The Emerging Concept of the Osteopathic Lesion*

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INTRODUCTION

The survival, growth, achievements, and increasing effectiveness of osteopathy are eloquent testimony to the soundness of the principles upon which it was founded. The attainments of the osteopathic profession have been possible only because the profession is founded upon the solid rock of basic truth. Its continued growth and prestige indicate that those truths continue to be correctly applied and soundly developed.

The time has come, however, when increasing attention must be given to the theoretical reserves upon which continued technical advance is predicated. For many reasons these reserves have been consumed far more rapidly than they have been replenished. In osteopathy, as in all technological aspects of modern life, large backlogs of fundamental information must be maintained and enlarged if continued practical advances are to be assured. They are, indeed, the springs from which the advances flow.

In osteopathy these reserves consist of our understanding of the basic biological processes and mechanisms associated with the phenomenon designated as the osteopathic lesion. Today this understanding is not, or at least until a very few years ago was not, a great deal larger than in Still's day. Although knowledge of the mechanisms of the lesion (the "cause") and of its clinical manifestations (the "effect") has greatly advanced, there has been no parallel advance in our knowledge of the processes intervening between these two aspects of the problem.

These processes are the problems before us today. Given a lesion—so well known to osteopathic physicians through their trained fingers and through x-rays—how does it produce its effects? Through what mechanisms and channels does it "impair" the defensive, reparative, and homeostatic functions of the body? How does it "cause" disease? How does it upset physiological equilibrium? What processes does it initiate? The very future of osteopathy, as a distinct and advanced system of practice, is directly related to the accuracy and thoroughness with which these questions can be answered in the next few years.

It is my purpose in this paper to present our current theories regarding these central aspects of the osteopathic lesion. Then I wish to draw some of the practical implications of these emerging concepts. Paradoxically, I shall present our current theories by dealing to a large extent with other matters. It is possible to do this because those other matters are so intimately, and sometimes inseparably, related to the osteopathic lesion. The discovery of these relations is as important as the discovery of the new facts about the lesion itself because, with the establishment of each such relation, a whole body of knowledge, ready-made and usually still growing, is automatically incorporated into the osteopathic concept. With every such incorporation our concepts, in which clinical and professional advances have their origin, are deepened and widened.

The history of science—physical, biological, or medical—records again and again the collapse of fences separating scientific and technical fields. As a result of certain fundamental discoveries entire fields of scientific pursuit, whole schools of thought, and major concepts begin to develop and attract disciples. These fields may develop independently and remain separate, one from the other, and apparently unrelated, for many years. However, as the knowledge and understanding within each field accumulates, through experience and research, it becomes apparent in many cases that the walls which separate these fields have very little substance; in fact, they exist only in the minds of men, and not in nature itself. Each field begins to draw from, and give to the other, new and additional meaning. Finally they merge.

Nowhere is this better illustrated than in the fields of immediate interest to the osteopathic profession. I have selected for discussion only three major fields which, from our perspective, appear to have much basic and distinctive substance in common. Each has yielded a major body of concepts, a school of thought or a school of practice. Each originated independently, at different periods and in three different countries, separated by thousands of miles, and under very different circumstances. Today they are adjoining fields and the fences between them are crumbling. They have in common the following general concepts:

1. The body is a unit; all parts function in the context of the entire organism.
2. Disease is a reaction of the organism as a whole: Abnormal structure or function in one part
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3. The organism has the inherent capacity to defend itself, to repair itself, and to resist serious upsets in equilibria.
4. The nervous system plays a dominant organizing role in the disease processes.
5. There is a somatic component to every disease which is not only a manifestation of the disease, but an important contributing factor.
6. Appropriate treatment of the somatic component has important therapeutic value in that it leads to improvement in the other components.

The concepts I refer to are: (1) the osteopathic, (2) the concept of referred pain and associated phenomena, and (3) the concept of disease developed by A. D. Spinarsky and his colleagues in Leningrad. These concepts have not only had very different origins, but very different courses of development.

The osteopathic concept soon led to the development of a most effective therapeutic weapon which became, and for more than 60 years has been the basis for a new and expanding school of practice. From the beginning, this weapon—osteopathic manipulative therapy—was so revolution and so effective that the major concern of its designers, developers, and practitioners was with: (1) Learning how to use it most effectively, (2) winning the right to use it, (3) determining its effects on the various ills to which man is heir, and (4) reproducing the weapon, winning recruits, putting the weapon in their hands and teaching them how best to use it.

Possessed of such a weapon, but with few other material resources, and preoccupied with those struggles in the face of opposition, it is understandable that the founders, the disciples, and the earlier practitioners of this school found it impossible to engage in the more leisurely pursuits of investigating experimentally the fundamental basis for the effectiveness of their therapeutic weapon.

The founders of the other two schools did not, however, strike upon new therapeutic measures in the early development of the concepts. They and their disciples, therefore, devoted themselves to seeking the mechanisms whereby pathological processes are initiated, and the channels whereby pathology of one part affects others. These investigations have led to extensive research programs which are now conducted throughout the world and which have won much support and many recruits.

These two research programs have made available a great wealth of information, which has led to some sound theory. This, in turn, like all good theory, is today leading to good practice. New and promising forms of therapy are emerging from the work of these schools. It is to be expected that these forms of therapy, experimental though they may be today, but based as they are on rapidly expanding bodies of fundamental knowledge, will rapidly develop and increase in applicability and effectiveness. As I hope to demonstrate, both of these fields of investigation are actually concerned with certain fundamental aspects of the osteopathic lesion, though they may not be recognized as such.

In preparing this lecture, I have found it convenient to review the work of these two fields—referred pain and the work of the Spinarsky school—before summarizing the emerging concept of the osteopathic lesion, since that concept is emerging, not only from osteopathic research and experience, but from their integration with contributions of these two schools in particular.

REFERRED PAIN AND ASSOCIATED PHENOMENA

This field of investigation had its most important beginnings in England in the work of Sturge,7 Ross,5 Head,4 Mackenzie,6 and others in the early 80's and 90's. More recently important contributions have been made by Sir Thomas Lewis and his co-workers,9 also in Britain, and by a number of laboratories and medical institutions in this country. These workers were primarily concerned with the somatic manifestations of visceral disease, especially the somatic pain, and with related phenomena.

Even very superficial study in the field of referred pain reveals the close resemblance of this syndrome to the osteopathic lesion. Mackenzie,6 for instance, many years ago spoke of the triad of somatic manifestations of visceral pathology: (1) referred pain, (2) hyperalgesia, and (3) motor phenomena.

1. Referred Pain.—In many cases, the pain of visceral disease is felt not in the organ itself, but is referred to the soma, that is, skin, muscles, etc. Very often these somatic structures do not overlie the area of disease and may be remote from it. It was soon demonstrated, however, that the zone of reference bears a segmental relationship to the area of origin; both are innervated from the same segments of the spinal cord. The pain is said to be referred to the corresponding dermatome and myotome. Many examples are familiar to the physician: The pain of angina pectoris, originating in the myocardium and referred to the chest wall, the back, shoulder, and medial surface of the arm; renal colic, which produces intense pain in the lower back and groin; irritation of the diaphragm which is referred to the base of the neck and shoulder tip.

2. Hyperalgesia.—Tenderness is also found in somatic structures segmentally related to the pathological viscus:
   a. Cutaneous tenderness—the over-sensitivity to pinching and to friction in the dermatomes related to the sick viscus;
   b. Muscular tenderness and exaggerated sensitivity of the muscles to deep pressure; and
   c. Tender spinous processes. Interestingly enough to osteopathic physicians, Mackenzie6 placed great diagnostic significance on the tender spinous processes. He demonstrated, for instance, that diseases of the heart were commonly associated with tender spines T1 to T4; stomach, with T4 to T8; liver, with T8 to T11; rectum and uterus, L5 to S2.

3. Motor Phenomena.—Mackenzie described the spasm, sustained contraction, and rigidity in muscles segmentally related to the pathological organ. He included under motor phenomena the averse changes in the zone of reference although they properly belong in a fourth category.

What is the basis for the "referred pain complex"? Much of the final answer is certain to be found in the spinal cord (Fig. 1). There is obvious interchange of excitation among all the types of neurons which meet or have their origin in a given segment of the spinal cord: The dorsal root (afferent) fibers conveying centripetal impulses from all the tissues, somatic and visceral; the various efferent or motor neurons, including those which have their cell bodies in the anterior horn and which regulate activity of the skeletal musculature, and those originating in the intermediolateral column which regulate visceral...
activity (motor and sensory), sweat gland activity, vasomotion, etc. The sympathetic fibers which carry sensation of pain to the higher centers are also partially involved in this complex. Although the sympathetic fibers can be excited by impulses transmitted by the afferent fibers from the viscera, particularly the central nervous pathways or "reflexes" of the somatic structures with afferent fibers from the same spinal roots. (See the paper by Drescher for a review of the mechanism.)

On the basis of these observations, Madison developed the hypothesis of the "irritable focus." This hypothesis stated, in essence, that irritation from the viscera, conveyed by the afferent fibers, renders the nerves in the same segment hypervascular. As a result, tissues and organs innervated from that same segment are affected by the vascular pathology. The "irritable focus" hypothesis has since been modified and modified in accordance with more modern concepts of facilitation.

More recently, Lewis and his colleagues, J. H. Beier, showed that the phenomenon of pain referred was not peculiar to visceral irradiation, since similar and even identical patterns ("trigeminal") could be produced by injection of deep-lying sciatic structures. They found that injection of 0.1 to 0.5 cc. of 6 per cent sodium chloride solution into certain ligaments, tendons, and muscles produced reference to relatively large and often remote areas of the corresponding dermatome and myotome. The pain referred was accompanied by the other components of the classical triad, namely, emaciation and muscular hypotonia and muscular rigidity.

Even more striking was the demonstration that such localized irritation of the interosseous ligaments or spinal extensor muscles in certain segments, reproduced with remarkable fidelity the pain patterns and other somatic phenomena which are associated with visceral pathology. This was true to such an extent that patients who had experienced the real disease could not distinguish between the experimentally induced and the naturally occurring syndrome. For instance, the injection of the eight cervical interosseous ligament with the hyperbaric saline solution produced a perfect facsimile of an original attack, not only with respect to pain distribution (including the substernal pain and the radiation down the upper surface of the arm), but also the hypotonia of the musculature, rigidity, and the series of compressions of the chest. Intravenous injection of substances into the cervical or aortic region produced the typical pain distribution in the extremity (lower back, lower abdomen, groin, and scrotum), rigidity of abdominal and spinal muscles, hypotonia, and often a marked constitutional reaction to the corresponding side. (In our own laboratory, we have not only confirmed these observations, but have demonstrated the effects of anesthesia.)

Furthermore, these workers and others demonstrated that experimental trauma to certain visceral
organs produced recordable contractions of skeletal muscles in corresponding segments. These contractions could be almost perfectly reproduced (with respect to location, amplitude, and time characteristics) by irri-
tation of certain somatic structures in the same seg-
ment. (Studies on the converse, namely the influence of somatic irritations on visceral function, are in pro-
gress in our laboratories.)

It may be concluded from these observations that not only does irritation or pathology in one tissue or organ stir up abnormal activity of other tissues in the corresponding segments, but that the complex—the pattern of the overall response to the primary pathol-
ogy—is organized by the spinal cord. The character
of the pattern is determined by the segment or seg-
ments which are involved, and not by the tissue which
is first irritated (somatic or visceral) nor by the nature
of the irritation.

It was early recognized by workers in this field
that the secondarily irritated structures, that is, those
tissues in the zone of reference, may themselves, as
a result of this pathological influence, become sec-
ondary sources of irritation—leading to the establish-
ment of a vicious cycle. This recognition has formed
the basis for certain important therapeutic measures
which have been begun to emerge from this work. Give
such a pattern, including visceral pathology and the
reference phenomena, then why not eliminate the irri-
tation contributed by the most accessible part of the
complex—the somatic component? The poten-
tialities of this approach were indicated 20 years ago by Weiss
and Davis who showed that at least the pain,
due to visceral pathology, could be relieved by local anes-
thetization of the skin areas to which the pain is
referred. It is of special interest that the relief from
pain often outlasted the expected duration of the local
anesthesia by considerable periods of time.

Other work (reviewed by Wolff and Hardy and
Wolff and Wolfe) has demonstrated that the sus-
tained muscular contractions or spasms which are part
of the referred pain patterns, may themselves com-
prise sources of irritation. Local infiltration of the
rigid muscles, identified by palpation, relaxed those
muscles, relieved the pain, and often produced im-
provement in the associated autonomic disturbances.

This general approach has been receiving clini-
cally significant development in the hands of Trainell
and her colleagues at Cornell University Medical Col-
lege. They were able to produce complete and imme-
diate relief from cardiac pain due to myocardial infarct
by infiltrating appropriate trigger areas with dilute pro-
caine hydrochloride. These were intensely hyper-
esthetic areas located in the myofascial structures of the
reference zone (usually in the pectoralis major, pectora-
lis minor, or serratus anterior). When sufficiently near
the surface the trigger areas could also be effectively
blocked by spraying the overlying skin with ethyl chlor-
ide. Relief from pain was not only immediate, but last-
ing. Relief was obtained for periods of months and even
years. It is of interest that when similar trigger areas, in
patients with skeletal muscle disorders without or-
ganic disease, are irritated, as by needling, referred
pain occurs "which is indistinguishable in distribution
and quality from the subternal and radiating pain of
coronary insufficiency."

Of interest to those familiar with the osteopathic
concept and the current theories of the osteopathic
lesion are the explanations of these observations pro-
based by these workers. Thus Trainell and Rinzler say,
"The most reasonable explanation is that the
initial insult, whether to visceral or somatic structures,
sets in motion a chain of events perpetuated by a
vicious cycle of nerve impulses which have no further
dependence on afferent impulses from the heart and
which are probably transmitted to and from the soma
by virtue of sustained facilitation of the noxious im-
pulses by the closed self-re-ecciting chains of inter-
nuclear neurons in the central nervous system." Appar-
ently, even brief interruption of this self-
sustaining cycle of nerve impulses at any point in the
chain may be effective in permanently abolishing it.

In explanation of the lasting effect of this brief
interruption by local somatic block therapy they offer
the possibility that the "somatic trigger mechanisms
contribute to the perpetuation of the primary source
of pain," that is, the coronary insufficiency. In support
of this hypothesis they refer to the evidence obtained
by Lindgren and local anesthetization of the pre-
cordial structures produced improvement in the cor-

3. Infiltration of the appropriate and specific somatic
structures dramatically relieved disorders of vision,
respiration, motor power, and cutaneous sensation
(e.g., glove-and-stocking paresthesiae). The concept
is advanced that "high intensity stimuli from somatic
trigger areas reflexly produce prolonged vaso-
constriction with partial ischemia in localised areas of
the brain, spinal cord, or peripheral nerve structures." The
authors point out that, in these patterns, raising the
threshold of excitability at the synapse in the central
nervous system directly, by general anesthesia, hyp-
nosis or psychotherapy, may be expected to accomplish
the same result as blocking the source of noxious
impulses at the somatic trigger area.

No attempt has been made in this section to review
this field, but rather to present a few outstanding
examples and to establish several important concepts.
(For more comprehensive reviews see references 8,
14, and 15.) These may be summarized as follows:
1. There is extensive interchange, through the
spinal cord, among the various structures, visceral and
somatic, blood vessels, glands, smooth muscle, skeletal
muscle, skin, etc., which draw their innervation from
the same segment.
2. Pathology or irritation of one of these struc-
tures may lead to the establishment of a pattern of
changes in all the others. The pattern is determined
more by the nature of the nervous system affected
than by the irritant structure or nature of the irritation.
3. As a result of these associated pathological
processes new sources of irritation may be produced,
which lead to the establishment of an autogenic
vicious cycle of nervous impulses.
4. Interruption of this cycle for even a brief period may permanently prevent, or greatly delay its re-establishment, permitting the reparative processes (e.g., in the viscera) to proceed under more favorable circumstances.

5. Highly localized areas in skeletal muscle or articular structures frequently become important sources of referred impulses in these complexes, reinforcing or facilitating the primary irritation, or even becoming independent of it. Inactivation of the nociceptive component of the pattern associated with visceral pathology, may disrupt the pattern and break the vicious cycle.

6. This has therapeutic import, not only because the nociceptive component is accessible and easily localized, but also because it may be the most important factor in sustaining the (primary) pathology.

7. The patterns are not exclusively segmental, in view of the involvement of the vasculature of the central nervous system. Vasospasm in the brain, spinal roots, or nerves may produce secondary effects quite far removed from the locus of primary irritation.

THE WORK OF THE EMERGING LABORATORY

If we go into the elaborates detail which the work of Speranze26 and his coworkers deserve, let us summarize the main conclusions to which their extensive laboratory and clinical observations have led.

1. The nervous system not only participates in every disease but plays a dominant role in organizing the pathological processes and their various manifestations.

2. Sustained irritation, inflammation, or pathology of nerves, skin, bone, vessels, or nervous structures leads to secondary consequences in the nervous system which may lead to certain functional and organic changes designated as "neurodegeneration." Once initiated, the process in the nervous system cannot be reversed as the excitability of the intact nervous system is initially established by irritative processes, predisposing to disease, though they may be masked for some time. These segments are, so to speak, the vulnerable segments of the nervous system which may serve as loci of disease processes under certain circumstances.

This concept bears a distinct resemblance to that originally developed by Mackenzie, the concept of the sequestration of the areas of "excitability" beyond the periphery of the spinal segments, rather than upon the spinal column itself. The "sequestration" results from individual to individual, and within the individual from time to time according to circumstances, environmental influences, etc. The disease—and the therapy—must be considered in the context of the patient as a whole.

3. The nature of the process, and its final extension, are independent of the nature of the irritation—chemical, physical or biological. The biological systems—the mucosal, biliary, visceral, etc.—act fundamentally in the same way as the chemical and physical stimuli; they merely initiate the process, which then runs independent of the primary pathology.

4. The role of the nervous system appears to be played upon much slower processes than nerve impulses—irritable processes. (Sparsely innervated cells have a greatly increased sensitivity of their receptor elements, as indicated by the recent observations of Wyss,89 and Schneid,90)

5. As a result of the primary lesion, lasting and pathologically demonstrable effects on the nervous system may be produced which may remain latent for long periods of time. The signs of the new irritation may long have disappeared before the first signs of the disease appear.

A recent dramatic illustration of changes is the case which presented after the healing of the original lesion appeared in a report by Franklin.91 The first signs of cutis were injected with turpentine, producing pain and inflammation, and the typical long and limb-walking pattern. After some time the irritation disappeared, no signs of the inflammation were detectable, and the animal no longer limped or "warred" the paw. At this time the cat was desensitized, and it was found that the postures assumed by the animal were similar to those produced when a derivate turpentine receives intense attention upon the foot corresponding to that which had had the lesion, namely, section of the sciatic and spinal roots. In other words, reflex signs of the original irritation reappeared, although that irritation had apparently vanished. Furthermore, this new lesion had no apparent effect on the sciatic, or spinal cord; the altered state persisted for some time after the precipitating lesion had inactivated, but was masked by section of the higher centers. Removal of both forelimbs of the foal permitted the observation of the altered state to re-emerge. Speranze insisted, also, that such states, in the nervous system, originally established by irritative processes, predispose to disease, though they may be masked for some time. These segments are, so to speak, the vulnerable segments of the nervous system which may serve as loci of disease processes under certain circumstances.

7. The effect of a given irritation, that is, the disease pattern it evokes, if any, depends largely on the condition of the "substratum," the patient and his nervous system, rather than upon the irritation itself. The "substratum" varies from individual to individual, and within the individual from time to time according to circumstances, environmental influences, etc. The disease—and the therapy—must be considered in the context of the patient as a whole.

8. These concepts are today providing the basis for therapy. Attention is focused, not on the offending organism, irritant, or primary lesion, but rather on the nervous system, and more specifically on those parts (e.g., spinal segments) which control the disease process. In fact, the therapy is to alter the balance of nervous factors in such a manner as to provide optimal circumstances for the operation of the normal reparative and defensive processes of the body.

These principles were illustrated in a large series of cases of osteopathic lesions,26,85 Speranze and his coworkers had previously demonstrated in experimental animals. It is of interest that Speranze's work was upon turpentine and that was later used by Dr. Speranze's father, Dr. A. Speranze, in the treatment of patients suffering from osteopathic problems.
mental animals that intense stimulation of sensory nerve endings in muscle and skin, in areas innervated from the medulla oblongata and upper segments of the cord, or direct mechanical and chemical stimulation of these parts of the nervous system, could produce profound pulmonary changes, very similar to pneumonia. These changes in the lung may develop within a few minutes. "Treatment must therefore be directed not only at the diseased lung but also at the associated nervous disturbance... This suggested that treatment of pneumonia in men be directed at the nerve segments involved. ... The above experiments showed that the nerve regions involved were connected with the cervical-thoracic segment of the spinal cord and the adjacent medulla oblongata. The anterior branches of this segment, except those supplying the head, neck and extremities, supply the organs of the chest and medias tinum specifically involved in pneumonia. But the posterior branches of these nerves are distributed in the lung muscles and skin of the spine and neck. Thus, by anesthetizing these posterior branches which have no direct connection with the lungs we shall affect through other axons specific nerve segments of the lung."

In several hundred cases of lobar pneumonia in soldiers during the Finnish campaign and during World War II remarkable results were obtained by injecting 60 to 70 cc. of 0.5 per cent novocain intradermally into a diamond-shaped area extending sagittally from C3 to T4 and covering the medial halves of the scapulae. The treatment, when given early, is usually followed by a drop of temperature by crisis to normal within 18 to 24 hours; in some cases a drop by lysis occurs within 48 hours. Resolution of the pneumonic consolidation begins as the temperature drops and the general condition improves. Convalescence is short and uneventful. The treatment is non-specific since beneficial results were obtained also in acute or chronic catarrhal pneumonia, and the type of pneumococci responsible for the disease did not influence the effectiveness of the treatment. "Laboratory and clinical data support the belief that the therapeutic result is affected more by the site of the application than by the drug."§

THE OSTEOPATHIC CONCEPT

The basic principles of the practice of osteopathy need not, of course, be reviewed in detail for an osteopathic audience. We shall state them briefly, paraphrasing them somewhat, with the foregoing in mind, and review the basic processes through which these principles operate as they have been revealed by recent researches in osteopathic and other institutions.

1. A. T. Still fully recognized, and for the first time incorporated into a system of practice, the capacity of the human organism to resist and defend itself against noxious influences, to resist or compensate for alterations in equilibria, and to repair itself.

2. He fully recognized and incorporated into practice, the unity of the body as expressed in the fact that abnormal structure or function in one part exerts abnormal influence on other parts.

3. The human organism, presumably because of its incomplete adaptation to the erect state, is highly subject to anatomic and functional derangements of joints and their supports, especially the vertebral, pelvic, and other weight-bearing articulations.

4. These "errors" in weight-bearing unfavorably affect the structure and function of neighboring and distant parts of the body, thus initiating and contributing to pathological influences and processes. This complex of the articular disturbance and its associated phenomena has been designated as the osteopathic lesion.

5. The spinal lesion is associated with: (a) Tenderness or hyperesthesia of the paravertebral tissues and those overlying the vertebrae (skin, muscle, connective tissue); (b) muscular changes—rigidity, sustained contraction (or contracture), ropiness, and lowered motor reflex thresholds; (c) autonomic changes, as reflected in textural changes of the supraspinal tissues, vasomotor changes, alterations in visceral and other autonomic functions; and (d) pain, which, when it occurs, is of the "deep" variety; it is rather diffuse and may be radiating or "referred."

6. The lesion may be detected and evaluated through its associated phenomena.

7. The osteopathic lesion is conceived as a most important—and frequent—etiologic, predisposing, exacerbating, and sustaining factor in disease, through the establishment and maintenance of a vicious cycle of irritative, inflammatory, and other pathological processes which impair the defensive and reparative capacities of the human organism.

8. It may be present for varying periods of time without the production of symptoms.

9. The lesion may be corrected or improved through the application of appropriate manipulative technic. A highly effective system of osteopathic manipulative therapy has been developed whereby lesions of many kinds and locations may be corrected.

10. Correction of the lesion interrupts the vicious cycle and is followed by regression, amelioration, or abolition of the related pathological processes. Elimination of the lesion provides more favorable circumstances for the operation of the defensive, reparative, and homeostatic mechanisms of the body.

11. Recent researches conducted at the Kirksville laboratories support the conclusion that the patterns of local and distant effects of the articular disturbance and associated phenomena—the osteopathic lesion complex—are mediated and organized by the central nervous system; the lesion expresses itself primarily through those parts of the nervous system with which it is associated. Correction of the lesion provides a more favorable balance of nervous factors.

Since these researches and the concepts which emerge from them have been recently reviewed they will only be briefly summarized and supplemented by the advances that have been made since the publication of the review. I shall try to present our concepts dynamically rather than in the chronological order in which they have developed. (The reader may find it helpful to refer frequently to Figure 1.)

The disturbance of an articulation exerts its influence directly through the soft tissues which surround and support it. There is no known mechanism whereby the positional relationships of two bones or two vertebrae can be "registered" except through those tissues. Further, we have the frequent clinical observation that an osteopathic lesion need not have associated with it a gross articular displacement. At

The similarity between this complex and the classical referred path pattern is obvious.
any rate, as a result, for instance, of an intervertebral lesion (whether it be described as a subluxation, a fusion, dislocation, or section lesion) the (paraspinal, intercostal, and longitudinal) nerves on at least one side of that articulation are subjected to, and maintained at, excessive tension. This causes the proprioceptors (end organs in muscle and tendon sensitive to changes in length and tension) to fire increased numbers of impulses into the corresponding segment of the spinal cord, via the dorsal root fibers with which they are connected. The frequency of the impulses fired by these receptors is in proportion to the degree of stretch (severity of the lesion); and since these receptors are relatively nonspecific, the barrage is established as long as the tension is maintained.

The stretch or sensory reflexes are self-regulatory and self-extinguishing. That is, if the dorsal root fibers (afferents) bearing impulses from the proprioceptors synapse directly with the anterior horn cells which conduct impulses to the appropriate muscles segments, the stretch reflexes are further stimulated to produce still greater tension. This may be an important factor in the maintenance of the artificial arrhythmia seen in established arrhythmias.

Because of the synaptic connections of the dorsal root fibers and through interneuronal connections, this sensory stimulation affects, potentially or actually, the excitability of all neurons which have their origins (cell bodies) in the corresponding segment of the spinal cord. These include not only the efferent or motor cells, but also the cells of the intermediate (intermediolateral) column, which are the preganglionic neurons of the sympathetic nervous system. They include also the neurons remaining in the spinal tract. This is certainly true of the spinalthalamic fibers which conduct impulses to the brain for the registration of pain, and there is evidence that it applies to other tracts terminating in supraspinal structures.

As a result of the sustained barrage of impulses, these neurons, in the segment of the cord associated with the artificial arrhythmia, and maintained hyperexcitable to all impulses which reach them regardless of their source—impulses from other segments of the cord, from the higher centers, including the cerebral cortex, from the skin, etc. (The inhibitory aspects of the sympathetic nervous system are monosynaptic.) The segment of the lesion is said to be a facilitated segment of the cord. This may be of the ventrolateral part of the cord, in which the fibers have been lowered.

The afferent (motor) neurons in these segments may be said to be maintained in their active state (in the state of subliminal excitation) and easily triggered into activity by relatively few additional impulses from any source.

Since the neurons which have their origins in the segment of lesion, as in all segments of the spinal cord, receive various afferent impulses, the activity of these neurons (and the structures they innervate) will be determined by the balance of inhibitory and excitory impulses which reach them. Given a sufficient background of nervous activity, such as that descending from the cerebral cortex, its influence will be amplified and channeled through the facilitated segments, that is, the segments of lesion. As a result, the afferent neurons (motor neuronal), having their cell bodies in these segments will discharge abnormally and may produce abnormal symptoms to the tissues served by the posterior roots.

It is true that the degenerative process in the posterior roots does not always begin at the root entry zone, and there are instances in which the posterior roots are relatively normal. However, a degenerative process that begins in the posterior roots may spread to the anterior roots and spinal cord, and thus may produce a chronic degenerative process in the anterior roots and spinal cord, which may be of the chronic degenerative type.

The symptomatology will depend upon the lesion and on the extent to which it has spread. In some cases, the lesion may be confined to a particular spinal segment, and in others, it may involve a number of segments. In either case, the symptoms will be determined by the extent of the lesion and its location in the spinal cord.

The degenerative process in the posterior roots may involve the dorsal and ventral roots, and may be of the chronic degenerative type.

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The very core of the osteopathic system of practice, while to the others it is at best experimental or ancillary to other forms of therapy.

It is important to point out that still a fourth major field of practice, which is daily becoming a larger and more important part of the healing arts and sciences, is intimately bound, by mechanism, to the three reviewed above. Its distinctive feature, too, is the emphasis on the nervous system, especially the cerebrum, as the organizer of, and even as a primary etiological factor in, disease. Reference is made, of course, to psychosomatic medicine. Representatives of all three of the schools previously reviewed have placed emphasis on the higher centers, especially the cerebral cortex, in the role of inhibiting, exciting, exaggerating, masking, reinforcing, or initiating the disease patterns mediated by the lower levels. Travell and Bigelow,36 Theobald37 and others have done it for the referred pain school; Frankstein38 has demonstrated the influence of the cerebrum on the phenomenon designated as neurodystrophy by Travell and his followers. Korrey39 has ascribed to the osteopathic lesion (chronic segmental facilitation) a localizing, channelizing, and predisposing influence in the bodily expression of mental or emotional imbalance. It is not surprising that this is being more widely recognized. After all, the nervous system exerts its influence on the body structures through the effector neurons which are the common paths receiving and funneling impulses from a host of sources in the body, not the least of which is the cerebral cortex.

In all these schools there appears to be a de-emphasis of the specificity between the etiological agent on the one hand and the manifestations of the disease on the other. We see an approach to a unitary concept in which disease is conceived, not as the effect of this agent or that upon this organ or that, but rather as the reaction of the organism as a whole to noxious influences.40 It is being increasingly recognized, and especially in the above four fields, that the organism can respond in only a limited number of patterns to noxious influences.41 The pattern—the character of the disease—is determined by the patient, and not by the offending or invading agent; the nervous system certainly has a key role in the organization of the patterns. These schools, then, might be said to be characterized by their emphasis on the similarities among diseases rather than on their differences. "There are no illnesses; there are only ill people."

POSSIBILITIES IN THE FUTURE OF THE OSTEOPATHIC CONCEPT

There are many important implications in the above "story" for the osteopathic profession. The present writer is hardly the person to draw the lesson for the profession, but it might be well to point out some important facts and make some predictions supported by the foregoing and by recent scientific and medical advances.

It is clear that the basic concepts upon which osteopathy is based and which have been dealt with so successfully for more than a half-century are receiving increasing investigative attention and increasing therapeutic emphasis from other major schools of medical thought and practice. Workers in these other schools have arrived at these basic concepts by patient, intensive, and extensive exploration of basic mechanisms. They have arrived at these concepts through very different experiences and processes of
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thought that has the osteopathic profession, and, indeed, all think of them and apply them in a very different context.

The osteopathic profession has earned its place in medicine and society, however, through having developed, and effectively and skillfully applied, a system of diagnosis and therapy based on the role of the somatic structures in disease. It has been demonstrated, although it is not yet recognized by the other schools, that the somatic component can be most directly and effectively influenced and controlled by adjustment of the vertebral and paraspinal structures—i.e., by recognition and correction of the osteopathic lesion. Once attention will suffice. The somatic lesions are within reach and are treatable.

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have their beginnings in youth and childhood. Early life and childhood are themselves too frequently victimized by the chronic diseases and disabling functional disorders. These diseases are today the biggest killers, the biggest cripplers, and among our most pressing social problems.

Today the osteopathic concept is the only one sufficiently broad and sufficiently unitary in its outlook, upon which a system of practice can be based, that is capable of encompassing all these diseases. Today osteopathy is the only system of practice which has preventive potentialities with respect to these diseases. Medical practice as yet has no key, no clear-cut, and certainly no systematic approach to the prevention of these disorders. Treatment is still largely palliative, symptomatic, or substitutional. A few illustrations will suffice. In the treatment of diabetes mellitus, in which such great advances have been made since the discovery and isolation of insulin, the disease itself—the pancreatic deficiency—is taken for granted. The prevention of this deficiency, or even the elimination of the basis for the deficiency, has received no practical therapeutic attention. Without minimizing the importance and the magnitude of the advances made in the recent past through research, unfortunately no more than this can be said of the other chronic degenerative diseases and functional disorders.

What can be positively said about the prevention of heart disease, coronary thrombosis, hypertension and peripheral vascular diseases, the skin diseases, the arthritis, kidney diseases, rheumatism, peptic ulcer, and the host of endocrine disturbances? Can it yet be said that medical science, in the treatment of these diseases, has gone more than a step beyond the palliation of the signs and symptoms, or beyond the treatment of the terminal step in the disease processes? In fact, the terminal process is usually referred to as the cause of the disease. The endocrine diseases are "caused" by under-or overactivity of this gland or that; they are accordingly treated. But what combination of factors led to the over- or underactivity? To ascribe them to "autonomic imbalance" or to the under- or over-activity of another gland is merely to beg the question.

The success of osteopathy in the treatment of many of these diseases and the promise of osteopathy in their prevention, lie in the following three factors:

1. The identification of a major predisposing and primary etiological factor in disorders affecting all parts of the body.
2. Its detectability in even very early stages; and
3. Its amenability to correction before it does irreparable damage. All three, in other words, mean the recognition and appropriate treatment of the osteopathic lesion.

A great deal, however, remains to be learned before osteopathy is adequately prepared for its role as the preventive medicine of tomorrow.

1. The effectiveness of osteopathic therapy in preventing and alleviating disorders of all kinds needs to be precisely evaluated on a mass scale. This requires reliable comparisons of segments of the population receiving osteopathic therapy with those not, as to incidence of the various diseases, mortality, duration of the illness, convalescence, etc. Statistics on the control segment of the population are already amply available. It is difficult to conceive of a more informative—and more convincing—survey of the therapeutic and preventive merits of osteopathy than the comparison of two large groups of children—one of which is under osteopathic management, the other not—and following their medical records into adulthood. The osteopathic profession has simply not tested adequately, with sufficient persistence, with adequate controls, with objective enough methods, with careful enough recording, and in sufficient numbers, the value of osteopathy in a large number of baffling conditions—especially those dealt with in the various specialties which have developed since Still's day. It is sometimes too easy to resort to convenient symptomatic treatment.

2. Osteopathic concepts and techniques have to be developed to the point where they can be applied effectively to entire populations, in the same way that the preventive medicine of today protects millions at a time against infectious diseases.

3. A great deal more needs to be learned about the factors leading to the development of the lesion—the structural, postural, congenital, environmental, inheritable, occupational, age, activity, and other factors. What again, in this regard, could be more informative than studies on large numbers of children in different age groups for the incidence of lesions of various kinds, in relation to those various factors? This would make possible education of masses of people on the prevention of the lesion.

4. We need reliable, easily applied methods of detection of the lesion which may be utilized by the lay population that they may benefit from early correction.

5. We need to learn a great deal more about the lesion itself and the processes which it initiates and sustains. Without question, the time, labor, and skill required for the correction of each lesion set a certain limit upon the mass applicability of present-day osteopathic therapy, although today that labor and skill are the basis for the very success of osteopathy, and of its distinction from other forms of therapy. On the basis of our present knowledge it is entirely conceivable that a higher, more general, less laborious form of osteopathy may be achieved by preventing or interrupting the effects of lesions, by preventing or obliterating the processes that lesions initiate wherever the lesions may be and whenever they occur. This possibility has already been referred to, and it is important to recall that the processes associated with the lesion are receiving widespread attention in nonosteopathic institutions.

It would appear from the foregoing that to consider that the osteopathic concept is the same today as it was at the time of its inception is a serious mistake. Any endeavor to keep it the same is even a worse mistake. This does not imply departure from the fundamental Stillian principles, but rather their extension, explanation, and elaboration, as recent advances in genetics and cytology have done for the Darwinian principles. The concept itself has been greatly enriched and developed, and its forms of application, its range of effectiveness have been widened. But most important, the osteopathic concept is different today for the simple reason that it has new roles to play with respect to the national health, and it operates in a very different, context—social, political, scientific, economic—from that in Still's day. A living, working concept—and the osteopathic concept is certainly that—could not remain the same while the scene around it is transformed. A new and more important place in the world scene for the osteopathic concept has been and continues to be, prepared. The concept and the techniques must continue to evolve, to fill that place, fit in with the scene, and operate in the new context. But
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...they must evolve... an accelerated pace because the scene is changing rapidly.

CONCLUSION

In summary, the following appear to be the major issues before the profession today:

1. The question is whether or not the osteopathic profession can, or should, attempt to incorporate the findings of all the biological sciences into its field.

2. The question is to what extent the osteopathic profession is necessary to the current health care system, and whether the osteopathic profession should make a commitment to continue development of the osteopathic profession.

3. The question is whether the osteopathic profession is capable of fulfilling the responsibilities of providing medical care and health services to the public.

4. The question is whether the osteopathic profession is capable of providing medical care to the public in a manner consistent with the American Public Health Association's definition of medical care.

5. The question is whether the osteopathic profession is capable of providing medical care to the public in a manner consistent with the National Academy of Sciences' definition of medical care.

6. The question is whether the osteopathic profession is capable of providing medical care to the public in a manner consistent with the American Association of Medical Colleges' definition of medical care.

This issue of the osteopathic profession's future will be determined by the answers to these questions. However, the osteopathic profession should be committed to the development of medical care and health services to the public in a manner consistent with these definitions.

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REFERENCES


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Special reprints


Editor’s note

The pages appearing in this “Special reprints” section have been electronically scanned from the original journals in which they appeared. Consequently, the scanning process at a density to enhance readability has picked up artifacts and other “blemishes” that existed in the original paper on which the text was printed. JAOA regrets these anomalies and hopes that they will not detract from the content and relevance of these works that were published in the osteopathic medical profession’s early history.

Gilbert E. D’Alonzo, DO, July 2000