

## Integrated Mental Training and Psychosomatic Health

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## Integrated Mental Training and Psychosomatic Health

*One particular aim of integrated mental training which has been actively developed over the last few years (Unestahl L.-E. et al, 1993; Gissen L., 1990; Bundzen P., 1995) is the matter of increasing stress tolerance as basic mechanism of psychosomatic health.*

*It has been established that stress can promote the development of pathology in any organ or system, especially in the case of genetically predisposed diseases. However, the majority of authors maintain that irrespective of that kind of stress, the central nervous system as well as the cardio-vascular and immune system are basic stress targets in the human organism (Baeva E., Babare G. 1987; Federov B., 1990; Furuduj F., 1990; Nagata S., 1993).*

*An analysis of the information available via literature requires us, at the same time, to assert to date, the psycho-physiological and neuro-biochemical mechanisms involved in correcting pathological reactions induced by systemic stress are not sufficiently known (Aivasjan T., 1989; Johnson E., 1992). The latter can, however, be regarded as health promotion effect of mental relaxation (MR) which makes up the psychological base for Integrated Mental Training.*

*The above provides the grounds for studying the mechanisms of the stress limiting effect of MR, a major component of mental training.*

### **The investigation included:**

1. Analysis for singular as well as the systematic influence of MR on the organism's basic stress targets.
2. Study of neuro-biochemical and immunological mechanisms of MR's stress limiting and health promoting effects.
3. Comparison of MR's ability to provide a stress limiting influence under conditions A) acute (experimental) stress b) chronic vital stress.

### **Materials and Methods**

The 90 students taking part in this study were 18-22 yrs. of age and attended The Military Institute of Physical culture and other centers of higher learning in St. Petersburg.

Programs used by the subjects were the Russian version of the Swedish mental training model as well as the experimental program, "Introduction of an Alternative State of Consciousness" ( Bundzen,P., with co-auth., 1994). which has been certified by the Sports Federation of Russia.

Two series of experiments were carried out in order to pursue the aims of this study. In the first series, the effects of one single application of the MR program were studied, where the subjects from the basic group (BG) listened to the program from a reclining position, using ear-phones. The effect of this was studied by using the POMS test (McNair, 1992) which provides an evaluation of psycho-emotional status, the Luscher test and the Spielberger-Khanin Scale of Relative Anxiety as well as by registering the changes observed in the differences of quasi DC potential.

The dynamic state of cardio-vascular system (CVS) in the acute series was studied by measuring pulse rate, arterial pressure, and ECG dynamics in 12 standard nodes.

In addition, the first series of experiments included the Cold-Ischemic Test (CIT) (Janal M., 1984) which provided an acute stress situation. This included submerging the hand into icy water while at the same time applying a tourniquet to the human artery until the pulse disappeared. That moment established the time point for the appearance of pain sensations (TAPS)

The biomechanical study included determining cortisol levels in the subjects' blood serum (B) via the radio-immunological method as well as determining the level of fat-free acids (FFA) in the subjects' blood serum via the photo-calometrical method.

The control group (CG, n=10) listened to calming background music of the MR program. Otherwise, the conditions carried out in the investigations were in every way analogous to those already described.

In the second series, the BG participants (military students, n=28) engaged in daily mental training for total of 6 weeks - 4 for the basic course and 2 for either the 'cheerfulnedd' or 'activity' program. The last two weeks of the course coincided with end-of-the-term exams. The CG (n=20) took part in the school curriculum as usual. During the study, the influence of mental training on psycho-emotional status was determined via the Luscher Test and the POMS Test. Immunological status in the sub-groups of those often suffering from illness was tested by determining the level of immunoglobulins A, G and M in the blood serum via Manchin's method (1965) and also by determining the state of cellular immunity via the Mendes method (1973). As the result of discussions on the immunological status data, some methodological recommendations from the Pasteur Institute of Immunology and Microbiology in St Petersburg were taken into consideration.

Concomitantly, measurements of beta-endorphin (BEN) levels in the subjects' blood serum were taken by means of the radio-immunological method and ECG alterations were registered in 12 standard nodes.

The resulting data was processed using non-parammetrical statistical methods ie. criterion of signs, the exact Fischer method and the student criterion.

## Results and Discussion

### 1. Estimation of MR Influence on the state of the Nervous System.

While listening to the audio program, 30 o 32 students showed similar omega-potential activity. At the left sided standars node, there was a smooth reduction of omega-potential from diapason 27-32 mB to diapason 15-20 mB ( $p<0.005$ ), accompanied by a return to initial values after the program's conclusion ( $p<0.005$ ).

Similar activity was also observed at the right-sided standard node ( $p<0.01$ ). However; if the initial potential was higher at the left-sided standard node, it was also higher on the left while listening ( $p<0.05$ ). No changes of omega-potential activity observed in the CG.

Given one single induction of MR in the BG, a considerable reduction was observed in levels of anxiety ( $p<0.01$ ), depression ( $p<0.01$ ) and fatigue ( $p<0.01$ ). Strength for psychic processes increased ( $p<0.01$ ) and the total index showing psycho-emotional status was improved ( $p<0.001$ ). This data concurred with the reduction of anxiety levels by using the Spielberger-Khanin Scale ( $p<0.05$ ). There was also some improvements of psychological indices observed in the CG but in most cases these lacked reliability. By comparison, the effect in the BG ( $<0.05$ ) is more significant than in the CG. During the systematic use of mental training lessons, the POMS thest shows results that are on the whole, analogous, although somewhat less noticeable, while a tendency toward increasing anxiety and fatigue was observed in the CG.

Carrying out the CIT under influence of MR, participants showed a reliable increase of TAPS. 28 cases out of 30 showed increases - in 16 cases, an increase of more that 50% over the initial state and in 4 cases, no pain sensation occurred up until the end of the program. In the CG a reduction was observed in 6 cases and in 4 cases there was an increase of TAPS (not more that 10% above the initial atate). The reliability of indifference between the groups is  $p<0.001$ .

These findings indicates a functinal reconstruction in the activity of the central nevous system in persons engaged in MR. The reduction of pain sensation and the improvement of mood can be associated with increases in the activity of the cerebral opoid system. This is corroborated by tha sata produced by Tomas abd Turner (1990) who observed the disappearance of the sense of joy in persons practising ralaxation after receiving naloxon.

## 2. Dynamics of Biomechanical Indices Under the Influence of MR

At the commencement of MR in the experimental group, there was 15-20% reduction (compared with initial levels) in the levels of cortisol ( $p < 0.005$ ) and FFA ( $p < 0.01$ ) while the changes observed in the control group were not reliable.

After six weeks of MR, an increase of BEN levels could be ascertained where the greatest increase (twice the initial value) was observed in the sub-group involved with the 'cheerfulness' program ( $p < 0.001$ ). Changes in BEN levels were not observed in the CG.

Cortisol and adrenalin (ascertained via FFA content) are basic hormones playing the leading role in the development of stress reactions (Sevye H., 1957; Cox T., 1987). At the same time BEN, as a part of the stress limiting system, restricts excess development in this area (Blalock G., Smith E., 1985; Selvye H., 1989; Zozulja A., 1990; Surkina I. et al, 1995) and prohibits damage from catecholamines and corticosteroids. In the opinion of some authors (Filaretov A. with co-auth., 1993; Rosenblatt M., 1993) the release of endogenic opioid peptides from the cells of the hypophysis provide the fundamental means by which the nervous system exerts its influence on the organism's stress target. The findings concerning the reduction of the level of cortisol in the FFA as well as the findings concerning the increase of BEN levels demonstrate the stress limiting effect of MR. These findings enable us to define exactly the biomechanical mechanisms behind MR's ability to affect the immune and cardio-vascular systems.

## 3. Evaluating the Influence of MR in the CVS State

In the acute test of the BG and CG, a reliably reduced pulse rate was observed ( $p < 0.05$ ). However, in the BG, systolic arterial pressure also decreased in a parallel way ( $p < 0.05$ ). In a few cases in the BG the disappearance of the rhythm migration leader was noted along with some improvement of the repolarization process of the ventricles and of conductivity in the right pedicle.

During the 4 weeks of basic mental training, a military student who suffered from myocardial dystrophy showed a considerable improvement of health in the absence of other medical measures and the ECG reading was also improved showing mainly positive activity with smoothed-out and negative T waves.

The indicated alterations in pulse rate, arterial pressure and ECG readings may be considered to be an index of the reduction of sympathetic influences on the cardio-vascular system and of the level of catecholamines in the peripheral blood supply which is confirmed by the resultant data of the biochemical study. The hormonal alterations described promote a decreasing flow of calcium to the cardiomyocytes (resulting in a reduction of the pacemaker activity of the sinus node) and to some other centers of the myocardium and normalized metabolism (Meerson F., 1984; Fjodorov B., 1990).

## 4. Influences of MR on the State of the Organism's Immune System

In both the BG and CG, 5 subjects stood out as those who often fell ill. From the beginning both groups showed strained cellular immunity (T-cells) combined with reduced IgM in the blood serum. With mental training the BG participants showed a reliable IgG increase ( $p < 0.05$ ) and a tendency toward increasing IgA and IgG levels as well as a tendency toward normalization of cellular immunity. The CG indicated changes with an opposite trend, namely a tendency toward humoral depression and an increasingly strained cellular immunity system.

In this case the data provided by clinical observation was of great interest. 3 CG subjects out of 5 suffered from the following diseases during the course of the experiment: acute laryngotracheitis, acute right-sided bronchial pneumonia and pyoderma. However, among the subjects practicing MR only one suffered from an acute respiratory-viral infection during the first week of the study.

The assumed immunomodulation effect of MR is probably conditioned by the activation of the immunocompetent cells' opioid receptors which prevent, on one hand, the premature influencing of corticosteroids and catecholamines during conditions of physiological stress and regulates, on the other hand, the stimulation of the entire immune system (Blalock E., Smith E., 1985).

These findings enable us to draw the following conclusions:

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1. A single and systematic application of MR to the human organism is co-directed: MR leads to expressed alterations in the status of the neuro-endocrinal system which leads to alterations in the functioning of the cardio-vascular and immune systems.
2. With respect to the fore-mentioned data regarding neuro-biochemical alteration, one may suppose that a tonal decrease in the sympathetic nervous system provides the base for the stress limiting and health promoting effect of MR. This is affected via the simultaneous activation of the endogenous opioid peptides.
3. MR provides an anti-stress effect both under conditions of acute CIT and chronic stress (examination period).

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