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 con-
tinued 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 oste-
opathy, 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.1

In osteopathy these reserves consist of our under-
standing of the basic biological processes and mechan-
isms 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 mechanical aspects 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 physi-
cians through their trained fingers and through x-rays
—how does it produce its effects? Through what mech-
nisms and channels does it "impair" the defensive,
reparative, and homeostatic functions of the body?
How does it predispose to disease? How does it upset
physiological equilibria? What processes does it initi-
ate? 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 cur-
rent theories regarding these central aspects of the
osteopathic lesion. Then I wish to draw some of the
practical implications of these emerging concepts. Par-
adoxically, I shall present our current theories by deal-
ing 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 ad-
varces 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 sci-
centific 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 sub-
stance; 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 mean-
ings. 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 different countries,
separated by thousands of miles, and under very dif-
fersent circumstances. Today they are adjoining fields
and the fenses 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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EMERGING CONCEPT OF THE OSTEOPATHIC LESION—KORR

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. Speransky 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 revolutionary 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 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 Speransky 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 Sturte,9 Ross,6 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,8 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, but 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, MacKenzie 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 autonomic 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 centrifugal 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, respiration, etc. The afferent nociceptin fibers which convey sensation of pain to the higher centers are also exclusively involved in this complex. Although the afferent nociceptin fibers can be excited by impulses transmitted by the afferent fibers from the viscera, regardless of the central cortex project or "reflex" these sensations to somatic structures whose efferent fibers have the same dorsal root. (See the paper by Douglas of a review of the mechanism.)

On the basis of these observations Mackenzie developed the hypothesis of the "irritable focus." This hypothesis stated, in essence, that irritation from the irritant, conveyed by the afferent fibers, renders many of the nerve cells in the same segment hyperirritable. As a result, fibers and organs innervated from that segment are affected by the visceral pathology. The "irritable focus" hypothesis has since been modified and restated in accordance with more modern concepts of neural facilitation.

More recently Lewis and his colleague, J. E. Hogan, showed that the phenomenon of pain referred was not peculiar to visceral irritation, since similar and even identical patterns ("trigeminal") could be induced by injection of deep-lying somatic structures. They found that injection of 0.1 to 0.3 cc. of 6 per cent sodium chloride solution into certain ligaments, tendons, muscles, could produce intense pain in relatively large and often remote areas of the corresponding dermatome and myotome. The pain reference was accompanied by the other components of the classical triad, namely edema and muscular hyperesthesia 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 precision 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 syndromes. For instance, the injection of the eighth cervical interosseous ligament with the horseradish peroxidase produced a perfect facsimile of an original attack, not only with respect to pain distribution (including the substernal pain and the radiation down the back and arm), but also, the hypotension, rigidity, and the series of compression on the chest. Injection of the first lumbar interosseous ligament produced the typical pain distribution of renal colic (lower back, lower abdomen, groin, and scrotum). Rigidly of abdominal and spinal muscles, hyperesthesia, and often a marked adrenergic reflex on the corresponding side. In our own laboratory, we have not only confirmed these observations, but have demonstrated certain associated autonomic changes.

Furthermore, others have 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 irritation of certain somatic structures in the same segment. (Studies on the converse, namely the influence of somatic irritations on visceral function, are in progress 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 pathology—is organized by the spinal cord. The character of the pattern is determined by the segment or segments 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 secondary sources of irritation—leading to the establishment of a vicious cycle. This recognition has formed the basis for certain important therapeutic measures which have been used to counteract the cycle. Give a stimulus of such a pattern, including visceral pathology and the reference phenomena, then why not eliminate the irritation contributed by the most accessible part of the complex—the somatic component? The potentialities of this approach were indicated 20 years ago by Weiss and Davis18 who showed that at least the pain due to visceral pathology could be relieved by local anesthesia 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 Hardy44 and Wolf and Wolff45) has demonstrated that the sustained muscular contractions or spasms which are part of the referred pain patterns, may themselves comprise sources of irritation. Local infiltration of the rigid muscles, identified by palpation, relaxed those muscles, relieved the pain, and often produced improvement in the associated autonomic disturbances.

This general approach has been receiving intensive significant development in the hands of Travell and her colleagues at Cornell University Medical College. They were able to produce complete and immediate relief from cardiac pain due to myocardial infarct by infiltrating appropriate trigger areas with dilute procaine hydrochloride.42,43 These were intensely hyperesthetic areas located in the myofascial structures of the reference zone (usually in the pectoralis major, pectoralis minor, or serratus anterior). When sufficiently near the surface the trigger areas could also be effectively blocked by spraying the overlying skin with ethyl chloride. Relief from pain was not only immediate, but lasting. 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 organic disease, are irritated, as by needle, referred pain occurs "which is indistinguishable in distribution and quality from the subternal and radiating pain of coronary insufficiency."44

Of interest to those familiar with the osteopathic concept and the current theories of the osteopathic lesion are the explanations of these observations proposed by these workers. Thus Travell and Rinzler46 say, "The most reasonable explanation 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 impulses by the closed self-exciting loops of internumeral neurons in the central nervous system." Apparently, 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 Lindgren59 that local anesthetization of the precordial structures produced improvement in the coronary circulation. Although the authors are careful to make therapeutic claims unsupported by their observations, they point out that the relief of pain due to myocardial infarction may itself, have true therapeutic effect since there is evidence that pain may induce reflex spasm of collateral coronary vessels.

Autonomic changes in the zone of reference are well established, but it has only recently begun to be appreciated that the blood vessels supplying the brain and spinal cord54,55 may also be included in the zone of reference. Travell and Bigelow59 have recently shown, for instance, that phenomena of hysteresis may be mediated by afferent impulses from trigger areas in the skeletal muscles. Whether these zones are activated by psychogenic stress or (experimental) trauma, the same clinical patterns are produced. The patterns are often bizarre, and may be not only spatially, but also segmentally remote from the somatic trigger area. Infiltration of the appropriate and specific somatic structures dramatically relieved disorders of vision, respiration, motor power, and cutaneous sensation (e.g., glove-and-stocking paresthesias). The concept is advanced that "high intensity stimuli from somatic trigger areas reflexly produce prolonged vasoconstriction with partial ischemia in localized 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, hypnosis or psychotherapy, may be expected to accomplish the same result: 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 structures may lead to the establishment of a pattern of changes in all the others. The pattern is determined more by the part of the nervous system affected than by the irritated structure or the 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 nerve impulses.
4. Interruption of this cycle for even a brief period may permanently prevent, or greatly delay its re-establishment, permitting the reparative processes to proceed under more favorable circumstances.

5. Highly localized areas in skeletal muscle or myofascial structures frequently become important sources of referred impulses in these complex plexus, reinforcing or facilitating the primary irritation, or even becoming independent of it. Detrimental effects of the osseous 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 osseous 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. Vascular pain in the brain, spinal roots, or nerves may produce secondary effects quite different segmentally from the locus of primary irritation.

THE WORK OF THE NEUROLOGIC LABORATORIO

Without going into the elaborate details which the work of Sperrmann and his coworkers deserves, let me summarize the main conclusions to which their extensive laboratory and clinical observations have led them:

1. The nervous system can only participate in every disease but plays a dominant role in organizing the pathological processes and their various manifestations.

2. Sustained irritation, inflammation, or pathology of muscles, skin, bones, viscera, or nervous structures initiate processes in the nervous system which may lead to certain functional and organic changes designated as "neurotropism." Once initiated, the process in the nervous system does not require the continued action of the irritant, and the neurotropism may persist long after the primary pathology has waned.

3. The neurotropism expresses itself through pathological and trophic changes in the various organs of the body, first, usually, in the segments related to the primary pathology, and later in other segments.

4. The nature of the process, and its final outcome, are independent of the nature of the irritation chemical, physical, or biological. The biological bases—the microorganisms, viruses, etc.—are fundamental in the same way as the chemical and physical agents; they merely initiate the process, which then becomes independent of the primary pathology.

5. This role of the nervous system appears to be predicated upon much slower processes than nerve impulses. These processes (Sperrmann calls them "trophic processes") are not new but are described in detail elsewhere.

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

7. A recent dynamic illustration of changes is the case which occurred after the healing of the original lesion appeared in a report by Franklin. The first pains of one ear were reported in a manner, producing pain and inflammation, and the typical imaging and limb withdrawal pattern. After some time the irritation disappeared, no signs of the inflammation were detectable and the animal no longer limped or "favored" the paw. At this time the ear was denervated, and it was found that the paws were similar to those produced when a similar animal's animal received intense stimulation upon the foot corresponding to that which had had the lesion, namely, section of the affected nerve and exposure.

8. This concept bears a distinct resemblance to that originally developed by Mackenzie, the concept of the insensitivity of the area of "innervation" beyond the duration of the initial irritation. It will be recalled that Mackenzie also believed that once established, the irreversible process remained for a variable period of time after the initiating cause of irritation had been removed, and continued to influence the activity of structures innervated by that segment for some time. Similarly, an osteopathic lesion may exist for years without producing symptoms.
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 mediastinum specifically involved in pneumonia. But the posterior branches of these nerves are distributed in the long 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 scapula. 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 equilibrium, 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 stance, 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 vertebral (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 supraspinous 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—pathological, 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 technique. 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 emanate 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 these tissues. Further, we have the frequent clinical observation that an osteopathic lesion need not have associated with it a gross articular displacement. At this time, the similarity between this complex and the classical referred pain pattern is obvious.
any rate, as a result, for instance, of an intervertebral lesion (whether it be described as a subluxation, a fixation, dislocation, or rotation lesion) the paravertebral muscles, tendons, and ligaments 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 tendons 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 which with their 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 synaptic reflexes are self-regulatory and self-limiting. That is, as the dorsal root fibers (afferents) bearing impulses from the proprioceptors synapse directly with the anterior horn cells which conduct impulses to the alpha motoneurones segment, the stretched muscles are further stimulated to produce still more tension. This may be an important factor in the maintenance of the articular derangement once it is established.

Because of the synaptic connections of the dorsal root fibers medullary and through intermedullary neurones, this sensory stimulation affects, potentially or actually, the excitability of all neurones which have their origins (cell bodies) in the corresponding segment of the spinal cord. This includes not only the sensory neurones, but also the cells of the intermediolateral column, which are the preganglionic neurones of the sympathetic nervous system. These include the neurones emerging in the spinal tracts. This is certainly true of the spinal tracts which conduct impulses to the brain for the registration of pain. Hence, there is evidence that this applies to other efferent terminal, suprasegmental structures.

As a result of the sustained barrage of impulses, these neurones, in the segment of the cord associated with the articular derangement, become hyperexcitable to all impulses which reach them regardless of their source—impulses from other segments of the cord, from the higher centres, including the cerebral cortex, from the skin, etc. (The inhibitory aspects of the organs of the cord and periphery are not considered.) The segment of the lesion is said to be a faciliated segment of the cord, one in which the barriers have been lowered. As the afferent (motor) neurones in these segment are said to be maintained in the 'on' position (in a state of subliminal excitation), they are easily triggered into activity by relatively few additional impulses from any source.

Since the neurones which have their origins in the segment of lesion, as in all segments of the spinal cord, receive, first, common sensory, the activity of these neurones (and the structures they innervate) will be determined by the balance of inhibitory and excitatory impulses which reach them. Given a sufficient background of nervous activity, such as that descending from the cerebral cortex, its influence will be magnified and channelled through the facilitated segments, that is, the segments of lesion. As a result, the different neurones (end intraspinal neurones) having their cell bodies in these segments will discharge abnormal impulses to proprioceptors of the tissues into the tissues which they supply, which will therefore be maintained in altered states of activity. The segmental changes may include alterations in contractile states, in blood flow through various structures, and organs, as well as visceral motility, in irritability and sensitivity, as well as maintenance of the segmental reflexes, that is, the other components. Continuation of these processes leads to profound structural and functional rearrangements of these tissues—trophic changes—which no longer depend upon native impulses for their maintenance. As was shown by Kendall and Haswell, and confirmed many times since, the paravertebral muscles in the segment of lesion remain rigid and appropriately shortened, and in tension, in the complete absence of external potentials, that is, with no stimulation from the superior horn cells. By definition, this is a state of hypostasis—a reversible loss of the ability to respond to the part of the contractile elements. (It will be recalled that Marfan's syndrome discussed similar states of skeletal muscle associated with visceral referred pain.) These muscular changes are pathogenetic and unquestionably continue to be a source of irritation to the cord.

It is important to recognize that trophic, cellular, and functional changes, due to prolonged irritation and operation of the viscera cycle, may extend also to the central nervous system itself. Cole has obtained evidence that microscopically demyelinating changes in the cord are associated with the segmental lesion; these bear a distinct resemblance to the changes described by workers in Sperling's laboratory and others. These pathological changes may constitute an encroaching "irritative focus" in its literal sense and may be an important factor in the chronic lesion. Furthermore, as indicated in an earlier section, localized partial ischemia may be produced in the nervous system by the peripheral irritation. Liddell and Lissau have shown that impaired circulation through normal elements may lead to them not only hyperexcitable but spontaneously active, in which state they may themselves serve as "trigger zones."

Although the generalization of the concept of the central lesion of the osteopathic lesion has been concerned with the segmental mechanisms and manifestations, although the primary focus is within the segment of lesion, and although the pattern of pathological processes associated with the lesion is especially conspicuous in the tissues segmentally related to the lesion, the importance of the extrasegmental and suprasegmental effects is not to be minimized, and is demonstrated in daily osteopathic practice. They can, may, be organized by the nervous system in at least two ways which have already been mentioned: (a) through the system of intersegmental neurones and spinal tracts and (b) by the production of localized vasospasm and partial ischemia in the nervous system. The lesion apparently may irritate as well as excite sensory elements which terminate in various parts of the body. Through exciting visceral and cranial reflexes such as the vagi, these may in turn alter the function of other segmentally remote from the primary lesion. This concept has been elaborated by Cole to account for the diverse symptoms and signs which may be occasioned by a single lesion. As noted above, a single lesion may cause a variety of conditions and signs, and may be the cause of a variety of symptoms. The symptoms may be produced, not only by irritation of the various tissues segmentally related to the lesion, but also in the extrasegmental areas. The extrasegmental effects may be the result of irritation of the nerve roots or their connexions with the spinal cord. The extrasegmental effects may also be due to irritation of the sympathetic system, which is involved in various parts of the body. Through exciting visceral and cranial reflexes such as the vagi, these may in turn alter the function of other segmentally remote from the primary lesion. This concept has been elaborated by Cole to account for the diverse symptoms and signs which may be occasioned by a single lesion.
spread effects which he claims for the experimental lesion in the rabbit. Its similarity to the spread of neurodystrophies, in Speransky's view, is suggestive. Similarly, according to the views of Travell and Bigelow, partial ischemia in parts of the brain stem, due to lesions in the cervical segments, could also produce far-reaching effects. The evidence for the operation of these mechanisms in the osteopathic lesion is, however, still presumptive.

According to the above concepts, the basis for the effectiveness of osteopathic therapy lies in silencing the somatic component of the complex, by abolishing the contracture, spasm, or sustained contraction (and ischemia) of the skeletal muscles in the lesioned segment. Lasting effects are obtained by correcting the mechanical or articular disturbance which imposed the stress.

It is not a vital question, affecting the validity of these concepts, as to which part of the complex comes first. The mode of operation of the somatic component (the osteopathic lesion) is fundamentally the same whether the muscular and articular disturbance was the primary, precipitating factor in the complex, or whether it is secondary to irritations which arise elsewhere in the segment, e.g., in the viscera. Once established it plays a major role, or even the most important role, in the subsequent development of the pathological pattern. This is amply supported not only by clinical osteopathic experience (the secondary "reflex" lesion), but is now a well accepted fact that the sustained muscular contractions in the classic visceral referred pain pattern become an important contributor to the vicious cycle; it has also been demonstrated by Wolff and his coworkers for headaches of various kinds and origins. The important thing is that the somatic component, whether primary or secondary, is accessible and responsive to treatment, and that appropriate treatment of this component, by establishing a more favorable balance of neural factors, benefits all the structures associated in the pattern—and therefore the entire body.

THE TREND TO A UNITARY CONCEPT OF DISEASE

Three major fields of medical thought, which have had very different origins and different courses of development, have been briefly reviewed and shown to have a great deal that is fundamental in common. All three schools have, implicitly or explicitly, accepted certain basic principles or generalizations at which they have arrived through very different experiences and processes of reasoning. They appear to be concerned with very similar, if not identical, phenomena, although each may conceive of them differently.

All three schools agree that the somatic component of the disease pattern, of which the most conspicuous features are the sustained muscular contraction (rigidity, spasm, contracture), the sensory changes (pain, hyperesthesia) and vaso-motor changes, is not only a sign or symptom of disease, but a major contributing factor to the disease, and that it may be a primary etiological factor.

All have therefore directed therapeutic attention to this component because of its accessibility and responsiveness to treatment, and because of the demonstration that improvement in this component results in improvement in the others, through interruption or retardation of a vicious cycle of impulses (or trophic influences) coursing through the central nervous system. The treatment of this component is

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, Theobald and others have done it for the referred pain school; Frankenstein has demonstrated the influence of the cerebrum on the phenomenon designated as neurodystrophy by Speransky and his followers. Kort 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 widely recognized. After all, the nervous system exerts its influence on the body structures through the effrent neurons which are common paths receiving and funneled 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. 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. The pattern—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 mechanism. 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, still 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 develop-
mental and effectively and skillfully applied: a system
diagnosis and therapies based on the role of the
osteoarticulating structures. It has demonstrated,
though it is not yet recognized by the other schools,
that the osteopathic component can be most directly
and effectively influenced and controlled by adjustment
of the vertebral and peripheral structures—i.e., by recog-
nization and correction of the osteopathic lesion. One
innovation will suffice. The osteopathic approach to
musculoskeletal care, in association with certain cases of
occupational and muscular disorders, are appar-
tently identical with, and certainly similar to, those
previously associated with the rib lesions familiar to
the osteopathic physician. Adjustment of the articula-
tion of the rib-head on the vertebra is followed by dis-
appearance of intensely hyperesthetic spots in the
muscles and paraspinal muscles and relief from pain. It
is important to record, also, that rib lesions in the upper
abdomen can present symptoms and signs referable
symptoms typical of angina pectoris, incomplete,
complete, and lasting relief is obtained upon

1. That system of diagnosis and therapy and the con-
tent of the lesion distinguishes osteopathy from all other
schools, and that it is practiced by no other school.

2. Diagnostic manipulative therapy, as the heart of its
method, distinguishes the osteopathic physician from
other doctors. We must be quick to recognize, however, in
light of the foregoing, that workers in other schools

3. Treatment is gaining increasing importance, with
respect to disease, upon the processes which are
associated with or initiated by the osteopathic lesion,
and making serious and effective attempts to base ther-
apy upon the osteopathic processes.

4. It is impossible to make accurate predictions
that can be made with a high degree of certainty that
informed investigations by these workers must inevi-
tably lead to the development of new and better forms
of therapy. Although it is possible that they may
be used only to a limited extent and the direct

5. That treatment is much more probable, view of the present direction of their work, that
will circumvent the lesion by learning how much
more useful to deal with the processes is set up. As a

6. We find ourselves faced . . . with an enormous personal and national burden of
disease in the adult population, the most productive
element of our society. It is possible that we shall not
be able clearly to define healthy maturity until we learn
more about the chronic degenerative diseases and until
we attempt to apply the entire population our knowl-
edge of these diseases. . . . We have barely started to
explore . . . the main causes of ill-health among adults.

Although chronic and degenerative disorders are
spoken of as diseases of majority or of middle and late
life, it is not adequately appreciated that often they
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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 overactivity 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 amenable 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 tactics 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, hereditary, 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 abolishing the processes that lesion initiates, 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—that of social, political, scientific, economic—than that in Still's day. A living, working concept—and the osteopathic concept is certainly that—cannot 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.48 an accelerated pace because the scene is changing rapidly.

conclusion

In summary, then, from this perspective, the following appear to be the major themes before the profession today:

A. 'So to protect osteopathy as to leave no question in the mind of the patient, as to what is distinctive about osteopathy as a system of practice and wherein lie its merits.' In view of the clinically and experimentally demonstrated role of the osteopathic profession as a provider of prophylactic and therapeutic factors; the question is seriosly raised whether any osteopathic physician has the moral—right to withhold the only therapy which today can correct it. One can certainly question the wisdom or motivation of any osteopathic physician who cases aside the powerful and preventive weapon which he alone possesses for prophylactic and symptomatic therapies simply because they are more convenient or easier to apply. One can seriously question the integrity of any osteopathic physician who cashes the weapon aside to conceal his distinction from other physicians.

B. The profession must establish a research program of such magnitude and proportionate as to reflect the historic importance of the osteopathic concept. This is required to provide the information and the new techniques which will prepare osteopathy for its role in the current theme of the healing and prevention of disease on a mass scale. We need data, and still more data.

C. The osteopathic colleges must become among the best institutions in the world for the training of physicians—physicians who will be prepared to meet this growing challenge; physicians who, through their training in scientific osteopathy, will provide a steady stream of needed information and data; physicians who will seek and know how to apply scientific advancements to the health of mankind; physicians who will know how to teach others to do likewise. Our colleges must be tutored by the best physicians and the best scientists who must be given the means with which to do their best work. The facilities must be sufficient to support the men, their students, to work with the patients and the public. The facilities must be such that they can contribute their share to the knowledge of mankind.

The third is unquestionably the most important of the three, because the fulfillment of the other two, as well as those concerned with organization, legislative and public relations, will be from the failure of this one. The osteopathic profession has reached a stage of development where its progress from now on will be limited by, and in direct proportion to, the progress and welfare of its training and research.

For these facts, it would appear, are the essence of the day for the osteopathic profession.

It is important to remember that the scientific and mankind in general are neutral in the struggle of the osteopathic profession against its opponents. They are even indifferent to the question of its survival contended growth as a distinct and separate profession. They are not neutral, however, in the question with which we are especially as it affects the 6th and 7th decades of this century. The things that will result in the continued and rapid development of osteopathy to its fullest potential are the very things that at the same time, will lead to its universal acceptance as a superior—and indispensable—form of practice. We refer again to data, solid, incontrovertible fact which permits no alternative conclusion; not opinions, no exceptions, the isolated dramatic case, not even faith, but "the scientific substance in which faith can be intrenched."

History and society have presented the osteopathic profession with a great challenge and an opportunity—the development of osteopathy to its fullest mass-serving potential. Because of its illustrious half-century of successful application of the osteopathic concept, this profession has been best equipped by history to meet this challenge. Whether it can, however, the profession meets the challenge will deteremine the future of the osteopathic profession, but not the survival of the osteopathic concept; that seems determined. Good luck to the osteopathic profession in carrying the weight that is placed upon it to meet the challenge of the idea that first occurs. The history of the osteopathic profession shows that once a challenge has been recognized—invariably that challenge has been met—and with honor.

acknowledgments

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Kirksville College of Osteopathy and Surgery

REFERENCES

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