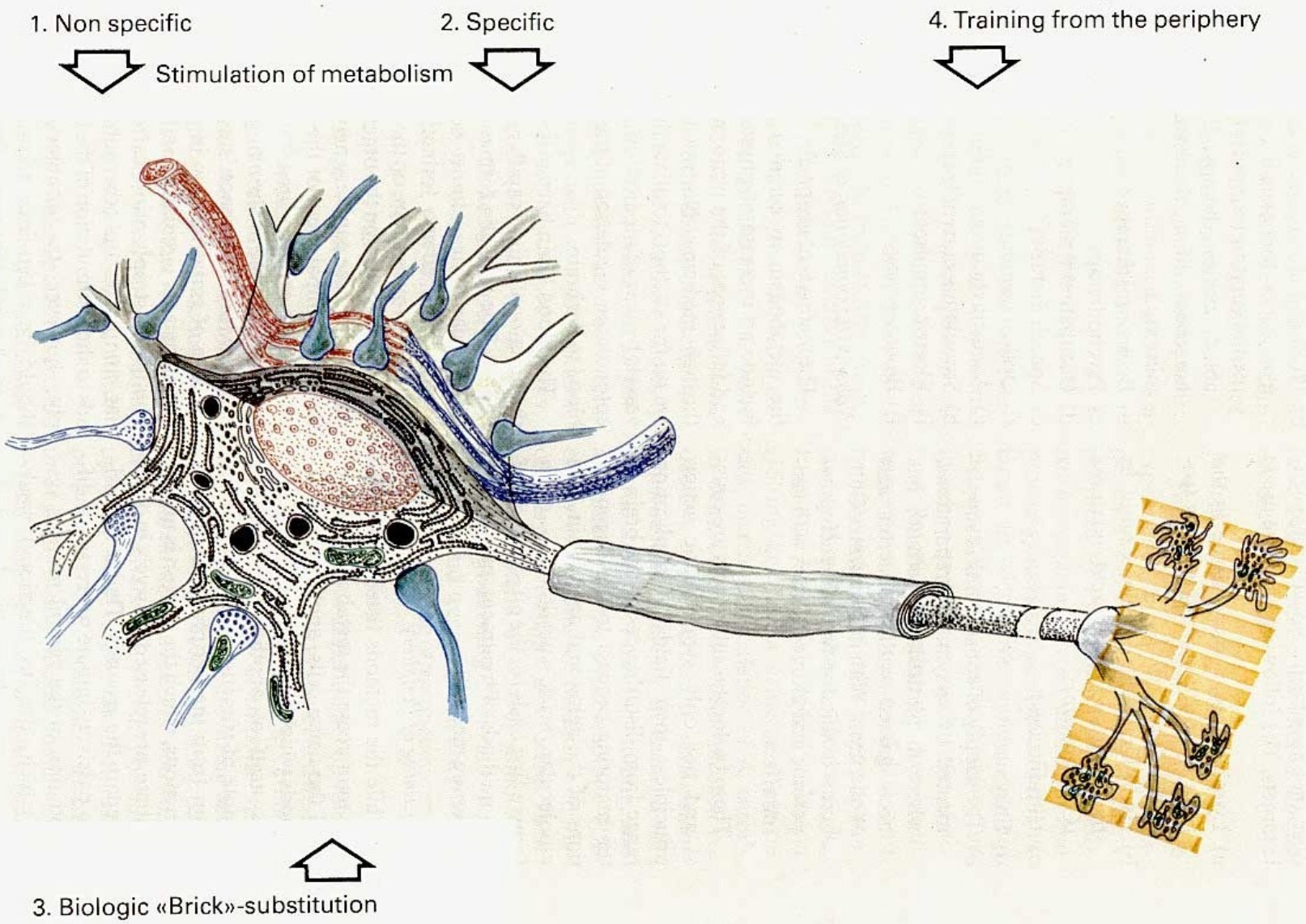


Fig. 261: Therapeutic approaches on the neuron

over, they have been used without specific targets. The following types are used:

a) Lyophilisates of brain tissue in the form of injection-implantations (so-called cell therapy);
b) Hydrolysates from animal brain in the form of amino acid mixtures (Cerebrolysin);
c) Ultrafiltrates;
d) Enzymes;
e) The supply of constituents is supplemented by enzymatic preparations, where in particular experience has been gained with Coliacron and Wobenzym. With its 3 enzymes Coliacron is suitable for influencing hypotonic and atonic muscles with lasting effect.

These biological substances are causal and not only symptomatic action principles; their fields of application range from disturbances of the brain in the maturing process to the degenerations of the aging and aged brain. The «molecular brick substitution» often forms a first basis for the effectiveness of other methods of treatment, particularly of training methods.

4. Training of Periphery

While the methods listed under 1–3 serve to increase the metabolism and rebuild the nerve cells, another group of methods which is differentiated in itself, avails itself of another principle: the principle of (functional) training of the neuron from the periphery. Sequences of functions, which the neuron is unable to initiate, are released passively in order to prepare the grounds. Thus it is possible to passively initiate processes of differentiation of the central nervous system which, due to functional weaknesses, cannot be realized actively. These methods include:

a) Physiotherapy (remedial gymnastics, gymnastics for special diseases, remedial eurythmics, sports for the disabled, motion therapy, therapeutic horseback riding, therapeutic swimming etc.);
b) Behavioral therapy;
c) Psychotherapy;
d) Occupational therapy;
e) Speech therapy;
f) Optical training;
g) Acoustic training;
h) Stimulating current therapy;
i) Electric impulses;
j) Bioenergetics.

Nonspecific stimulation of Metabolism

The methods of unspecific increase of the metabolism in cerebral affections include an increase of physical activity and influences of the brain metabolism through medicine. Narrow limitations are set for attempts to dilate the cerebral vessels by way of medication, due to the autonomous regulation of the supply of blood to the brain.

The blood-brain barrier is formed by the functional unit of capillary-astroglia-neuron. The astroglia formations envelop the capillaries almost completely. Swelling and edema formation in the central nervous system, on the one hand, and cicatrisations, on the other, lead to a narrowing of the capillary networks and thus to an impairment of the metabolic chain in the capillary area; this is due to increased volume or shrinking of the astroglia. More experience is available in the area of geriatrics than in pediatrics, with agents for circulation and the heart. The use of strophantine, caffeine, fludilat, complamin and other substances leads to short stimulation of the blood supply; however, the counteradjustment should be taken into account, which takes place after the main effect has subsided. For these considerations alone,

the methods of unspecific increases of the metabolism serve to treat acute conditions rather than chronic diseases of the central nervous system.

A very important way of nonspecific influences on the brain-metabolism is a disease-orientated-nutrition and diet.

Specific influenser on the metabolism of the Central Nervous System

The intent to increase the performance of the brain goes back to time immemorial; it ranges from the pneuma of GALEN of BERGAMON over the mixture of ether and spirits of Friedrich HOFFMANN (1760, Halle) (in the form of ether drops, used up to the present century) to the «modern» *psychostimulants, psychoenergetica* and *nootropica* (J. KUGLER, 1977). The first specific entry was made by LEVIN (1927) with *amphetamines*, which increase the ability of perception, concentration and reaction. Similar, though shorter improvements of performance of the central nervous system can be achieved with *coramin, ephedrin* and the previously much used *camphor.*

The practical applicability of these substances is limited because, in part, they cause dependence and addiction; without exception, they lead to a counteradjustment, a reduced performance of the central nervous system, after a stimulated stage which may last minutes or hours.

A few substances affecting the brain metabolism do not result in such a counteradjustment; their focus is more specific than the above mentioned substances and the agents that have the general effect of encouraging circulation (cardiac tonics and circulatory stimulants).

In theory and clinical practice certain substance groups, to which specific metabolic stimulation must be ascribed in experiments on animals and humans, have found general acceptance during the last two decades.

Pyrithioxin, Pyritinol (Encephabol®)

The probably most comprehensive experimental materials and clinical experience with a neurodynamic agent are provided by Pyrithioxin (Encephabol). An increase in glucose utilization and protein synthesis is attributed to this vitamin B6 derivative without vitamin character. Probably this does not do full justice to its complex mechanism of action. Before evaluating the therapeutic importance the experimental data must be analysed. In previous basic pharmacological examinations (HOTOVY, R., ENENKEL, J. H. a. o., 1964), Pyrithixion (150 mg/kg) had a calming effect on cats, increased circulation of A. carotis in dogs, connected with a nitrogen reduction in the urine, a diminishing experimental catalepsy in cats, an improved training of rats for running, and an increase in the psychomotoric efficiency in persons. Circulation and visceral organs remained unaffected. There were no criteria of central stimulation such as an awakening effect, locomotoric action and tremor which are particularly characteristic of amphetamines.

Membrane Effects

In hemolysis experiments on human erythrocytes, MARTIN succeeded in starting, in vitro, a monophasic reversible labilisation of the erythrocyte membrane; the membrane-stabilizing action of benzyl alcohol was antagonized by Pyrithioxin derivatives. The antialcohol effects oberserved in vivo may be bound up with these membrane-influencing properties. The choline transport through the membranes of human erythrocytes and in synaptosome preparations from rat brains is inhibited. The retardation of the c-AMP-synthesis with

procaine – checked on brain sections of rats – is antagonized. The last two findings show that the membrane effects of Encephabol are not confined to erythrocyte membranes but can also be demonstrated on neuron membranes. The protective mechanism against alcohol is also assumed with regard to the cholinergic spinal marrow synapsis (BENECKE a. o. 1972).

ENDO assumes that Pyritinol influences the interplay of phospholipid-protein substances; the extractability of firmly bound phophorus lipids increases. Membrane permeability increases; some substrates such as for example sodium, glucose, choline, are transported easier.

Clinical Effects

The short-time memory and the immediate memorization in 48 persons subject to experiment was markedly improved according to investigations by I. M. DEUSINGER and H. HAASE (1972) under 300 mg of Pyrithioxin daily for 4 weeks. Increases in vigilance in school children, 8–13, were substantiated by K. D. STOLL (1973) by way of concentration tests after administration of Pyrithioxin. G. LOGUE and others (1974) reported on further positive action on learning attitudes; Ch. FEHLING-JOSS reported on such effects with dyslexia (1974).

Additional effects were registered with regard to brain contusions (BYSTRICKY a. o. 1977; S. Y. OH 1974; LAHODA), with the appalic syndrome (K. v. WILD and G. DOLCE, 1976), with organic psychosyndromes (MISUREC and others, HAMOUZ, W., 1977), with chronic alcoholism (J. MASARIK and J. DEMEL 1974). The probably most interesting interactions were found with cerebral seizures. The consequences on cerebral seizures were examined by GASTAUT on 48 patients with a double-blind experiment. In 5 cases a reduction of the seizures was noticed, in 5 cases an increase. The electroencephalogram changed in the Encephabol group in 8 cases, among them 5 cases changing toward the positive; in the placebo group the change was noticed in 2 cases. On the whole, interest, language, academic and occupational performance were judged favourably. TASSINARI did not see any influence on the electrocardiogram in 30 seizure conditions, when Encephabol was administered intravenously. A differentiated study of infantile seizure conditions (43 cases of 4–14 years) was made by ROGER, ROBAGLIA and C. DRAVET. In a pyridoxin insufficiency test conducted by means of tryptophane loads, 22 of these children were subjected to pyridoxin insufficiency; a negative test was made with 21 of the children. Administered were 300 mg (600) daily for several weeks. In a group of 21 children who were not free from seizures during the experiment, the seizures were reduced in 7 instances, and increased in 13 instances.

According to DIEMATH pyrithioxin effects can be noticed after 4–6 minutes in the electroencephalogram, but they remain confined to the depth branches and are reversible in a few minutes.

Precisely these seemingly contradictory results in seizure conditions and the effects on the electroencephalogram suggest that pyrithioxin is a substance which acts on the neuron specifically and in a highly efficient manner. The mechanism of action is most probably of complex nature; the increase in membrane permeability is probably only at the beginning of the metabolic chain; only on account of this it is possible to improve the cytoplasm metabolism. Since the initial substance, Vitamin B_6 attacks at 6 different points the trypto-

phane-serotonine metabolism, the B_6 derivative pyrithioxin could play a similar role. The positive action in hypodynamic disturbances (Down's syndrome, hypotonic cerebral paralysis, impulse insufficiency), on the one hand, and an increased effect in hyperdynamic conditions, on the other, suggest a pharmacodynamic emphasis in this metabolic chain.

Piracetam (Nootrop®, Normabrain®)

This is a derivative of the *gamma aminobutyric acid* to which an improvement of the synapsic function is attributed. In animal experiments it was possible to shorten the hypoxic recovery times, to prevent hypoxy-contingent cancellations of short-time memory, and to improve learning effects. In the clinical field various authors observed impulse increases and depression-reducing effects (KANOWSKI1975). My own observations among more than 1000 children suffering from cerebral retardation extended over 10 years; they were made in a nonsystematic examination series and gave some enlightenment on the effects and limitations of application. The incorporation of piracetam in the therapy for hypodynamic cerebral paralyses and mongolism is probably advantageous between the second half-year of life and the end of the second year. Symptoms such as slowness, poor initiative, weak power of concentration can also be influenced in a positive way among older children. On the other hand, hyperactive erethitic children can respond already under lower dosages (1/4 measuring spoon, 100–200 mg daily) with increased restlessness and excitement; even with a onetime administration in the morning it may be possible that sleeplessness will occur. With the single individual these oberservations can be reproduced by several starts of administration and discontinuation, so they have practical significance.

The indicative range of this surely interesting substance deserves to be given a better analysis.

Centrophenoxin (Helfergin®)

This is a synthesis product from an aminoalcohol and p-chlorphenoxy-acetic acid. In animal experiments the influence on cell respiration and glucose metabolism has been established (K. NANDY). Without changing pulse frequency and blood pressure, an increase in spontaneous activity has been achieved in animals. The lipofuscin formation, a morphological expression of the aging process in the cytoplasm of the neurons, seems to be delayed by centrophenoxin. The ability to learn and to remember were increased and the life of C47BL/6-mice was prolonged (K. NANDY, 1977). Lipofuscin is considered a degeneration product of the mitochondriae (P. GLEES 1977), the intracellular digestion of which is more difficult for older cells than young ones. S. RIGA and D. RIGA (1977) attribute even a lipofuscinolytic action to centrophenoxin. RODEMANN and BAYREUTHER(1977) registered, under specific experimental conditions, a significant increase in the metabolism of glial-cells in humans. Contingent upon dosage and duration, centrophenoxin activates the pentosephosphat-cycle (making ribose-5-phosphate available for the nucleotide and nucleic acid synthesis) and influences the transport of specific nucleic acids from the cell nucleus into the cytoplasm (K. KANIG, 1977). S. HOYER and K. KENDEL as well as R. COIRAULT have pointed out the increases in cerebral insufficiency circulation.

In the clinical field influences of centrophenoxin were ascertained on the aging process (J. BÖGER, 1977), by way

of flicker-photometric examinations; it had also influence on children with learning difficulties and legasthenia (PERET, WEHRLI and HAFEN, 1977). According to HOYER, a significant increase is achieved by centrophenoxin among children suffering from a pathologically reduced brain circulation. This lets us visualize effects with the organic psychotic syndrome to be within reach. In the treatment of mongolism HAUBOLD included Helfergin in the basic therapy, probably with the idea of delaying a premature aging process and increasing the neuron metabolism.

Actihaemyl

This is a haemodialysate from the blood of young calves; is contains approximately 30% organic compounds and about 40–45 mg/ml dry substance. The organic share contains amino-acids, nucleic acid components, low-molecular peptides and substances of the intermediary metabolism – glucose, acetate, lactate, hormones.

An improvement of transport mechanisms of oxygen and glucose, a stimulation of the cell metabolism and of the cell regeneration are attributed to actihaemyl. In particular, it is said to have the following effects on the cellular metabolism, inclusive of the neurons:

Increase in activity of key enzymes of the respiratory chain.
Increase of the intracellular stock of energy-rich phosphates;
Diminution of pathologically increased lactate and pyruvate values;
Increase of the oxygen transport to the cell;
Increase of the glucose transport.

Actihaemyl is a biological medicine free from side-effects; it may be administered at a dosage of 100–300 mg daily the oral way. Under seriously traumatic and apallic conditions of the brain, the dosage administered may be up to 1000 mg a day parenterally.

Nicotinic-acid derivatives

Nicotinic acid compounds lead to a relatively speedy improvement of the blood circulation at the peripheries. Whereas the improvement in circulation in the central nervous system is problematic, distinctive pharmacological effects on the central nervous system have been secured with regard to nicotinic acid amides.

Niamid® = 1-/2-benzylcarbamylethyl 1/2-isonicotinoylhydrazin is an effective monoamino-oxydase inhibitor with remarkable metabolic and psychotherapeutic effects. As part of the basic therapy of mongoloid children and in other hypodynamic symptoms of mentally retarded children it is possible to improve the psychomotoric activity, social contact and emotional control.

Similar effects can be expected from the following preparations: Hämovanad® (= Inositolnicotinate) and Nicoacid® (= sodium nicotinate), Progresin fortard® (= Mg-nicotinate), Nicoplectal (= 50 mg of nicotinic acid + 200 mg of buckeye extract).

L-Dopa

A favourable effect on certain cases of dyskinetic cerebral paresis, besides an influence on Parkinson's disease, is ascribed to L-Dopa (Nacon®) (SIEVERS, 1980)

Membrane Activators

These are substances and biocatalytic combinations intended to improve the functioning of the cytomembranes. Membrane disturbances play their part in numerous congenital disorders of the metabolism and in the aging process of the tissue. Following are the areas of indication:

a) Physiological and premature aging processes;
b) innate metabolic disturbances caused by the membranes;
c) Down's syndrome (basic treatment);
d) Hypothyreosis-athyreosis.

The function of the membrane activator is not confined to supplying intracellularly lacking or reduced substances; it also creates the premises for transmembral movement. Numerous preparations and combinations of vitamins, trace elements and biocatalysators increasing the blood circulation aim at this effect.

Long years of practical experience with various individual constituents have resulted in a biocatalytic combination which is available as *Membravit®*; it contains 3 magnesium compounds, zinc, iodized common salt of Tölz compound, vitamins B1, B2, B6 and tryptophane. The substitutes magnesium and zinc activate the DNS and membrane metabolism in connection with asparagin and orotic acid. The B-vitamins catalyze numerous enzymatic processes, for which magnesium and zinc are essential co-enzymes. After all, the metabolic chain of tryptophane to serotonin can only function if tryptophane is offered to a sufficiently great extent and is also transported into the cell.

Biological Therapy

Decisive progress in the treatment of mental development disturbances was achieved in the last 20 years by the introduction of the so-called cell- and enzyme therapy into the therapeutic concept. The offer of fetal cell suspensions serves to maturate secondary structures of the central nervous system – dendrites, neurites, medullary sheaths, synapses. Naturally, nonexisting cells cannot be replaced. This «Brick-component» therapy in the form of lyophylised fetal cerebral tissue, i. e. the offer of substrates, is supported by the stimulation of the incorporation, namely enzyme therapy. Whereas substrate preparations are available in sufficient differentiation, the availability of enzyme preparations is still fragmentary. The possibilities and limitations of both therapy methods which complement each other, will be briefly described hereafter.

Injection Implantations (Cell therapy)

The following process is initiated by deeply subcutaneous (epifascial) injection of cell and tissue suspensions of xenogenic fetal cerebral regions, in the organism of the recipient:

1. The fetal heterological donor material contains a high concentration of organ-specific substrates and enzymes which is characteristic of rapidly growing embryonal and fetal tissues.
2. The injected suspended tissue material is dissolved like a net within two hours in an animal experiment intraperitoneally, decomposed and attached to the microphage membranes as tissue particles; a leukocytosis develops in the peripheral blood picture.
3. The complex of microphages (= polynuclear) + tissue particles is subject to a phagocytosis during the following hours, through macrophages (monocytes, histiocytes); in a kind of « microphage battle» the complexes are intracellularly decomposed in the macrophages. The process is completed after 48 hours to such an extent that optically no

Symptom	CENTER OF LESION	*recommended cell suspensions for implantation*
Intelligence normal		
Debility (iQ 80-50)		*cortex, hemisphere, frontal-, temporal-,*
Imbecility (iQ 50-20)		*parietal-, occipital brain*
Idiocy (iQ ander 20)		*according to cause and conc. symptoms*
normocephalic		
macrocephalic		
microcephalic	CEREBRAL CORTEX	
Monoplegia	CEREBRAL	
Diplegia spast.	HEMISPHERE	*cortex, hemisphere, frontal-, temporal-,*
Hemiplegia limp.		*parietal-, occipital brain*
Triplegia		*possibly diencephalon spinal medulla*
Tetraplegia		*according to cause and symptoms*
Contractures		
Rigor		
Muscle-Hypertonia		
Muscle-Hypotonia		*mesencephalon, occipital brain, Medulla oblong.*
Dystonia (alternat. Tonus)		*mesencephalon, occipital brain, Diencephalon*
Convulsions		*Petit-mal: mesencephalon, Medulla oblong., Thalamus, cerebellum*
Hyperkinesia		*Grand-mal: cortex or sections*
Coordination-Discorders		*cerebellum, basal ganglis, Diencephalon, cortex*
Tremor		*basal ganglia, Diencephalon, cortex*
Chorea	BASAL GANGLIA	*diencephalon, basal ganglia, temporal brain*
Athetosis		*frontal brain, basal ganglia, temporal brain*
Restlessnes	DIENCEPHALON	*diencephalon, basal ganglia, temporal brain*
Eretism		*Thalamus, basal ganglia, temporal brain*
Autism	HYPOTHALAMUS	*Hypothalamus, diencephalon, frontal brain, hemisphere*
extrapyramidal Symptoms		*basal ganglia, diencephalon, mesencephalon*
Initiative-Disorder		*frontal brain, diencephalon*
Concentration-Weakness		*thalamus, diencephalon, cortical areas*
Emotional Incontinentia		*Hypothalamus, diencephalon, cortex*
Perseveration		*diencephalon, cortex*
Legasthenia		*hypothalamus, diencephalon, cortex*
Polydipsia		*diencephalon, hypothalamus, hypophysis*
Polyphagia		*diencephalon, hypothalamus, hypophysis*
Hypertrichosis		*diencephalon, hypothalamus, mesencephalon*
Vegetative Disorders		*mesencephalon, Medulla oblong., diencephalon*
Trophic disorders		*mesencephalon, Medulla oblong., diencephalon*
Lability of temperature		*mesencephalon, Medulla oblong., diencephalon*
Hypersensibity	MESENCEPHALON	*mesencephalon, Medulla oblong., parietal brain*
Hyposensibility		*mesencephalon, Medulla oblong., parietal brain*
Hyperhydrosis	MEDULLA OBLONG.	*mesencephalon, Medulla oblong., diencephalon*
Anhydrosis		*mesencephalon, Medulla oblong., diencephalon*
Ataxia	CEREBELLUM	*Cerebellum, diencephalon, frontal brain, basal ganglia*
Strabism		
Eye-Paresis	VISUAL DUCTS	*diencephalon, thalamus, occipital brain*
Nystagmus		
Reduced Visual-Capacity	OCCIPITAL BRAIN	
Amaurosis	EYE	*optic nerve, retina, lens*
Reduced Hearing-Capacity	HEARING DUCTS	*diencephalon, mesencephalon*
Deafness	TEMPORAL BRAIN	*temporal brain, occipital brain*
Dyslalia	EAR	
Swallow-Discorder		*basal ganglia, Medulla oblong., mesencephalon*

The most frequent symptoms of cerebral damages in early infancy have been classified roughly according to their o ligin in the central nervous system.

Fig. 262: Symptomatological implantation therapy.

foreign particles are any longer identifiable.

4. The intracellular digestion of the phagocytised complexes of microphages + donor tissue takes place in intracellular digestive cisterns (vacuoles). The main mass of the ingested tissues disappears rapidly from the digestive cisterns; remnants of the complex of microphage membrane + donor tissue particles are identifiable for a relatively long time (48 hours).
5. The bulk of donor material is rapidly moved away and utilized. Vital storage and radioactive taggings concordantly show the removal within the first 6 hours after implantation; the main contingent is moved away within the first hour.
6. Whereas the bulk of the donor material is handed over to the metabolic passages of the recipient (utilization), the smaller remaining complex of microphage membrane + donor tissue particles may have an immunogenic effect. This applies primarily to connective tissue structures (glia, mesenchyme).
7. Two premises are vital for the incorporation:
   a) There must be a need in the corresponding organ of the recipient (defect, illness, insufficiency).
   b) For the incorporation the biochemical components must have the corresponding organ-specific structure.
8. The incorporation can take place in accordance with the needs of the recipient by various dimensions; experimental evidence available ranges from oligopeptides to (heterological) macromolecules (immunoglobulin M).
9. The advantage of implantations by injection as against conventional transplantation techniques is as follows:
   a) the implanted tissues are not dependent on blood supply in the recipient; they do not suffer any structural changes on account of degeneration as a result of a lacking blood supply and anoxaemia.
   b) the implantation technique reaches organs inaccessible to conventional transplantations (e.g. brain, liver, pancreas, endocrine glands, thymus and others).
   c) the implantation technique alone can supply substantial quantities of biochemical substrates and enzymes of fetal tissues.
10. The clinical effect of the implantations by injection sets in during the third week after implantation in measurable way; it extends to 4 months up to two years, depending upon age, organ and basic illness.

In some organs (placenta, liver, suprarenal gland) a short immediate effect can be seen within minutes to hours after implantation.

Selection of implantation-tissue

In the case of disturbances of the central nervous system, the organ (= brain region) is selected by symtoms or symptomatological localisations. Fig. 262 provides a guiding survey for practical application.

The following principles used for implantation treatment have resulted from so far 70000 implantations on handicapped infants, children and youngsters:

A) The therapeutic expectations are the greater the earlier treatment is start-

Age	STATO-MOTORIC	FINE MOTORIC, COORDINATION	DRINKING, EATING, LANGUAGE, COMPREHENSION OF LANGUAGE
14			
13			
12			
11		uses knife for cutting	data learned «auditively» are utilized
10		copies geometric figures	repeats sentence of 20 syllables
		writes skilfully and fast	interprets material which was read or seen
9			spontaneous statem. w. compl. sentences
		catches flying ball	repeats sentence with 16 syllables
8		draws variety of people	picture stories are interpreted
	rides a bicycle		sentence constr. stabilized; future tense
7	Jumps at least 3 feet wide, 1 foot high		reads short text
6½	walks backward on toes	ties bows, shoestrings	retelling possible
		throws ball further than 3 y	learns characters
6	Roller-skating	draws 6-part man	
		eats with knife and fork	
5½	goes forward on toes	copies square	
		uses knife for cutting bread	repeats sentence of 10 syllables
5	uses a swing by him(her)self safely	draws 3-part man	learns simple verses
			puns; creates own words
4½	climbs ladder	catches bouncing ball	
			asks for meaning («why»)
			repeats sentence of 8 syllables
4	jumps on one leg	able to button	uses names and surnames
		safe sequence of movements	uses childrens' songs
		threads perls on to string	asks «why?», «how?»
3½	goes down stairs	catches rolling ball	uses «J»-form
		copies round shapes	vocabulary more than 200 words
	drives on tricycle or quadricycle		repeats sentence of 6 syllables
3	jumps with two legs	puts shapes into the proper holes	uses plural
			forms sentences of 3 words
		builds tower with 4 bricks	asks «where?», «who?», «what?»
2½	goes up stairs with-out holding to railing	builds bridge of 3 parts	asks about names and things
			eats by him(her)self
	stable balance		
2		scribbles upon his(her) own initiative	forms «sentences» of 2 words
	pushes ball with foot	uses spoon safely	eats «normal» food
	goes up stairs while holding on to railing	able to decant liquids	points to named parts of the body
			uses 2–8 words
1½	goes also backward	uses spoon, insecure	imitates noises
	walks without help	builds tower from 2 parts	repeats simple words
	walks with support		reacts to simple request
	stands freely	grips with thumb and index finger	chews; takes coarse food
1	stands with support	handles building blocks	says «Mom» specificly to mother
	crawls forward and backward	points with hand or finger	drinks from cup
	creeps forward	reaches for, holds toy; cannot let it go	
9/12	sits without aid for a long time	grabs threads	says «Mom», undirected
	sits for a short while without aid	able to hold two toys	bites off biscuit
	supports him(her)self on hands	changes toys from one hand to the other	
6/12	lets him(her)self be pulled up for sitting	turns toy between hands	forms syllable chains
	turns body from dorsal to abdominal pos.	targeted individual movements	laughs sonantly
	supports him(her)self on arms	tries to grab toys	takes pap from spoon
3/12	holds head upright for at least 30 seconds	holds rattle in hand	squeaks, chatting
	holds head upright for at least 5 seconds	untargeted complex movements	screaming stage
	turns head to side		

Name, Surname: Birth date:

Fig 263: Developmental Analysis.

SOCIAL DEVELOPMENT	INTELLECT. PERFORMANCE; IDENTIFICATION; UTILIZATION; COMBINATION	SPECIAL DATA ON INDIVIDUAL DEVELOPMENT	Age
is able to exercise self-criticism	explains terms		14
criticizes others	repeats 6 figures		13
discovers its own «self»	indicates the opposite		12
	interest in legends, technics		11
ancious to have pals	masters figures up to 100		10
team games	recognizes nonsensicalness		
thinking in terms of rank	explains pictures		9
	identifies shapes in the maze of signs		
	describes a picture		8
efforts to perform are identifiable	repeats 4 figures		
is conscious of his(her) duty	distinguishes between right and left		7
ties bows, laces			6½
	interest in fairytales		6
constructive common games	knows all basic colours		
combs his (her) hair	recognizes shortcomings, deficiencies		5½
strong feeling for family	knows meaning of «1–4»		
sex-specific game	has scale for sizes and quantities		5
makes friends	names 3 colours		
cleans teeth	relates experiences		
first signs of competitive feeling	constant memory		4½
observes rules of game	knows meaning of figure 3		4
is dependable, clean and dry			
	brings 3 objects upon request		
	knows 3 basic colours		3½
able to dress and undress	repeats 3 figures		
able to dress of			
goes to the bath-room by him(Her)self	distinguishes between front and back		3
plays with other children	recites simple nursery rhymes		
plays for a long time	assigns the proper colours to each other		
wants to do a lot by him(her)self	recognition stays for months		
plays games with assigned parts	repeats 2 figures		2½
	differentiates between «a lot» and «a little»		
reacts logically to situation	matches simple figures		
dry during the day	differentiates «round», «square»		2
expresses wishes			
is potty trained (stool)	differentiates «top», «bottom»		
	differentiates «large», «small»		
follows simple commands			1½
gives toys up	reacts to names		
rolls ball to the mother	points to familiar objects		
calls, when wet	recognition lasts 2 weeks		
resistance, when mother leaves	understands simple words		1
waves «bye, bye»	reacts to light colors	The data are so timed, that 90% of children with normal development are capable of these functions. The aproximate logarithmic orientation symbolises rate (tempo) of development. Developmental manquos are immediatly visible. The time of testing will be signed by a (colored) horizontal line. The criteria below this line are noted in the same color in the squares to the right.	
fetches toys			9/12
helpes to hold cup	recognition lasts hours		
recognises people as unfamiliar	turns head to sources of noises		
imitates simple movements	differentiates kind and stem voices		6/12
shows contact-pleasure	listens to music		
interest for toys	looks to toys, when removed		
answers smile by smiling	follows light	■ total ability ⊡ unsure □ inability	3/12
visual contact with mother	reacts to noises		

ed, that is the earlier the evident growth phase of the human brain is utilized, (the first 4 years of life).

B) Implantations by injection should always be incorporated into an wholistic medical concept of medicamentous, pedagogical and training methods.

C) Implantations should be continued as long as substantiated progress can be registered.

Special Indications

The effect of «cell therapy» depends on the basic condition, age and the wholistic therapeutic concept. The following possibilities and limitations result for various disturbances of the central nervous system:

Congenital Metabolic Disorders

They represent a highly diversified field of more than hundred, partly very rare, illnesses. As a rule, enzyme defects are at the base of these diseases of the metabolism; before the enzymatic step, substrates are dammed up and tissues damaged. Tissues with a high degree of metabolic turnover such as liver, brain, cardiac muscle, are affected usually more frequently and more seriously than tissues having a smaller metabolic turnover. Tab. 31 gives a survey of the important innate metabolic disturbances.

Up to this day it has not been possible to make special recommendations for the application of implantations by injection for innate disturbances of the metabolism because only individual observations relating to rather few disturbances of the metabolism have become known.

The following tissues seem to occupy a central position in implantation therapy: liver, mesenchyme, suprarenal gland, placenta.

With innate or acquired immuno-deficiency (antibody deficiency, syndromes) the use of thymus, bone marrow, liver and mesenchyme is recommended.

Infantile Cerebral Paresis

A classification of the types and subdivisions of infantile paresis can be seen from Tab. 35.

The age limit of the 4th year of life is particularly important for the use of cell therapy in the case of a cerebral paresis. The later cell therapy is applied in addition to the other methods in the first 4 years, the lesser the success will be.

The following is worth mentioning with regard to the various types: In spastic types, a spastic condition fixed once and not influenceable to a noteworthy extent by gymnastics, cannot be influenced by cell therapy methods beyond the 4th year of life. What can be done is to improve the biological overall condition of the children and the mental functional capacity. Compared with this relatively small responsiveness in the cases of fixed spastic types, effects can be achieved with the dyskinetic forms (choreoathetosis) and the atactic forms up to the time beyond the first decade of life though they are smaller than in earlier stages of life.

For the *spastic forms* the following materials are used: cerebral cortex preparations, cerebrum hemisphere, thalamus, midbrain, cerebellum, spinal marrow.

For the *dyskinetic forms* the emphasis of therapeutic application is on the diencephalon, basal ganglia, hypothalamus, thalamus, temporal brain, and cerebellum.

For the *hypotonic types* of infantile cerebral paresis,mainly fetal spinal mar-

row, occipital brain, cerebellum and midbrain should be used.

Atactic types originating, in the cerebellum or in the spinal marrow should primarily be treated with spinal marrow, cerebellum, midbrain and, possibly, occipital brain.

Heredo-degenerative conditions of the central nervous system present a diversified field of rare types of diseases which, up to this day the therapeutic experiences and observation-times are limited (see special chapter).

The application of fetal cerebral tissue in previous years has shown that no effects on a progressive development or even a healing process in these diseases can be achieved; on the contrary, in individual instances fever reactions developed after implantation. This was proof that also fetal tissue is not tolerated well with most of these degenerative conditions, which, in part, are combined with an autoimmunisation process.

Only the administration of fetal liver, placenta, suprarenal glands, in connection with a subsequent specific enzyme therapy, has opened up trends promising for the future, even if a binding judgment of the final value cannot yet be passed. Considering the otherwise usually poor prognoses and the inescapable progressive development it is recommended, however, to try this therapy.

Enzyme Therapy

Enzymes are synthesis products of the cell organelles; as to their action they are catalytically active proteins. Numerous enzymes are made available to the organism of the recipient through the injection implantations of fetal tissues applied to specific organs. Unlike biochemical substrates, however, their action is only short, because they are rapidly utilized and transformed. According to the logical consequence of this reality it is advisable to maintain the introductory catalysis by a prolonged application of enzyme preparations. Parenterally administered enzymes are governed by the same laws of action as substrates; they penetrate into the cells where they are lacking or are present in reduced quantities; a local need, a cellular insufficiency is the premise for effectiveness. The live cell behaves toward enzymes the same way as toward vitamins, minerals, amino-acids, peptides and other substances.

The selection of enzyme preparations that can be used unter the therapy concepts for mental retardation is still incomplete. The application presents problems.

For many degenerative disorders of the central nervous system digestive enzymes are indicated.

What is available in sugar-coated pill form are the following: *Wobe-enzym-Tabl.®*; as enema tablets: *Wobe-Mugos Klistier-Tabletten®*; as soluble preparations administered subcutaneously or as preparations of Enzypharma in ampoules, which can be administered via the mucous membrane of the mouth. The following preparations among them are of importance for the disturbances of the central nervous system:

Aminosäure-Komplex®

contains ligases of the Amino-Acyl-Ribonucleic acid synthesis.

Coliacron®

suitable for diseases of the neurohormonal system and applicable to hypotonic forms and general weakness of connective tissue; it contains the following active substances:

Symptom	Age / Years: 0	2	4	6	8	10	1	3	6	9	2	3	4	5	6	7	8	9	10	11	12	13	14
Intelligence normal																							
Debility																							
Imbecility																							
Idiocy																							
normocephalic																							
makrocephalic																							
mikrocephalic																							
Monoplegia																							
Diplegia																							
Hemiplegia																							
Triplegia																							
Tetraplegia																							
Contractures																							
Rigor																							
Muscle-Hypertonia																							
Muscle-Hypotonia																							
Dystonia (alternat. Tonus)																							
Convulsions																							
Hyperkinesia																							
Coordination-Disorders																							
Tremor																							
Chorea																							
Athetosis																							
Restlessnes																							
Eretism																							
Autism																							
extrapyramidal Symptoms																							
Initiative-Disorder																							
Concentration-Weakness																							
Emotional Incontinentia																							
Perseveration																							
Legasthenia																							
Polydipsia																							
Polyphagia																							
Hypertrichosis																							
Vegetative Disorders																							
Trophic Disorders																							
Lability of temperature																							
Hypersensibity																							
Hyposensibility																							
Hyperhydrosis																							
Anhydrosis																							
Ataxia																							
Strabism																							
Eye-Paresis																							
Nystagmus																							
Reduced Visual-Capacity																							
Amaurosis																							
Reduced Hearing-Capacity																							
Deafness																							
Dyslalia																							
Swallow-Disorder																							

For use: Symptome complete ■ partial ☒ abortive ⊡

Fig. 264: Documentation of the neurological symptoms.

(i. u. = international units)

Succinate-dehydrogenase	8 i. u.
NAD-kinase	8 i. u.
Acetyl-CoA-synthetase	6 i. u.
Glutamin synthetase	6 i. u.

Rheumajecta®

for mesenchymal metabolic disorders
contains:

Sulfate-adenyl-transferase	2 i. u.
Chondroitin-sulfo-transferase	2 i. u.
Cholinacetyl transferase	$3\frac{1}{2}$ i. u.
Katalyse: hydrogenperoxyde-oxydo-reductase	$6\frac{2}{3}$ i. u.

Oculucidon®

for building up mucopolysaccharides, usable for mucopolysaccharidoses and eye conditions
contains:

Hexokinase	6 i. u.
Glucosamin-kinase	6 i. u.
Glucosamin-acetyl transferase	2 i. u.
Sulfate-adenyl transferase	50 i. u.
Chondroitin sulfo-transferase	50 i. u.

Hydrolysates

The biological components for diseases of the central nervous system are supplemented by hydrolysates. Here the most comprehensive experience pertains to the raising of prematurely born children, the apallic syndrome and psychic diseases treated with the preparation Cerebrolysin®. This preparation may be used for injection and for permanent infusions.

Ultrafiltrates

Cell-free ultrafiltrates as oral preparations are used

as brainfiltrates for brain disorders
as liver-placenta-pancreas-intestine filtrates for degenerative disorders of the central nervous system, muscles and metabolic diseases,
as cartilage-bone filtrates for innate and degenerative bone diseases,
as thymus-spleen filtrates for immundeficiencies.

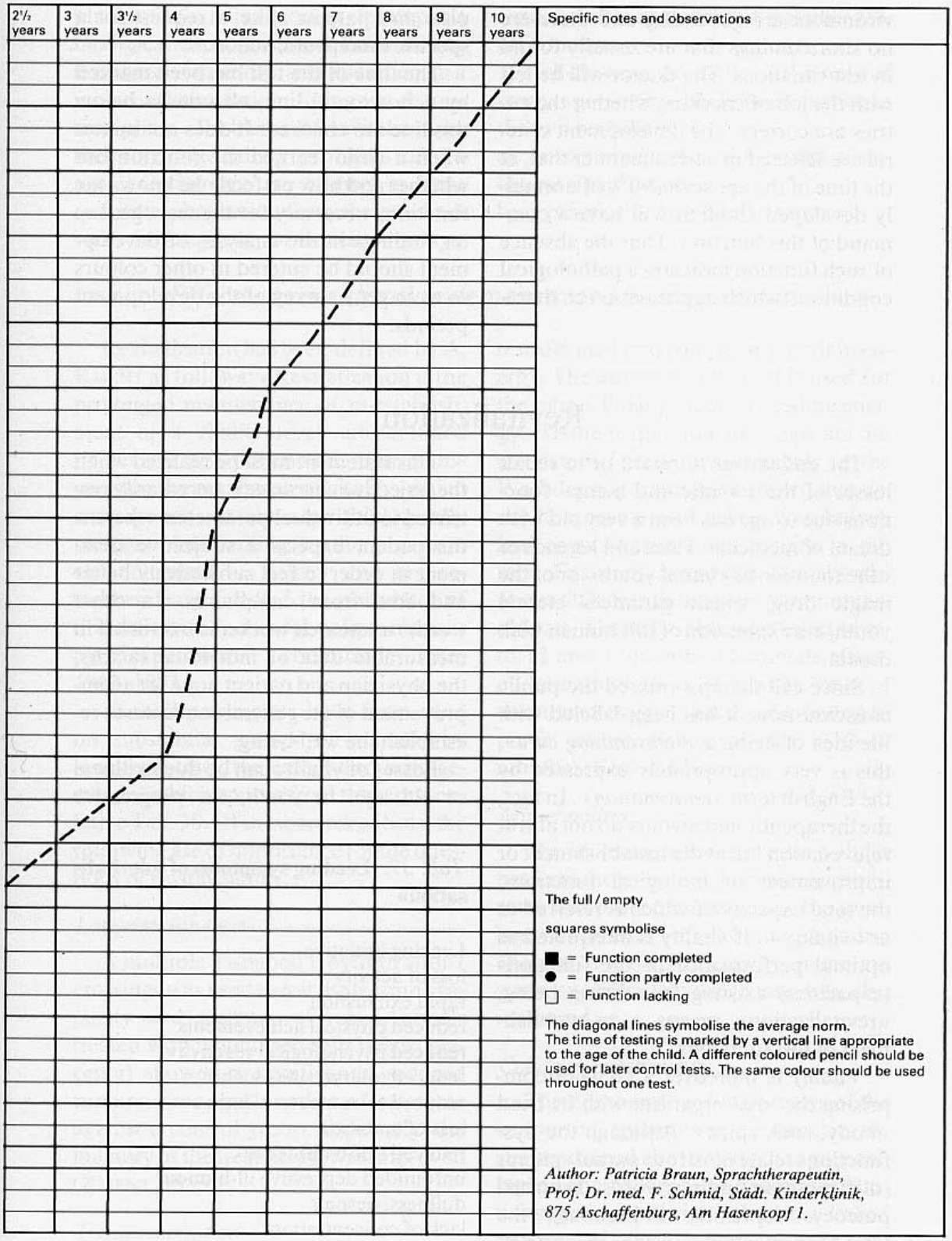
Documentation and Control of Development

With disease patterns which, as is the case with mental and multiple handicaps, are so diversified in terms of development and symptomatology, a comprehensive documentation on the findings made (examples of neurological symptoms see fig. 264, Tab. 24, 36) is as important as a detailed control of the development of the condition. Suitable for this are the clinical and technical data listed in the section «Diagnostic Requirements», also the development and intelligence tests enumerated there, provided they were conducted with a good knowledge of the subject-matter and interpreted within the limitations of their indicativeness; and the determination of the various development age groups according to HELLBRÜGGE; naturally also a verbal report of oberservations.

Documentation on findings and checks of development have been rendered most comprehensively in the foregoing pages (fig. 263). The vertical half-logarithmic principle symbolizes developmental progress which slows down with increasing age. The criteria selected are taken from steps of development observed in actual practice; they take into account practical capacities and to a great extent avoid abstract areas. Since the formulations are kept intelligible, parents and medical assistants can complete the development analyses and check the course of a disease. This way the observations made in the natural en-

Tab. 36: **Speech-Development and progress control.**

Age	Examination criteria	3 months	6 months	9 months	1 year	1½ years	2 years
10 years	Further development of memory span						
	Detailed interpretation of events (of the written / read)						
	Development of the word and script						
9 years	Interprets symbols and their meaning						
	Completion of abstract thought						
	Recognition of illogicalities						
8 years	Grammatical development in both word and script						
	Concentration span: 30 minutes uninterrupted						
	Memory span: repeats four numbers (1–10)						
7 years	Vocabulary and sentence construction with full grammatical structure						
	Development of concentration span						
	Development of memory span						
	Speech comprehension expanded						
6 years	Logical interpretation of a story						
	Stabilisation of sentence construction						
	Visual and acoustic interpretation of the seen and heard						
5 years	Stabilisation of articulation						
	Simple sentence construction (beginning)						
	Names forms – colours reliably						
	Visual interpretation of a picture sequence						
	Comprehension of time						
	Reliable form – colour identification						
4 years	Vocabulary of 190–200 words						
	Sentence construction of 5–6 words						
	Logical formation of statements, use of adjectives						
	Faulty articulation						
	Names three to four colours						
	Names 3–4 forms						
	Memory: Nursery-rhymes and stories						
	Comprehends 3–4 commands						
	Identifies colours						
	Identifies forms						
	Understands quantities						
3½ years	Verbal formulation of plans						
	Comprehends constructive toys						
3 years	Understands 2–3 part commands						
	Articulation faulty						
2½ years	Asks questions «where» and «who»						
	Uses 2–3 word phrases («ball gone», «door shut»)						
2 years	Reacts logically to situation (fetches pegs when M. hangs washing out)						
1½ years	20 words with meaning						
	Completes sentence (pat a . . .)						
	Imitates simple words						
	Understands simple commands						
	Imitates of noises, sounds and games (peek a boo)						
1 year	Says mommy and daddy with meaning						
	Simple word comprehension (come, no)						
	Immitation of movements						
	Reaction to own name						
9 months	Combination: Sounds and gestures indicating wishes						
	Babbles sounds, incorporating high and low intonation						
6 months	Localisation of voices and noises						
3 months	Babble noises						
	Awareness of voices and facial expressions						
	Crying and cooing						


2½ years
3 years
3½ years
4 years
5 years
6 years
7 years
8 years
9 years
10 years
Specific notes and observations
The full / empty
squares symbolise
■ = Function completed
● = Function partly completed
□ = Function lacking
The diagonal lines symbolise the average norm.
The time of testing is marked by a vertical line appropriate to the age of the child. A different coloured pencil should be used for later control tests. The same colour should be used throughout one test.
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vironment are governing and there are no shortcomings that are usually found in test situations. The doctor will be left with the job of checking whether the entries are correct. The development criteria are selected in such a manner that, at the time of the age scale, 90% of normally developed children will have a command of this function. Thus the absence of such function indicates a pathological condition, which represents, for therapists and parents alike, a request for a specific therapeutic action.

The time of the test has been marked by a horizontal line, all criteria below this line are checked. It does not matter when a child learned the function but whether and how perfectly he knows the functions necessary for the test age. Later findings in the analyses of development should be entered in other colours so as to get a survey of the development periods.