

# The Effect of Selected Potentiated Suis Organ Preparations and Traumeel® on Phagocyte and Lymphocyte Activity

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## Keywords

Chemiluminescence test, Embryo totalis, Funiculus umbilicalis, Glandula lymphatica, Glandula thymi, Glandula thyroidea, Glandula suprarenalis, Medulla ossis, MTT test, Mucosa nasalis, Placenta totalis, suis organ preparations, Tonsilla suis, Tonsilla pharyngica, Traumeel®.

## Abstract

The effects of selected potentiated suis organ preparations and Traumeel® on phagocyte and lymphocyte activity in the blood of clinically healthy human subjects were studied *in vitro*, using chemiluminescence and MTT testing techniques.

In the phagocytosis test, reactions differed greatly among the individual blood samples. The preparations tested differed in efficacy and reactions to some of them were dose-dependent. In order of effectiveness, the strongest reactions were noted for the following preparations: Traumeel®, Funiculus umbilicalis 6X, Medulla ossis 6X, Embryo totalis 6X, and Glandula thymi 4X. In at least one of the dosages, all of the test preparations induced significant to highly significant stimulation.

Lymphocyte reactions varied among the tested medications and were dose-dependent only in some cases. At least at certain dosages, the following prepara-

tions induced reactions that were both positive and significant to highly significant: Medulla ossis 6X, Glandula thyroidea 6X, Mucosa nasalis 6X, Glandula lymphatica 6X, and Glandula suprarenalis 6X.

## Introduction

According to Reckeweg, the founder of homotoxicology, the suis organ preparations are the 'simillimums' of the corresponding human organs which expand the familiar homeopathic pharmaceutical repertoire. As antihomotoxic therapy, they enable homeopaths to actively regulate and cure functional weaknesses and damage to organs and cells, especially during the impregnation and degeneration phases. However, they are also utilized in the phases to the left of the biological division, namely the excretion, inflammation, and deposition phases.<sup>4, 5, 36, 37, 49</sup>

According to the homotoxic theory, diseases are defense processes that target the toxins (homotoxins) that have overburdened the organism's self-healing forces in either the short or the long term. Thus biological therapy depends on supporting these forces and leading them back into a dynamic homeostasis so that the organs can again perform their functions without causing significant symptoms. Of all the body's overriding regulatory systems, the immune system plays the primary role in processes of regeneration and healing.

Under these premises, it makes sense to investigate how homeopathically prepared suis organ preparations influence the immune system. In view of the complexity of this system, however, it seemed necessary to focus our inquiry on two essential elements; phagocyte and lymphocyte

activity. To further minimize the problems, *in vitro* investigations were selected that would make it possible to side step the complexity of the immune system as a whole and to acquire direct, quantifiable data on how these cells function and how they are influenced.

According to Schmid, suis organ preparations contain several or all of an organ's tissue components. In addition to differentiated cell components, these preparations contain 'connective vesicular tissue,' matrix, and other substances.<sup>45</sup> The suis organ preparations used in antihomotoxic therapy are homeopathically prepared in accordance with Regulation 42 of the 1978 edition of the official German homeopathic pharmacopoeia (HAB 1) and consist of diluted and potentiated organ tissues derived from healthy pigs. As mentioned earlier, these can be seen as the 'simillimums' of the corresponding human organs, since there are many physiological similarities between pigs and humans. Cooper also sees a correspondence with regard to the predisposition to certain ailments such as arteriosclerosis.<sup>9</sup> Reckeweg attributes a stronger therapeutic effect to organ preparations from pigs than to those derived from cattle or sheep.<sup>37</sup> Proceeding from the assumption that the human organ is of higher quality than the homologous pig organ, he therefore places diseased human tissue on the same level as healthy pig tissue. Administering suis organ preparations is intended as irritation therapy that initiates a healing process by overcompensating for the initial worsening that may possibly occur.<sup>35</sup> These preparations are meant to be utilized in diseases of the corresponding organs. For example, colon suis is given for disturbances of intestinal tract, mamma suis in lactation disorders, etc.

\* The author shared the 1997 Dr. Hans-Heinrich Reckeweg Prize for the results of this study.

Controls	Phagocytosis Test		MTT Test
	physiol. NaCL	DMEM	physiol. NaCL
<b>Preparation:</b>			
Embryo totalis suis 4X	X	X	
Embryo totalis suis 6X	X	X	X
Funiculus umbilicalis suis 6X	X	X	
Glandula thymi suis 4X	X		
Medulla ossis suis 6X	X	X	
Traumecl®	X	X	X
Placenta totalis suis 6X			X
Cartilago suis 6X			X
Tonsilla suis 6X			X
Tonsilla pharyngica suis 6X			X
Mucosa nasalis suis 6X			X
Glandula lymphatica suis 6X			X
Glandula suprarenalis suis 6X			X
Glandula thyreoidea suis 6X			X

Table 1: Overview of test and control substances used in phagocytosis and MTT tests.

Their effects are said to develop primarily by way of immunological mechanisms.<sup>10, 35, 50</sup> Additional in-depth literature on organ therapy has also been produced:<sup>14, 21, 22, 23, 31, 35, 36, 37, 39, 44, 45, 51, 52</sup>

## Methods and Materials

### Subjects, Blood Sampling

The venous blood used in this investigation was drawn from 16 clinically healthy women and men ranging in age from 18 to 60 years. The samples were obtained during routine, voluntary blood collections at Bonn University Clinic's Institute for Experimental Hematology and Transfusion Medicine. Exclusion criteria of samples were identical to those applied in barring the use of a unit of donated blood for transfusion purposes. Table 1 gives an overview of the tested preparations and control substances.

The actual samples were taken after the full blood sacks were disconnected. The blood was allowed to flow freely, with a minimum of backup, from the sack into two different sample tubes. For the subsequent chemiluminescence test, the container was a 10 ml Li-Heparin LH/10 (Sarstedt) disposable test tube; for the hematological test a 5 ml EDTA-K disposable (KABE) was filled. These containers were sealed immediately and tilted back and forth carefully until the blood was thoroughly mixed with the respective anticoagulant.

This technique for removing blood is reputedly the gentlest on cellular components, which was very important in this context because of the leukocyte fraction. In order to exclude the possibility of pre-existing deviations from the normal range, different blood parameters and other factors were checked, including leukocyte count, erythrocyte count, hemoglobin content, hematocrit ratio, various erythrocyte indices, and thrombocyte count.

### Measuring Phagocyte Activity in Whole Blood

The effect of the test preparations and control solutions on the activity of the phagocytes (PMNL, monocytes) in the subjects' blood samples was measured using chemiluminescence. This test is based on the formation of reactive oxygen compounds during phagocytosis and the subsequent release of photons, which are then transformed into electrical impulses in a specialized photometer and recorded as counts/min (spm). In this study, chemiluminescence was measured according to the modified method of Nagahata *et al*<sup>32</sup> and Woestmann<sup>55</sup> after inducing phagocytosis in the whole blood samples by means of zymosan (Serva).

One of the advantages of this method is that it registers not only cellular but also humoral immune factors.<sup>16, 32</sup> Whole blood measurements mirror natural con-

ditions much more precisely because granulocyte functions, which depend on so many different factors, should not be considered in isolation.<sup>13</sup>

Another advantage of using whole blood to investigate phagocyte activity is that only very small volumes of blood, such as 100 ml, are required for each test, so that a single tube is sufficient for carrying out many separate measurements.

### MTT Test to Measure Activity and Proliferation of Lymphocytes

The MTT test was first established by Mosmann as an alternative to the (3H) thymidine test in determining the proliferation of lymphocytes in cultures.<sup>35</sup> The test is based on the ability of the mitochondrial dehydrogenases 3-(4,5-dimethylthiazole-2-yl)-2,5 diphenyltetrazolimbromide ('MTT' for short) to reduce to a blue-violet formazan dye, with the strength of the indicator being dependent on the degree of activation and the number of cells. Since mitochondrial dehydrogenases demonstrate a higher level of activity in proliferating than in non-proliferating cells, this method is suitable for measuring not only vitality and cytotoxicity but also cell proliferation.

The advantage of this new testing method lies in its ability to handle a large series in short periods of time while avoiding the use of expensive radioisotopes and counting devices. In addition, this test is comparable to radioactive methods of measurement with regard to both sensitivity and replicability and is especially suitable for quantitative measurements of metabolically active cells such as T- or B-lymphocytes that have been stimulated to proliferate quickly. The test is used on mononuclear cells isolated from blood, i.e., primarily on lymphocytes.

### Isolation of Lymphocytes from Peripheral Blood

Isolating lymphocytes from heparinized donated blood is exceptionally easy and low-risk if Böyum's density-gradient centrifugation is used.<sup>6,7</sup> A cell

count is performed immediately after isolation, as is the trypan blue test of viability, in which all nonviable cells appear blue.

### Classification of Isolated Cells

The umbrella term for cells isolated in this way is 'peripheral mononuclear cells' or 'peripheral blood mononuclear cells' (PBMNC). In this article, however, 'lymphocytes' will be used throughout for such cells, which are a heterogeneous mixture consisting for the most part of T-lymphocytes (T-cells, 55-85%). Other components include B-lymphocytes (B-cells, 10-20%), monocytes (5-25%), and natural killer cells (NK cells, 5-12%). Since functional interactions occur between these cells even in the body, we will not make any further distinctions among them here.

### Sequence of Events in the MTT Test

In order to guarantee consistent growth of the cell cultures and consistent light penetration during the measuring process, the experiments were set up in flat-bottomed sterile polystyrene microtiter plates with 96 wells. In order to guarantee the chance distribution of cells, each experiment was performed on three set-ups, which guarantees adequate reliability of measured results (0.9953 in the experiments carried out for this study).

After an incubation period following the incorporation of the test or control substances, a 5 mg/ml solution of MTT was added to the cell cultures, after which they were incubated for an additional 4 hours. By that time, blue-violet formazan crystals had formed in proportion to the metabolic activity in the cells. After the addition of 100 ml of an acid wetting agent and an additional 16 hours in the incubator, these crystals, which do not dissolve readily in water, were completely dissolved.<sup>15</sup> In the main part of the experiment, all developed microtiter plates were measured 16 hours after the addition of the acid SDS solution. The OD (optical density = extinction) was determined by means of a computer-

guided multiwell photometer using a wavelength of 550 nm.

In analyzing the results, the experimental OD was related to the OD of the corresponding NaCl control with the same dosage volume. For example, a test sample with a dosage of 10 ml was compared to the control that had received an additional 10 ml of NaCl, while the test with a dosage of 2 ml was compared to the NaCl control with 2 ml, etc. This ensured that only the concentration of the test substance was changed.

### Statistical Analysis

According to the Kolmogoroff-Smirnow test, the data were not normally distributed, so Wilcoxon's rank-sum test for pair differences was implemented.

Levels of Significance	0.1%	+++
	1%	++
	5%	+
Not Significant (n.s.)	>5%	

### Results and Discussion

Embryo totalis suis 4X was tested using only the phagocytosis test. The results are comparable regardless of which control solution (physiol. NaCl or DMEM buffer) was considered. At lower dosages, this test substance was seen to cause stimulation of over 20%, well beyond the margin of error for the test. Since statistical analysis also confirmed this finding as significant, this preparation must be classified as a reliable stimulator of phagocytosis.

Stimulation ranging from 10% to 30% (or even higher in single cases) was found to occur with Embryo totalis suis 6X. Since these results are statistically significant, Embryo totalis 6X must be classified as having effects similar to its 4X dilution. However, suppression responses are less pronounced with 6X.

In the MTT test, the degree of stimulation was approximately the same at all dosages—around 5%, or consistently under 10%. Since suppression was more

likely to occur at increasing dosages, it can be concluded that the test preparation, at least in this potency and in the dosages used, is to be classified as a lymphocyte modulator rather than as a stimulator. Whether inhibitor cytokines are responsible for both the instances of suppression that were observed and the presumed lesser antigenicity of embryonic tissue with respect to the less pronounced stimulant ability is an unresolved issue.

With highly significant rates of activation of well over 10% in the phagocytosis test, Funiculus umbilicalis 6X can be reliably classified as a stimulator of phagocytosis. Additional conclusions can be drawn if the umbilical cord's high content of glucosaminoglycans (GAG) and especially of hyaluronic acid (HA) is taken into account. Heine<sup>18</sup> does this, emphasizing the basic importance of GAGs and of HA in particular with regard to maintaining homeostasis. In connection with the demonstrated effect of Funiculus umbilicalis, it is interesting to note that Heine points out that its immunomodulatory effect is concentration-dependent, i.e., inhibitory at higher concentrations and activating at lower concentrations.

The latter situation may well be what we encounter in a 6X dilution of Funiculus umbilicalis. Additionally, it must be mentioned in this context—and this actually applies primarily to *in vivo* applications of the preparation—that the blood-sample leukocytes activated by the preparation can also secrete various immunomodulators that have an autocrine or paracrine hormonal effect on other interrelated components of the immune system and can therefore either intensify or subdue a reaction once it is initiated.<sup>25</sup>

In the MTT test, the range of reactions induced by Funiculus umbilicalis 6X at different dosages was similar to but on a lower level than that of Embryo totalis 6X, especially at lower dosages. Thus its overall effect on lymphocytes cannot be clearly assessed.

Lymphocyte responses induced by Placenta totalis suis 6X encompassed instances of both stimulation and inhibi-



tion, both relatively limited in scope (under 5-10%), which means that this preparation was not capable of stimulating lymphocytes in any clear and significant way at the tested dosages. This preparation's performance in the MTT test is not surprising, nor is that of Embryo totalis 6X, if we consider that we are dealing here with preparations derived from embryonic tissues which, as 'heterogenic transplants,' must be protected from lymphocyte-induced rejection reactions by antigen deficits, antigen masking, or other immunosuppressive mechanisms.

In the MTT test, reactions to Cartilago suis 6X were also scattered in both directions over a very limited spread, with the exception of a few strong suppression responses. Therefore, in this case too, it is not possible to classify its effect clearly and reliably. Here, as with Funiculus umbilicalis, there may be some connection to the test substance's very high GAG content, which masks or neutralizes the proteins that are present.

It is striking to note that responses to the tonsil preparations (Tonsilla suis 6X, Tonsilla pharyngica suis 6X, Glandula lymphatica suis 6X, Mucosa nasalis suis 6X) range from predominant suppression to stimulation without any apparent dose-dependency. A possible reason for this is that 6X may be a 'borderline' potency for these preparations and is therefore incapable of inducing clear-cut reactions in the test group. On the other hand, the organs from which these preparations are derived have high macrophage and lymphocyte contents, both of which have considerable secretory and immunomodulatory effects that can encompass both activation and inhibition. At the tested potency (6X) we must definitely still count on the presence of correspondingly effective cytokines.<sup>45</sup>

Something similar can be seen from Siefener's results with the preparation Medulla ossis suis 3X/4X in comparison to the potencies of 5X/6X or 7X/8X, where the low potencies induced both inhibition and activation at high levels of significance, giving way to highly signif-

icant activation in the higher potencies.<sup>47</sup> The variable and opposing responses of the lymphocyte cultures, both on an individual basis and in relationship to dosage and potency, might also be due to the interference effects of components that are still materially present in the relatively low dilutions. Since the different ingredients that are present in differing concentrations in these preparations lose their material character with increasing degrees of potentiation,<sup>49</sup> their prior mutual interference might give way to the dominance of a new active principle or a new unitary effect on a more energetic level. It is also possible that the issue of resonance that Stock addressed also plays a role here, in this case as a resonance between the blood samples and the test preparation.<sup>49</sup>

The profile of responses to Glandula lymphatica suis 6X, which were predominantly stimulation reactions, constitutes a transition of sorts to the reaction situation of Mucosa nasalis, where strong stimulation predominated at middle dosages. The organs of origin of the four tonsil test preparations are organs with concentrations of lymphoreticular tissue. Therefore, a higher antigenicity of the applied doses, a more suitable potency of the preparation's constituents, a more suitable combination or balance of activating and inhibitory factors, and improved electromagnetic resonance with the blood sample could all be responsible for the highly significant lymphocyte activation that is found in this sequence when assessing Mucosa nasalis suis 6X.

Statistically significant stimulation responses can be observed with Glandula thymi suis 4X in comparison to both controls and at all dosages, categorizing this test substance as a promoter of phagocytosis. The thymus, from which this preparation is derived, serves as the primary lymphatic organ for the formation, development, and maturation of T-lymphocytes. It has access to a large pool of cytokines that promote growth and differentiation. It is possible that these cytokines are still present in effective concentrations in the tested dilution; they certainly come into question as essential active ingredients because of the

close physiological connection between T-cells and phagocytes.<sup>25, 45</sup> To complete the picture it should be noted that Siefener was able to demonstrate that a 3X/4X potency of Glandula thymi suis induced slightly to highly significant stimulation of lymphocyte activity in the MTT test.<sup>47</sup>

Taking both controls into account, highly significant and wide-ranging stimulation reactions that were only slightly dosage-dependent were recorded for Medulla ossis suis 6X. This very clear finding can be explained by relating it to the structure and function of bone marrow, which is the basis of this preparation. Bone marrow is a primary producer of blood cells and immune-system cells. It has access not only to a very high concentration of stem cells and stages in the development of different cell lines but also to a plethora of growth and differentiation factors such as colony-stimulating factors (CSF), erythropoietin, and numerous immunoregulatory cytokines.<sup>25</sup> On the whole, it has an almost unlimited capacity for cell division and renewal.

If, like Schmid, we assume that homeopathically prepared organ remedies in 6X dilution still contain effective amounts of their original ingredients and that these preparations can therefore also have a substitutive effect, then the test substance Medulla ossis suis 6X can probably be assumed to possess stimulating qualities that could help to induce the effects described.<sup>45</sup> Of course this stimulation reaction may also have come about as a result of an appropriate balance between activating and inhibiting factors. In Siefener's parallel studies, all of the tested potency accords (3X/4X, 5X/6X, 7X/8X) induced pronounced and highly significant stimulation of lymphocyte activity in the MTT test.

Since Traumeel® consistently induced noteworthy and highly significant stimulation reactions in the phagocytosis test, this preparation can safely be classified as a stimulator of phagocytosis and thus as an immunostimulant. Since the same testing method has already demonstrated that Echinacea angustifolia, one of the ingredients of this combination remedy,

significantly stimulates phagocytosis both *in vivo* and *in vitro*, we can conclude that it contributes heavily to Traumeel's® efficacy in this regard.<sup>12,55</sup> It should also be noted that Matusiewicz observed an increase in chemotactic reactions in polymorphonuclear granulocytes after administering Traumeel® in a clinical setting.<sup>28</sup> In contrast, Conforti *et al* deny that Traumeel® has any immunomodulatory effect.<sup>8</sup>

Traumeel's® effect on lymphocyte cultures in the MTT test was predominantly stimulating, significantly so at dosages of 1 ml and 8 ml. However, the responses were neither particularly strong nor clearly dose-related. It is possible that on the whole this preparation is not so strongly lymphocyte-stimulating as to be able to induce differing or opposing reactions in different individuals.

Even at the lowest dosage, Glandula suprarenalis suis 6X significantly stimulated lymphocyte activity in the MTT test. This must be seen in connection with the adrenal gland's particularly close connection to the immune system. The fact that instances of stimulation outweighed the instances of suppression, which were also observed, leads us to expect, as discussed earlier, that suppression reactions may disappear at higher potencies while stimulation reactions become even more evident.

Stimulation reactions are even more predominant in the reaction profile of Glandula thyroidea suis 6X than in that of Glandula suprarenalis. In the case of Glandula thyroidea, the stimulating effect is significant to highly significant even at the lowest dosage, and there appears to be no relationship to the size of the dose. The relatively even distribution of reactions seems to express the thyroid's positive connection to lymphocyte activity rather than any particular antigenicity of the preparation. On the basis of consistent overall results, this preparation can be reliably classified as a stimulator of lymphocyte activity.

Until now, controlled *in vitro* studies of the suis organ preparations tested here have not been published, so there is no possibility of comparing the results. Since the potential active components of

these preparations have not been analyzed, ways of explaining the observed results can be sought only in the literature or on the basis of ingredients known to be present at processing.

The tested suis organ preparations are homeopathically prepared extracts of whole organs. Since they are not subjected to any treatment other than potentiation during processing, they can be assumed to be composed of heterogeneous materials—different types of intact cells, cell fragments, molecules of various sizes, and active substances such as cytokines, for example.<sup>45</sup> The test preparations were not so highly diluted that the presence of effective quantities of these materials can be ruled out.<sup>39, 45, 49</sup>

### Immunological and Biophysical Perspectives

According to Reckeweg, the effects of the suis organ preparations come about by way of various immunological reactions in which the foreign organ preparation serves as a 'simillimum' that affects the homologous human organ to relieve functional disturbances.<sup>36,37</sup> Stock offered a new and broadened perspective for understanding disease and therapy.<sup>49</sup> Supported by incisive results of biophysical research,<sup>34,46</sup> he pointed to a higher level of information in the organism, carried by electromagnetic signals. According to this construct, communication between a diseased organ and a medication also takes place on this energetic and dynamic level via the electromagnetic oscillations of the substances; the disturbed system can react positively only if the choice of the correct medication brings about a resonance between the two so that the disturbing frequencies emitted by disease foci can be canceled out. In this event, homeostasis will be reestablished in the functioning of the organ in question. This can also take place, for example, by stimulating detoxification mechanisms in the context of antihomotoxic treatment. According to Stock and Schmid, at higher dilutions, the active substances in the preparations lose any material and substitutive character they may still have possessed in favor of a more informational and energetic quality.<sup>45, 49</sup>

Heine describes organ preparations as highly complex antigen cocktails that owe their effect to the stimulation of various immune reactions.<sup>20</sup> It is quite possible that some of the suis organ preparations tested contain activators or modulators in the form of growth factors and various cytokines. Thus, the antiproliferative effect of TGF- $\beta$  and other inhibitory factors from T-cells might be responsible for the instances of suppression we observed.<sup>52</sup>

### Individual Immune Status

The individual immune status of each subject is co-determined by a great number of endogenous and exogenous factors<sup>11, 18, 19, 20</sup> such as medications, alcohol consumption, eating habits, subclinical infections, and immunizations. If we consider the number and interaction of all immunologically active factors, it is conceivable that identical amounts of identical preparations can lead to different results in different subjects. In addition, the suis organ preparations used in this study consist of mixtures of different substances.

### Composition of Blood Samples / Lymphocyte Cultures

Individual differences in the subjects' immune status can also result in variations in leukocyte populations in their peripheral blood, which in turn influence the reaction to a specific preparation. Thus Rosenstreich *et al* observed no proliferation in response to the mitogens PHA and ConA in lymphocyte cultures that contained only 0.3% macrophages and less than 2% B-lymphocytes unless the cultures were supplemented with additional macrophages.<sup>41</sup> Wakasugi was also unable to induce proliferation using IL-2 unless monocytes were added to the culture.<sup>53</sup> Kapsenberg *et al* varied the proportion of macrophages in the culture and noted a corresponding range in lymphocyte proliferation.<sup>24</sup> The effects on blast cell transformation varied, ranging from strong stimulation to indifferent results to suppression, depending on the origin and degree of activation of the macrophages.

Controls Preparation:	Phagocytosis Test		MTT Test
	physiol. NaCl	DMEM	physiol. NaCl
Embryo totalis suis 4X	n.s.	++	
Embryo totalis suis 6X	++	++	n.s.
Funiculus umbilicalis suis 6X	+++	+++	n.s.
Glandula thymi suis 4X	++	++	+++
Medulla ossis suis 6X	+++++	+++	+++
Traumeel®	+++	+++	+++
Placenta totalis suis 6X			n.s.
Cartilago suis 6X			n.s.
Tonsilla suis 6X			-/+
Tonsilla pharyngica suis 6X			-
Mucosa nasalis suis 6X			+++
Glandula lymphatica suis 6X			++
Glandula suprarenalis suis 6X			++
Glandula thyroidea suis 6X			+++

Table 2: Overview of the results of statistical analysis of the effects of suis organ preparations and Traumeel® on the activity of phagocytes and lymphocytes in peripheral blood.

In the current study, care was taken in determining cell counts to avoid unusually high (>15% of cells) or unusually low (<5% of cells) monocyte fractions in the cell suspensions. However, the range of fluctuation in the monocyte content of the subjects' peripheral blood remains one possible explanation of differences in results.

It is also conceivable that macrophage or monocyte activity can be increased by cytokines that may be present in the organ preparations. TNF- $\alpha$ , IFN- $\gamma$ , IL-2, and IL-4 are known to have this effect.<sup>2</sup> They would have a stronger influence on cultures with a relatively high proportion of monocytes than on cultures with relatively few monocytes.

Since T- and B-cell reactions do not absolutely have to run parallel,<sup>29</sup> it also seems possible that the cultures were differently affected by agents that selectively influence B- and T-cells. Heeg *et al* found differences in the activity of various T-subpopulations with regard to MTT metabolism.<sup>17</sup> In addition, this research team also found varying degrees of IL-2 dependency in different T-subpopulations. Thus individual variations in T-subpopulations could also be a reason for the differences in reactions observed here.

A further reason for variations in results could be the possibility of selective loss of lymphocyte subpopulations

during density-gradient centrifugation.<sup>6, 7, 40</sup> Selective loss of cell subpopulations, however, would have to affect all cultures equally. The blood donors may also have differed with respect to major humoral immune factors that are present in blood plasma (complement, fibronectin, antibodies, etc.) Since the phagocytosis test dealt with whole blood, individual variations in results may have been partially determined by differences of this sort.

#### Nutritional Influences on the Subjects' Reaction Profiles

Differences in the nutritional status of the donors may also have contributed to individually idiosyncratic results. Watzl *et al* found that inadequate protein intake had negative consequences for immune competence.<sup>54</sup> In this context, the amino acid arginine seems to be especially important because it appears to stimulate T-cells. Unsaturated fatty acids, in contrast to saturated fatty acids, inhibit lymphocyte function. In the view of these authors, alimentary hypercholesterolemia can also cause suppression of the immune system.<sup>54</sup> The nutrients  $\beta$ -carotene, retinol, tocopherols, ascorbic acid, and selenium also influenced lymphocyte proliferation.<sup>3, 27, 38, 42</sup>

Alcohol consumption inhibits cytotoxicity of T-lymphocytes.<sup>54</sup> Animal experiments have shown that alcohol consumption suppresses the secretion of

IL-2 and TNF- $\alpha$  regardless of nutritional status, but in malnourished subjects, the immunotoxic effects of alcohol were more pronounced.

An additional reason for individual differences in the extent of the observed stimulation may be due to the fact that the stimulation induced by the test preparations peaked at individually different times, as Sörenson *et al* observed in proliferation induced by incorporating (3H) thymidine.<sup>48</sup> In the current study, the cell cultures had four hours to transform the indicator reagent MTT, which was always introduced 72 hours after culturing began. Thus this factor could also account for differences in the results of this investigation.

The individual results of reactions confirm Schmid's view that efficacy is fundamentally an individual phenomenon that is averaged out in experimental groups.<sup>45</sup> It should also be noted at this point that human subjects—in contrast to the situation in animal experiments—constitute an exceptionally genetically heterogeneous collective.

However, even from the perspective of these variations, the influence of the preparations in question must also be considered, because there were clearly recognizable differences related to which preparations, which dosages, and which control was used. In the phagocytosis test, for example, Medulla ossis 6X, Traumeel®, Funiculus umbilicalis 6X, and Glandula thymi 4X induced stimulation responses almost exclusively. In contrast, the higher dosages of Embryo totalis 6X reversed the direction of the effect. On the whole, relating the results to controls with an addition of DMEM buffer instead of physiological NaCl led to readings that were higher and more regular, which suggests indirectly that the actual NaCl used as a dissolving and potentiating medium contributes a certain portion of the effect of the test preparations. When the purpose is to assess the effect of the complete pharmaceutical, it is therefore preferable to also test it against the addition of a corresponding amount of a 'neutral' buffer such as DMEM, as was done here, rather than simply against the dissolving and potentiating medium



## Commentary

All of the organism's regenerative and healing processes revolve around the immune system. Homotoxicology sees organ-derived pharmaceuticals, such as the homeopathically prepared suis organ preparations used in antihomotoxic medicine, as the simillimums of the corresponding human organs. This study tested the immunostimulatory or immunomodulatory effect of these preparations on leukocyte cultures of human whole blood. The findings demonstrate that in the lower potencies used here (4X-6X), both activating and inhibiting effects can appear, depending on the subject's immune status.

These individualized reactions seem to be mediated by cytokines and growth factors. Low potencies of suis organ preparations apparently induce leukocytes to release these factors to regulate homeostasis. Even Traumeel®, which contains no animal proteins, was found to produce immunostimulant and immunomodulatory effects. This yields very significant new insights into the workings of antihomotoxic preparations. Prof. H. Heine, M.D.

in the control sample.

In conclusion, if all of the results that have been discussed here both in general and in detail are related to Reckeweg's concept of illness and his ideas about how the suis organ preparations work, we cannot avoid the conclusion that they are more than just a good match. This study strengthens and supports his postulates, because it provided statistical confirmation, through at least one of the tests, of the immunostimulant effect of almost all of the preparations tested.

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