



## Hypnosis, Suggestions, and Psychosomatic Phenomena: A New Look from the Standpoint of Recent Experimental Studies

Theodore X. Barber Ph.D.

**To cite this article:** Theodore X. Barber Ph.D. (1978) Hypnosis, Suggestions, and Psychosomatic Phenomena: A New Look from the Standpoint of Recent Experimental Studies, American Journal of Clinical Hypnosis, 21:1, 13-27, DOI: [10.1080/00029157.1978.10403953](https://doi.org/10.1080/00029157.1978.10403953)

**To link to this article:** <http://dx.doi.org/10.1080/00029157.1978.10403953>



Published online: 22 Sep 2011.



Submit your article to this journal [↗](#)



Article views: 45



View related articles [↗](#)



Citing articles: 42 View citing articles [↗](#)

## Hypnosis, Suggestions, and Psychosomatic Phenomena: A New Look from the Standpoint of Recent Experimental Studies<sup>1</sup>

THEODORE X. BARBER, Ph.D.  
*Proseminar Institute, Research Division*  
*Medfield, Massachusetts*

A series of investigations are reviewed which indicate that suggestion (a) can block the skin reaction (dermatitis) that is produced by poison ivy-like plants, (b) can give rise to a localized skin inflammation that has the specific pattern of a previously experienced burn, (c) can be effective in the cure of warts, (d) can ameliorate congenital ichthyosiform erythrodermia ("fish skin disease"), and (e) can stimulate the enlargement of the mammary glands in adult women. Experiments are also summarized supporting the hypothesis that the aforementioned suggested phenomena may be due, in part, to localized alterations in blood flow to the skin and other organs that can occur when certain types of suggestions are accepted.

The first part of this paper summarizes recent experiments which indicated that suggestions (a) can prevent the skin reaction (contagious dermatitis) that is produced by plants such as poison ivy, (b) can give rise to a localized inflammation of the skin, (c) can stimulate the remission of warts, (d) can ameliorate congenital ichthyosis ("fish skin disease"), and (e)

can stimulate additional growth of the mammary glands in adult women. The underlying theme throughout the first part of the paper is that "suggestions" (statements that something is occurring or will occur) affect cutaneous and glandular functions when subjects accept the suggestions and incorporate them into their own ongoing cognitions (their ongoing thoughts, images, and feelings). The second part of the paper (a) summarizes recent psychophysiological experiments and biofeedback studies which indicated that our thoughts, images, and feelings affect blood flow to the skin and other organs and (b) postulates that the aforementioned phenomena produced by suggestions — i.e., the prevention of dermatitis, the production of inflammation, the remission of warts, etc. — may be due, in part, to the localized alterations in blood flow that occur when the suggestions are accepted and become part of ongoing cognitions.

Many of the experiments that are de-

---

<sup>1</sup> This paper was presented on October 24, 1976, at the Conference on Healing, which was sponsored by the National Institute for the Psychotherapies, New York, and it will appear in a volume containing the papers presented at the conference (J. L. Fosshage & P. Olsen, eds., *Healing: Implications for Psychotherapy*, Behavioral Publications, New York). Work on this paper was supported in part by a grant (MH 28432) from the National Institute of Mental Health, U.S. Public Health Service and in part by a grant from Proseminar Institute. I am grateful to the following for comments that helped to improve the manuscript: Donald Kaiser, Ph.D.; Judie Kaiser; Kimberly P. Kiddoo, Ph.D.; Peter M. Litchfield, Ph.D.; R. F. Q. Johnson, Ph.D.; Donald S. Scott, Ph.D.; and Sheryl C. Wilson, Ph.D.

scribed in this paper utilized hypnosis or hypnotic induction procedures. Although the available evidence strongly indicates that hypnotic induction procedures are not necessary, they can nevertheless be helpful in producing acceptance of suggestions (Barber, 1969; Barber, Spanos, & Chaves, 1974). When hypnotic induction procedures are helpful, it is not because the subject is in a "trance" or "hypnotized" in the popular sense of these terms. Instead, the evidence indicates that they are helpful when they reduce the subjects' critical attitudes toward the suggestions and thus help them accept the suggestions as believable and harmonious with their own ongoing cognitions (Barber et al., 1974; Ruch, 1975). Although hypnotic induction procedures are effective in reducing critical attitudes in some subjects, more ordinary procedures are often equally effective. Nonhypnotic procedures that have been shown to produce a high level of responsiveness to suggestions, presumably by reducing critical attitudes, include (a) exhorting subjects to try their best to imagine those things that are suggested ("task motivational instructions") and (b) urging subjects to put aside their critical attitudes and to let themselves "think with" the suggested themes ("think with instructions") (Barber, 1969, 1970, 1976; Barber & Ham, 1974; Barber et al., 1974; Barber & Wilson, 1977; Wilson & Barber, 1978). These topics will be mentioned again later in this paper. Let us now look at the empirical data.

#### PRODUCTION AND INHIBITION OF CONTACT DERMATITIS

Two Japanese physicians, Ikemi and Nakagawa (1962), reported an experiment demonstrating that suggestions can exert remarkable control over skin responses. The subjects participating in the experiment were 13 high school students who were

very sensitive to plants found in Japan that produce reactions resembling those produced by our poison ivy, poison oak, or poison sumac. When these students came in contact with the leaves of the poisonous plants, they showed a dermatitis consisting of an abnormal redness of the skin due to congestion of the blood capillaries (erythema), small circumscribed solid elevations of the skin (papules), and small blisters (vesicles) together with edema, a burning sensation, and itching.

Five of the students were exposed to a hypnotic induction procedure; when their eyes were closed they were told that they were being touched by leaves from the poisonous tree while they were actually being touched by leaves from a harmless tree. The remaining eight subjects were assigned to a nonhypnotic treatment; when their eyes were closed they were also touched by harmless leaves but were told they were being stimulated by the poisonous leaves. There is every reason to believe that both the hypnotic subjects and the nonhypnotic subjects could accept the suggestions as true. Both kinds of subjects had their eyes closed and could not see what kind of leaves were being placed on their arms. Furthermore, the experimenter was a physician with high prestige and the experiment was conducted in a highly respected medical setting. When the physician said that he was stimulating the subjects' arms with the poisonous leaves, there was no reason why the subjects (high school students) should doubt the physician's statement.

Skin changes were produced by the believable suggestion that the arm was being stimulated with poisonous leaves (when it was actually stimulated by harmless leaves). When the subjects were led to believe that they were being stimulated by poisonous leaves, the *harmless* leaves produced a slight to marked degree of dermatitis — e.g., flushing, itching, erythema,

and papules — in all five of the hypnotic subjects and in all eight of the nonhypnotic subjects. In 12 of these 13 subjects the dermatitis was observable within 10 minutes to one hour after the suggestion was given; in the remaining subject, the dermatitis was not clearly present until six hours after the suggestion.

In the next part of the experiment, the subjects were told that they were being touched on the other arm with the leaves of a harmless tree while they were actually stimulated by the poisonous leaves. When thus led to believe that the poisonous leaves were harmless, four of the five hypnotic subjects and seven of the eight nonhypnotic subjects did not show the expected dermatitis.

In summary, the data presented by Ikemi and Nakagawa indicate that in individuals who show marked dermatitis when stimulated by the leaves of poison ivy-like plants, (a) at least some aspects of the dermatitis can be produced by a harmless substance when the individual is led to believe it is the dermatitis-producing substance, (b) the dermatitis generally can be inhibited when the individual is led to believe that the poisonous leaves are harmless leaves, (c) formal hypnotic induction procedures are not necessary or especially useful in producing these effects, and (d) it appears that the critical variable in producing the phenomena is the subjects' belief that a harmless substance is actually a dermatitis-producing substance and, vice versa, that a dermatitis-producing substance is actually a harmless substance.

#### AN ATTEMPT TO PRODUCE BLISTERS BY SUGGESTIONS

A series of earlier studies, reviewed elsewhere (Barber, 1970; Pattie, 1941; Paul, 1963), appeared to indicate that blisters can at times be produced by hypnotic suggestions. Dr. R. F. Q. Johnson and I

recently attempted to validate the earlier studies in a controlled experiment with 40 student nurses. In this experiment (Johnson & Barber, 1976) each student first agreed to participate in a hypnotic experiment in which an attempt would be made to produce blisters by suggestions. To help convince the subjects that suggestions could produce blisters, they were asked to read a passage from a book by a physician which made this assertion. Each student nurse was then exposed to a hypnotic induction procedure and given the suggestion that it was early morning, she was in her kitchen at home, and bacon was being cooked in a red hot frying pan. It was next suggested that she was burned on the back of her hand when she accidentally touched the frying pan, e.g., "... the red hot frying pan touches the back of your hand . . . you can still feel the burning sensation . . . soon a blister will form there . . ."

In this experiment only one of the 40 subjects showed a skin change that was directly attributable to the suggestions. Specifically, the subject manifested an unmistakable inflammation of the hand during the time she was receiving the suggestions for blister formation. The back of the hand became bright red and the inflammation formed an irregular pattern, covering about 75% of the hand including part of the index finger to the first knuckle. The boundary between the inflamed and uninflamed part of the hand was very sharp and distinct. The inflammation was present during the time the subject was receiving the suggestions for blister formation and subsided within three minutes after completion of the suggestion.

Immediately upon completion of the experiment, the subject reported that six years previously she had been burned by hot grease on that very spot on the top of the same hand and that the outline of the inflammation coincided with the previously burned area. She further stated that the burn

she experienced six years earlier was due to an accident in the kitchen while she was cooking.

It thus appears that in this experiment we reinstated a previously experienced skin condition. The suggestions that we used — the subject was in the kitchen in the morning and was being burned on the top of her hand by a hot frying pan — closely resembled what had actually happened to her six years previously. These fortuitous events led the subject to relieve the experience vividly, e.g., she stated postexperimentally that when she received the suggestions she could feel the “blister” forming. Apparently, the skin changes manifested by this subject were intimately related to the fact that she fully accepted the suggestions and incorporated them into her own ongoing cognitions. We shall return to this experiment again later in this paper when we shall attempt to provide an explanation of the inflammation which was associated with the suggestions.

#### TREATING WARTS BY SUGGESTIONS

Dr. R. F. Q. Johnson and I also recently carried out a controlled experiment to check the assertion that warts can be cured by suggestions. In this experiment (Johnson & Barber, 1978), 22 subjects with warts were randomly assigned either to a hypnosis treatment or a control treatment. The 11 subjects allocated to the hypnosis treatment were exposed to a hypnotic induction procedure comprised of repeated suggestions of relaxation, drowsiness, sleep, and hypnosis. Immediately upon completion of the hypnotic induction procedure, the hypnotic subjects received suggestions for wart disappearance. The remaining 11 control subjects were not exposed to a hypnotic induction; instead, they were told that they were to be treated by “focused contemplation” and then were immediately given the same suggestions for wart disappearance

that were given to the hypnotic subjects. When given the suggestions for wart remission all 22 subjects were told to focus on certain warts, to imagine they were tingling, and to feel them beginning to go away. They were also told to continue to imagine the tingling and the warts disappearing henceforth for a few minutes each day.

Three of the 22 subjects showed remission of warts in close association with the suggestive treatment. The subjects were asked to return for two follow-up sessions at intervals of approximately two to three weeks and four and one-half to six weeks after the treatment session. One subject whose warts had been present for about three years had lost 37 of her 39 warts by the first follow-up session (two and one-half weeks); a second subject with warts of two years duration had lost all five of his warts by the second follow-up session (four and one half weeks); and the third subject who had 13 warts for about one-half year had lost all of the warts by the second follow-up session (six weeks).

Two aspects of this experiment are of theoretical and practical interest. First of all, we confirmed the results of many earlier studies (summarized by Barber, 1970, pp. 169–172) which found that wart regression was at times closely associated with suggestions for wart disappearance. How suggestions for wart disappearance can be causally related to the cure of warts is a difficult topic that we shall discuss again toward the end of this paper.

A second important outcome of this experiment was that all three subjects who showed wart involution were in the hypnotic group — none were in the control group. The three hypnotic subjects who showed wart cures strongly believed that warts could be cured by hypnosis; they were generally responsive to test-suggestions (such as suggestions for arm levitation), and they were highly motivated to participate in the experiment. On the

other hand, the subjects allocated to the control treatment had never heard of "focused contemplation" and did not especially believe that it could cure warts. It thus appeared to us that an important variable determining whether a psychological treatment will affect warts is its *believed-in efficacy*; that is, whether the subjects believe that the treatment is capable of curing warts.

An alternative explanation for the apparently greater effectiveness of the hypnotic treatment is that an altered state of consciousness, specifically, a hypnotic trance state, is necessary for suggestions of wart regression (or other "extraordinary" suggestions) to be effective. Although this type of explanation is more harmonious with traditional theories of hypnosis and is still generally accepted by laymen, a large number of investigations conducted during the past 20 years strongly indicate that it is not valid (Barber, 1969, 1970, 1973; Barber & Ham, 1974; Barber et al., 1974; DeStefano, 1977; Katz, 1975; Sarbin & Coe, 1972). Also, a series of studies pertaining to the treatment of warts, summarized in the next paragraph, indicated that *believed-in efficacy* rather than *hypnotic trance* is the critical factor in the successful psychological treatment of warts.

A series of earlier studies (Allington, 1934; Bloch, 1927; Bonjour, 1929; Dudek, 1967; Grumach, 1927; Memmesheimer & Eisenlohr, 1931; Sulzberger & Wolf, 1934; Vollmer, 1946; showed that warts can be cured by direct suggestions (without hypnotic procedures) provided that the patients believe that the suggestive treatment is effective in curing warts. For example, in one early study (Bloch, 1927), the patient's warts were exposed to an impressive electrical machine; although the motor was started no electrical current actually reached the patient. Next, the warts were painted with an innocuous dye and the patient was told that the dye was a powerful

new wart medicine, that the warts were now dead, and that they must not be washed until they disappeared. In this and other early studies, the warts typically began to disappear soon after the suggestive treatment and there is every reason to believe that the treatment possessed *believed-in efficacy*; that is, the patients believed that the treatment would cure their warts.

#### TREATING ICHTHYOSIS BY SUGGESTIONS

Congenital ichthyosis ("fish skin disease") has been ameliorated by suggestions. Let us look briefly at the reports in this area, beginning with the case presented by Mason (1952).

Mason worked with a 16-year-old boy who suffered from a severe form of ichthyosis (congenital ichthyosiform erythrodermia of Brocq). The skin over his entire body, with the exception of his chest, neck, and face, was black, horny, and covered with papillae. The skin felt as hard as a normal fingernail and, when cut, was of the consistency of cartilage and was anesthetic for a depth of several millimeters. Also, the skin was so inelastic that any attempt at bending would produce a crack in the surface which would then ooze blood-stained serum. Despite the extensive medical treatment that the patient had received, his skin had been progressively thickening from birth. His education had been interrupted because the teachers and students objected to his odor. The boy disliked relating with others because of his distressing appearance and he was shy and lonely. It should be emphasized that the etiology of this disease is unknown and that it is resistant to all forms of treatment.

After administering a hypnotic induction, Mason suggested to the patient that his left arm would clear. (The suggestion was limited to the left arm in order to exclude the possibility of spontaneous improvement.) Within five days, the horny layer

softened and fell off. The skin underneath was somewhat reddish at first but within a few days was normal in color and texture. By the end of 10 days, the arm was normal from shoulder to wrist.

Over a series of treatment sessions, Mason then suggested that the skin would improve first in one part of the body then in another. He summarized his results as follows:

These rapid and dramatic results were obtained during the first few weeks. During the next few months of treatment, there was no further improvement. However, in a subsequent four-year follow-up period, the improvement that had been obtained was main-

areas. In the next phase of the investigation the patients were exposed to a hypnotic induction procedure at biweekly intervals for two months and then monthly for a further two months and given suggestions that all affected areas of the skin would improve. Wink presented the following results:

Schneck's (1966) patient was a 20-year-old woman whose entire body was affected by the disease (congenital ichthyosiform erythrodermia). After a hypnotic induction she was given suggestions for overall improvement, was told to visualize herself in a mirror and to see herself as she would like to appear, and was told to watch for gradual improvement. On returning one week later

Part of Body	Condition Before Treatment	Condition After Treatment
Hands	Completely covered	Palms clear — Fingers not much improved
Arms	80% covered	95% cleared
Back	Lightly covered	90% cleared
Buttocks	Heavily covered	60% cleared
Thighs	Completely and heavily covered	70% cleared
Legs and feet	Completely and heavily covered	50% cleared

tained and the patient showed additional spontaneous improvement without any type of treatment (Mason, 1955).

Mason's results were confirmed by Wink (1961), Schneck (1966), and Kidd (1966). Wink (1961) worked with two sisters, ages eight and six, who suffered from congenital ichthyosiform erythrodermia affecting most of their bodies. (The younger sister had a less severe form of the disease and the skin on her palms, fingers, soles, and toes was normal.) Each girl was exposed to a hypnotic induction procedure at weekly intervals for eight weeks and given suggestions that specific affected skin areas would soon start to grow soft and smooth and the thick skin would flake off. The skin condition of both patients improved in some of the specified areas and improvement was also noted in some unspecified

there was a "startling change" — a 50 per cent improvement over her entire body. The patient continued receiving similar suggestions in therapy sessions with Schneck over several months. During this period she initially improved somewhat, then regressed, and finally improved again. At the termination of therapy, the degree of improvement was about the same as had been attained dramatically in the first session — about 50 per cent.

Kidd (1966) worked with two cases of congenital ichthyosiform erythrodermia — a father, age 34, and his young son, age four. The father was admitted to a hospital for the treatment of his skin condition. Each day for a three week period (and sometimes twice a day) he was exposed to hypnotic induction together with suggestions that

improvement would occur in his skin. By the end of three weeks marked remission had occurred. Treatment was then continued every other day for two more weeks and the suggestions were directed specifically at the areas that were still affected. At the end of the five weeks period, approximately 90 per cent remission had occurred. The four-year-old son was also treated by hypnosis and suggestions. However, the child was inattentive and easily distracted and the treatment did not help him.

The studies described above have broad implications in that they demonstrated that a congenital, severe skin ailment that has been considered to be resistant to all forms

can affect this congenital skin disease and the other skin processes that I have described.

EFFECTS OF SUGGESTIONS  
ON THE MAMMARY GLANDS

LeCron (1949) used suggestive techniques to induce breast development in 20 women (varying in age from 20 to 35), all of whom had a strong desire for larger breasts. LeCron saw the women at weekly intervals and, after a hypnotic induction, suggested to them that their "inner mind" was going to start the same process of breast growth that had occurred during puberty and that the process would continue

	Reduction in Skin Thickness	
	Older Sister	Younger Sister
Face	50%	75%
Neck	75%	40%
Arms	50%	20%
Palms and fingers	50%	(originally normal)
Trunk	50%	25%
Legs	75%	20%
Soles and toes	50%	(originally normal)

of treatment can be markedly affected by suggestions. In each case, the suggestions for improvement were given together with a hypnotic induction. No attempt was made to ascertain whether the suggestions for improvement were effective alone (that is, with or without the hypnotic induction) or whether variables included in the hypnotic induction also played a role. However, judging from the data previously discussed in this paper (for example, the data presented by Ikemi and Nakagawa) and from the results of a large number of studies presented elsewhere (Barber, 1969, 1970; Barber et al., 1974), it appears that the hypnotic induction procedure is not necessary, although it may be helpful in making the suggestive treatment more acceptable and believable. I shall return to these studies again later in this paper when I shall offer a theory to explain how suggestions

until the breasts reached the desired size. Utilizing self-suggestion (or "self-hypnosis"), the women repeated to themselves the suggestions for breast growth and they visualized themselves as they wished to be. They also suggested to themselves that they felt warmth and tingling sensations in the breasts from the increased blood circulation. LeCron reported that 17 of the 20 women showed at least moderate breast growth, of about one to one and one-half inches, and five of these showed growth of about two inches. Although these results are suggestive, they are not definitive, because it is difficult to measure the size of the mammary glands accurately and the measurements were not made in a pre-planned careful way. Fortunately, a more controlled investigation has been presented recently by Williams (1974). This investigation, which in-



cluded careful measurements of breast size, was comprised of a pilot study and a main study. In the pilot study, three women were exposed weekly to a hypnotic induction and to suggestions for breast development while three other women were exposed weekly to a hypnotic induction but not to suggestions for breast development. At the end of 12 weeks, those women who had been receiving the suggestions for breast development increased their bust measurement an average of one and five-eighths inches, whereas the women exposed only to the hypnotic induction showed no change.

Thirteen women who desired larger breasts participated in the main study. Careful baseline measures of the chest were taken for three weeks. All of the women then received 12 weekly treatments consisting of a hypnotic induction and repeated suggestions to feel again the sensations in the breasts that occurred during puberty. During the baseline measurements, the average bust measurement of the 13 women (after exhalation) was 33.6 inches. After 12 weeks of suggestions for breast development, the average bust measurement (after exhalation) was 35.7 inches. The average increase of 2.1 inches was statistically significant. As a control, the rib cage below the breasts was also measured during the same 12 week period and it did not show a statistically significant change.

The above results were recently confirmed by Willard (1977) who found that (a) all 22 women participating in his study showed some breast enlargement and (b) the women who were most able to visualize the suggested breast change had the greatest increase in breast size. Staib and Logan (1977) also confirmed Williams' (1974) results and, in addition, found that practically all (81%) of the gains in breast size were still present three months after the end of treatment.

In brief, the data available at present strongly indicate that suggestions of breast

growth and increased sensations in the breasts are effective, with at least some women, in stimulating breast enlargement. Another way to state this conclusion is that it appears that some adult women can increase their breast size by focusing on the idea that their breasts are growing. In the next section of this paper I shall discuss how this kind of focused, believed-in thinking, imagining, and visualizing can lead to increased blood flow to the breasts which, in turn, could stimulate breast enlargement.

#### CONTROL OF BLOOD FLOW AS A MEDIATOR

I have described the effectiveness of suggestions in producing and inhibiting contact dermatitis, producing localized skin inflammation, curing warts, alleviating congenital ichthyosis, and stimulating the growth of the mammary glands. Although these effects can be attributed to suggestions or hypnosis, the latter terms can easily mislead us into believing that something outside of the patient or subject (suggestions or hypnosis) is producing the effects. It needs to be emphasized that suggestions or hypnosis are effective only to the extent that they become "self-suggestions;" that is, the person accepts the suggestions as part of his own cognitive process (Ruch, 1975).

There is evidence to indicate that changes in blood supply to the skin may play an important role in producing the phenomena discussed in this paper. For instance, when we tried to produce blisters by suggestions (Johnson & Barber, 1976), one subject showed an irregular inflammation of the dorsum of the hand that was due primarily to vasodilation or markedly increased blood supply to the area. It also appears that changes in blood supply to a wart occur when warts disappear spontaneously or in response to suggestions (Barber, 1970, pp. 170-171). Unna (quoted by Samek, 1931) observed histologically that, during the spontaneous healing of warts,

the normal skin surrounding the wart shows a distinctive reaction consisting of hyperemia (increased blood supply) and cell proliferation. Other investigators (Arlington, 1952; Biberstein, 1944; Sulzberger & Wolf, 1934; Vollmer, 1946) also observed a distinct inflammatory reaction immediately before the spontaneous, suggestive, or chemically-induced healing of warts. In histological studies of warts undergoing remission in a patient treated by a suggestive procedure, Samek (1931) found a specific inflammatory reaction in the dermis consisting of dilation of blood vessels, hyperemia, edema, and perivascular infiltration of white blood cells. A number of earlier investigators (Sulzberger & Wolf, 1934; Zwick, 1932) had also hypothesized that vasomotor changes were crucial factors in wart remission and Ullman (1959) concluded from a thorough review of the literature that, when warts are affected by suggestions, an emotional reaction is induced in the patient and the mechanism of healing may depend on local vascular alterations which accompany the emotional reaction.

Similarly, alterations in the blood supply to the skin may play a role in the alleviation of congenital ichthyosis by suggestions. After dramatically ameliorating a case of congenital ichthyosiform erythrodermia by suggestions, Kidd (1966) hypothesized that the suggestions gave rise to an "ideovascular action" wherein nerve impulses acted on the vascular bed of the affected skin areas and influenced "the disturbed metabolism of affected tissue." Similarly, the enlargement of the mammary glands that was associated with suggestions may have been related to an increase in vascularity of the breasts. In brief, changes in blood flow and blood volume may be part of the mediating mechanisms that produce the phenomena I have discussed in this paper. This possible mediating mechanism is made more salient by recent studies, sum-

marized below, which have shown that many individuals either can control or can easily learn to control blood flow to localized areas of the skin and can thus also control localized skin temperature.<sup>2</sup>

### *Cognitive Control of Blood Flow and Skin Temperature*

Many individuals are aware from their own experience that strong feelings or emotions are associated with changes in blood supply to the skin; for instance, anger is associated with a red countenance (increased blood supply to the skin of the face) whereas fear is associated with a pale countenance. A series of studies extending back over many years has demonstrated that some individuals can *voluntarily* shift more blood to a specific area of the skin and can thus make the area warmer. Interesting data along these lines were reported by Wenger and Bagchi (1961) when they went to India to study the psychophysiological effects of yoga training. They found one yogi who was able voluntarily to raise the temperature of and to perspire from his forehead within ten minutes after he began meditation. The yogi stated that he learned to increase his feeling of warmth and to perspire at will when he spent two winters in caves in the Himalayas. Since it was very cold in the mountains, his guru advised him to concentrate on warmth and to imagine and visualize himself in a very warm place such as in the south of India. After about six months of practice, he found that he was able to make himself warm and even to

<sup>2</sup> Although I shall refer often simply to "blood flow" as a mediating variable in producing the effects discussed in this paper, other aspects of blood circulation are also involved. For instance, although changes in skin temperature are highly correlated with changes in blood flow, many other variables — e.g., blood pressure, blood volume, heart rate, and resistance of the vessels — also play complexly inter-related roles in affecting either or both blood flow and skin temperature.

perspire by allowing his cognitions — his imaginings, visualizings, and thoughts — to dwell on warm situations.

Another relevant study was carried out at the Menninger Clinic with Swami Rama (Green, Ferguson, Green, & Walters, 1970). During this investigation, the Swami stated that he was going to make one part of his palm much warmer than another part. Temperature transducers which had been placed on two sides of his palms showed that the temperature began to change and within a few minutes there was a 9°F difference between the two sides of his palm. Apparently, he accomplished this feat by voluntarily increasing the blood supply to one side of the palm and reducing the blood supply to the other side.

A series of additional reports, reviewed elsewhere (Barber, et al., 1974), showed that some individuals can voluntarily produce localized changes in blood flow and skin temperature. For instance, Menzies (1941) reported that three out of five subjects showed localized vasodilation on the hand (with a concomitant rise in skin temperature) when imagining steam escaping from a valve onto the hand and all five subjects showed localized vasoconstriction (with a concomitant drop in skin temperature) when imagining extreme cold. Duggan and Sheridan (1976) recently presented similar results.

In an earlier study, Hadfield (1920) also found that localized changes in skin temperature could be produced by suggestions. The subject participating in the investigation had exercised vigorously before the experiment and the temperature of both hands had reached 95°F. It was suggested to the subject that the right hand was becoming cold. Within half an hour the temperature of the right palm fell to 68° while the temperature of the left palm remained at 94°. The subject was next given the suggestion that the right hand was becoming warm; within 20 minutes the temperature of

the hand rose from 68° to 94°. Although sufficient data were not presented in the report to specify the mediating processes that were involved, I would hypothesize that when the subject was told that the hand was becoming cold or warm, the subject vividly visualized, imagined, and thought about previous cold or warm experiences and these “believed-in cognitions” were associated with the change in skin temperature.

A more recent experiment (Maslach, Marshall, & Zimbardo, 1972; Zimbardo, Maslach, & Marshall, 1970) similarly showed that some individuals can use self-suggestions to raise and also to lower their skin temperature. The three subjects who took part in this experiment had received practice in hypnosis; that is, practice in relaxing, concentrating, imagining vividly, and dissociating themselves from specific events. In the experimental session, each subject was given suggestions for deep relaxation (a “hypnotic induction procedure”) and then was asked to make one hand hot and the other hand cold. Several images were suggested that might be useful in changing the temperature of the hands and each subject was also encouraged to use self-suggestions and to utilize his own imagery. All three subjects succeeded in lowering the temperature of one hand (by 2° to 7° C) and two of the three were also able to raise the temperature of the other hand (by 2° C). When the subjects increased and decreased blood flow to the hands and thus raised and lowered the hand temperature, they were typically thinking and imagining that one hand was becoming red with anger while the other was becoming white with fear or that one hand was in a bucket of ice water while the other was under a heat lamp (Zimbardo et al., 1970). It appeared that the training the subjects had received in relaxing, concentrating, imagining, and dissociating was an important factor enabling them to alter the flow of blood to the hands

and thus alter the hand temperature. Subjects in a control group who had not received this training did not succeed in changing the temperature of their hands.

### *Biofeedback and Self-Regulation of Blood Flow*

Important recent studies utilizing biofeedback suggest that everyone may have the potential ability to control voluntarily the flow of blood to specific areas of the skin. Before we describe these studies, let us explain briefly how biofeedback is used.

Biofeedback means simply that an individual is obtaining information pertaining to what is occurring inside or on the surface of his body. The simplest form of biofeedback is when we measure our own heart rate by placing our hand on our chest above the heart or by picking up our pulse near the wrist or above the carotid artery. During recent years, however, a large variety of electrical or electronic instruments have been utilized to feed back information to the subject pertaining to what is occurring on his skin or internal organs. For instance, temperature sensors attached to the skin can inform subjects that their skin temperature is rising or lowering, and electrode leads attached to the back of the scalp can inform the subjects that certain "brain waves" such as the alpha rhythm are increasing or decreasing. These and other instruments — heart monitors, monitors of the electrical conductance or resistance of the skin, monitors of muscle activity, etc. — can provide information concerning what is happening in specific organs or parts of the body. This information is typically presented to the subject by a tone that varies in pitch or a visual display that varies in brightness as the function being monitored decreases or increases.

Using these type of biofeedback procedures, Taub and Emurian (1972) set out to

train individuals to control voluntarily the flow of blood to (and thus the temperature of) an index finger. Twenty subjects participated in four brief (15-minute) training sessions in which variations in finger temperature were indicated by variations in the brightness of a light. The subjects were told to try to make the light more intense or less intense; that is, to increase or decrease finger temperature and blood flow. To achieve the intended self-regulation of finger temperature, they were encouraged to imagine hot or cold stimuli impinging upon the finger. By the end of the four brief training sessions, 19 of the 20 subjects had attained control of finger temperature; on the average, they could voluntarily raise and also lower the finger temperature by about 2.5°F. After additional training, they were able to raise and also to reduce the temperature of the finger as easily with or without biofeedback, and they retained the ability to vary the temperature when retested after an interval of four to five months.

Subsequent work by the same investigator (Taub, 1977) showed that, after receiving additional training, some subjects (a) could raise or lower the temperature on localized areas of the skin as much as 8° to 15° F in 15 minutes, (b) could maintain a considerable increase in localized skin temperature for about 45 minutes while performing a concurrent task, and (c) could keep their skin warm when placed in very cold environments.

These studies have broad implications. They indicate that we can learn, within a reasonably brief period, to produce substantial changes in blood flow to the periphery of our body, we can maintain this changed blood supply over substantial periods of time, and we can use this skill for practical purposes such as keeping warm in a cold environment. Taub (1977) has also pointed out that the self-regulation of temperature through control of blood flow could also be

useful in (a) protecting against cold injury, (b) producing temporary sterility in males by elevating the temperature of the scrotum (cf., French, Leeb, & Fahrion, 1974), (c) treating ailments such as migraine headaches and Raynaud's disease which involve impaired circulation, (d) reducing edema and pain following tissue damage, (e) reducing the size of warts or tumors by influencing blood flow to the area of the tumors, and (f) promoting the healing of wounds by increasing blood flow to the affected area (Chapman, Goodell, & Wolf, 1959).

### *Cognitive Control of Blood Supply to Sexual Organs*

Before we close our discussion on the self-regulation of blood flow and temperature, let us glance briefly at how normal individuals control the flow of blood to one specific part of the body; namely, to the genital organs. Sexual arousal is basically a blood flow phenomenon. As a man becomes sexually aroused, more and more blood enters and remains in his penis. Similarly, as a woman becomes sexually aroused, more and more blood flows into the sexual organs and gives rise, for example, to enlargement of the breasts, erection of the nipples, erection of the clitoris, and engorgement of the labia.

The important point here is not just that sexual arousal is intimately related to blood flow and temperature change in the genital areas, but that normal men and women are able to self-regulate this blood flow by their cognitions; that is, by their thoughts, images, imaginings, and feelings. A man does not become sexually aroused by a woman that he finds unappealing; he becomes aroused when he thinks, feels, or "cognizes" the woman in a positive way. Similarly, arousal in a woman is related to how she perceives the man. In other words, thoughts, feelings, and imaginings or, in

more general terms, "cognitions" affect the flow of blood to the sexual organs.

It needs to be underscored that blood flow to the genital organs can be controlled voluntarily. A series of recent studies (Laws & Rubin, 1969; Henson & Rubin, 1971; Rosen, Shapiro, & Schwarz, 1975) have demonstrated that most men are able to produce a small degree and some men are able to produce a large degree of penile tumescence or erection when they are simply asked to do so. These studies also showed that "this normal ability to produce penile engorgement can be increased by biofeedback procedures" (Rosen et al., 1975), but the important point here is not that biofeedback can improved the performance but that normal men can voluntarily control blood flow to the penis by *controlling their cognitions*. As Rosen et al. (1975) pointed out, "It seems that subjects who are readily able to conjure up sexual images or fantasies are able to utilize these images to 'voluntarily' control the engorgement of the penile *corpora*." In other words, healthy men are either able to or can potentially control blood flow to the genital areas by deliberately focusing or shifting their thoughts and imaginings. For instance, they can produce an erection by turning their thoughts and visualizations to a woman they love and then focusing on those aspects of her being that they view as especially pleasing and desirable; and they can then lose the erection by turning their thoughts away from the beloved woman to other extraneous concerns.

The way our cognitions affect blood supply to the genital areas is the most dramatic and clearest example of how our thoughts, images, and feelings, produce variations in the blood supply to various parts of our body. The data summarized in this paper suggest the exciting possibility that blood flow not only to the genital areas, but also to other parts of the body, for example, to the skin, is continually affected to some de-

gree by how we are thinking, feeling, and experiencing.

### INTEGRATION AND SUMMARY

Let us now integrate the data pertaining to blood flow and relate them to the five phenomena we described in detail in the first part of this paper.

1. Blood flow to the sexual organs is affected by cognitions; that is, by thoughts, feelings, and imaginings. this phenomenon occurs in all healthy individuals regardless of whether or not they are aware of how their cognitions affect their sexual organs.

2. Many individuals are aware, and apparently all healthy individuals potentially can become aware, that they can shift blood to the sexual organs by thinking, fantasizing, or imagining arousing sexual situations.

3. Although there can be little disagreement that cognitions affect blood flow to the sexual organs, it is not as obvious that cognitions also affect blood flow to the skin (and other organs). Nevertheless, data, such as the following, indicate that our thoughts, feelings, and imaginings alter the blood supply of localized cutaneous areas: (a) Many individuals are experientially aware of changes in blood supply to the skin that are associated with strong feelings or emotions — the red face of anger or rage, the pallor or pale countenance of fear, and the blush of shame. (b) Some individuals can clearly self-regulate blood flow to the hands or to localized cutaneous areas. In general, these individuals shift blood to specific areas by thinking or imagining that cold or warm objects are stimulating the area. (c) Recent data indicate that, with a short period of training, e.g., one hour, possibly all healthy individuals can learn to increase and decrease blood flow to localized areas of the skin. The training that seems especially helpful involves biofeedback; that is, the individual tries to increase

or decrease the temperature at a specific area on his skin (and thus to increase or decrease the blood flow to the area) while receiving continuous information pertaining to moment-by-moment variations in the temperature of the area.

4. We can begin to explain the phenomena discussed in this paper if we accept the contention that blood supply not only to the sexual organs but also to the skin (and possibly other organs of the body) is affected by thoughts, feelings, imaginings, and other cognitive processes. If we accept this contention, then we can postulate that “believed-in suggestions,” which are incorporated into ongoing cognitions, affect blood supply in localized areas and the altered blood flow, in turn, plays a role in producing all five of the phenomena that were described in detail in the first part of this paper. Specifically, the altered blood flow plays a role in (a) reducing the dermatitis produced by a poison ivy-like plant (Ikemi & Nakagawa, 1962), (b) giving rise to a degree of dermatitis when the poisonous plant is not actually present (Ikemi & Nakagawa, 1962), (c) producing a localized skin inflammation that has the specific pattern of a previously experienced burn (Johnson & Barber, 1976), (d) curing warts that have been present for a long period of time (Johnson & Barber, 1978), (e) ameliorating congenital ichthyosis (Kidd, 1966; Mason, 1952; Schneck, 1966; Wink, 1961) and, (f) stimulating the enlargement of the mammary glands (Staib & Logan, 1977; Willard, 1977; Williams, 1974). Further research is needed to delineate much more precisely how suggestions which are accepted and incorporated into ongoing cognitions are related to changes in blood flow and how alterations in blood flow, in turn, are related to the phenomena I have described in this paper.

Proseminar Institute, Research Division  
P.O. Box 312  
Medfield, MA 02052

## REFERENCES

- ALLINGTON, H. V. Sulpharsphenamine in the treatment of warts. *Archives of Dermatology and Syphilology*, 1934, 29, 687-690.
- ALLINGTON, H. V. Review of psychotherapy of warts. *Archives of Dermatology and Syphilology*, 1952, 66, 316-326.
- BARBER, T. X. *Hypnosis: A scientific approach*. New York: Van Nostrand Reinhold, 1969. (Republished in 1976 by Psychological Dimensions, Inc., 10 W. 66 St., New York, 10023.)
- BARBER, T. X. *LSD, marihuana, yoga and hypnosis*. Chicago: Aldine, 1970.
- BARBER, T. X. Experimental hypnosis. In B. B. Wolman (Ed.) *Handbook of general psychology*. Englewood Cliffs, N. J.: Prentice-Hall, 1973. Pp. 942-963.
- BARBER, T. X. (Ed.) *Advances in altered states of consciousness and human potentialities, Vol. 1*. New York (10 W. 66 St.): Psychological Dimensions, 1976.
- BARBER, T. X. & HAM, H. W. *Hypnotic phenomena*. Morristown, N.J.: General Learning Press, 1974.
- BARBER, T. X., SPANOS, N. P. & CHAVES, J. F. *Hypnosis, imagination, and human potentialities*. Elmsford, N.Y.: Pergamon Press, 1974.
- BARBER, T. X., WILSON, S. C. Hypnosis, suggestions and altered states of consciousness: Experimental evaluation of the new cognitive-behavioral theory and the traditional trance state theory of "hypnosis". *Annals of the New York Academy of Sciences*, 1977, 296, 34-47.
- BIBERSTEIN, H. Immunization therapy of warts. *Archives of Dermatology and Syphilology*, 1944, 50, 12-22.
- BLOCH, B. Ueber die Heilung der Warzen durch Suggestion. *Klinische Wochenschrift*, 1927, 6, 2271-2275, 2320-2325.
- BONJOUR, J. Influence of the mind on the skin. *British Journal of Dermatology*, 1929, 41, 324-326.
- CHAPMAN, L. F., GOODELL, H. & WOLFF, H. G. Increased inflammatory reaction induced by central nervous system activity. *Transactions Association of American Physicians*, 1959, 72, 84-109.
- DESTEFANO, R. The "inoculation" effect in think-with instructions for "hypnotic-like" experiences. Doctoral dissertation, Temple University, Philadelphia, 1977.
- DUDEK, S. Z. Suggestion and play therapy in the cure of warts in children: A pilot study. *Journal of Nervous and Mental Disease*, 1967, 145, 37-42.
- DUGAN, M., & SHERIDAN, C. Effects of instructed imagery on temperature of hands. *Perceptual and Motor Skills*, 1976, 42, 14.
- FRENCH, D., LEEB, C., & FAHRION, S. Self-induced scrotal hypothermia: An extension. Paper presented at meeting of Biofeedback Research Society, Colorado Springs, 1974.
- GREEN, E. E., FERGUSON, D. W., GREEN, A. M., & WALTERS, E. D. Preliminary report on Voluntary Controls Project: Swami Rama. Topeka, Kansas: Research Department, Menninger Foundation, 1970.
- GRUMACH, L. Ueber Suggestivbehandlung von Warzen. *München medizinisch Wochenschrift*, 1927, 74, 1093-1094.
- HADFIELD, J. A. The influence of suggestion on body temperature. *Lancet*, 1920, 2, 68-69.
- HENSON, D. E., & RUBIN, H. B. Voluntary control of eroticism. *Applied Behavioral Analysis*, 1971, 4, 37-44.
- IKEMI, Y., & NAKAGAWA, S. A psychosomatic study of contagious dermatitis. *Kyushu Journal of Medical Science*, 1962, 13, 335-350.
- JOHNSON, R. F. Q., & BARBER, T. X. Hypnotic suggestions for blister formation: Subjective and physiological effects. *American Journal of Clinical Hypnosis*, 1976, 18, 172-181.
- JOHNSON, R. F. Q., & BARBER, T. X. Hypnosis, suggestions, and warts: An experimental investigation implicating the importance of "believed-in efficacy". *American Journal of Clinical Hypnosis*, 1978, 20, 165-174.
- KATZ, N. W. Comparative efficacy of sleep/trance instructions and behavior modification procedures in enhancing hypnotic suggestibility. Doctoral dissertation, Washington University, St. Louis, Mo., 1975.
- KIDD, C. B. Congenital ichthyosiform erythrodermia treated by hypnosis. *British Journal of Dermatology*, 1966, 78, 101-105.
- LAWS, D. R., & RUBIN, H. B. Instructional control of an autonomic sexual response. *Applied Behavioral Analysis*, 1969, 2, 93-99.
- LECROON, L. M. Breast development through hypnotic suggestion. *Journal of the American Society of Psychosomatic Dentistry and Medicine*, 1969, 16, 58-61.
- MASLACK, C., MARSHALL, G., ZIMBARDO, P. Hypnotic control of peripheral skin temperature. *Psychophysiology*, 1972, 9, 600-605.
- MASON, A. A. A case of congenital ichthyosiform erythrodermia of Brocq treated by hypnosis. *British Medical Journal*, 1952, 2, 422-423.
- MASON, A. A. Ichthyosis and hypnosis. *British Medical Journal*, 1955, 2, 57.
- MEMMESHEIMER, A. M., & EISENLOHR, E. Untersuchungen über die Suggestivebehandlung der Warzen. *Dermatologie Zeitschrift*, 1931, 62, 63-68.

- MENZIES, R. Further studies of conditioned vasomotor responses in human subjects. *Journal of Experimental Psychology*, 1941, 29, 457-482.
- PATTIE, F. A. The production of blisters by hypnotic suggestions: A review. *Journal of Abnormal and Social Psychology*, 1941, 36, 62-72.
- PAUL, G. L. The production of blisters by hypnotic suggestion: Another look. *Psychosomatic Medicine*, 1963, 25, 233-244.
- ROSEN, R. C., SHAPIRO, D., & SCHWARTZ, G. E. Voluntary control of penile tumescence. *Psychosomatic Medicine*, 1975, 37, 479-483.
- RUCH, J. C. Self-hypnosis: The result of heterohypnosis or vice versa? *International Journal of Clinical and Experimental Hypnosis*, 1975, 23, 282-304.
- SAMEK, J. Zum wesen der Suggestiven Warzenheilung. *Dermatologische Wochenschrift*, 1931, 93, 1853-1857.
- SARBIN, T. R., & COE, W. C. *Hypnosis: A social psychological analysis of influence communication*. New York: Holt, Rinehart, & Winston, 1972.
- SCHNECK, J. M. Hypnotherapy for ichthyosis. *Psychosomatics*, 1966, 7, 233-235.
- SULZBERGER, M. B. & WOLF, J. The treatment of warts by suggestion. *Medical Record*, 1934, 140, 552-557.
- TAUB, E. Self-regulation of human tissue temperature. In G. E. Schwartz and J. Beatty (Eds.) *Biofeedback: Theory and research*. New York: Academic Press, 1977.
- TAUB, E., & EMURIAN, C. S. Self-regulation of skin temperature using a variable intensity light. In J. Stoyva, T. X. Barber, L. V. DiCara, J. Kamiya, N. E. Miller, and D. Shapiro (Eds.) *Biofeedback and self-control: 1972*. Chicago: Aldine, 1973, p. 504.
- ULLMAN, M. On the psyche and warts: I. Suggestions and warts: A review and comment. *Psychosomatic Medicine*, 1959, 21, 473-488.
- VOLLMER, H. Treatment of warts by suggestion. *Psychosomatic Medicine*, 1946, 8, 138-142.
- WENGER, M. A., & BAGCHI, B. K. Studies of autonomic functions in practitioners of Yoga in India. *Behavioral Science*, 1961, 6, 312-323.
- WILLIAMS, J. E. Stimulation of breast growth by hypnosis. *Journal of Sex Research*, 1974, 10, 316-326.
- WILSON, S. C., & BARBER, T. X. The Creative Imagination Scale As A Measure of Hypnotic Responsiveness: Applications to experimental and clinical hypnosis. *American Journal of Clinical Hypnosis*, 1978, 20, 235-249.
- WINK, C. A. S. Congenital ichthyosiform erythrodermia treated by hypnosis: Report of two cases. *British Medical Journal*, 1961, 2, 741-743.
- ZIMBARDO, P. G., MASLACH, C., & MARSHALL, G. Hypnosis and the psychology of cognitive and behavioral control. Department of Psychology, Stanford University, 1970.
- ZWICK, C. G. Hygiogenesis of warts disappearing without topical medication. *Archives of Dermatology and Syphilology*, 1932, 25, 508-521.