

## A STUDY OF VISCERO-CUTANEOUS (ANGIO) REFLEXES IN NASAL DISEASES AND ITS CLINICAL APPLICATION

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When an injury occurs in an internal organ, a complicated set of referred reflexes appears. Effects of these reflexes can be observed on the body surface of the dermal segment which is innervated by the same segment of the spinal cord as the organ affected.

Ishikawa et al. have recognized the existence of a new reflex pattern which they have called the viscerio-angio-cutaneous reflex.

We undertook an investigation to discover if this reflex was a significant phenomenon in nasal disease as well as in some of the internal diseases and if so, it could be put to practical use in the diagnosis of certain of these disturbances. A skin impedance bridge was designed for measuring the impedance of the human skin over the frequency range of 20 cycles per second (c/s), to 50 kilo c/s of alternating current. The electro-physiological characteristics, that is "impedance component" of the normal skin of the face are shown in table 1.

R: Resistance component (M  $\Omega$ )

C: Capacity component (pF)

$\delta$ : Loss angle (degree)

c/s	20	100	200	500	1K	2K	5K	10K	20K	50K
R	2.1	1.5	1.0	0.56	0.42	0.24	0.17	0.057	0.038	0.017
C	2,500	1,800	1,500	1,300	1,100	990	800	650	510	320
$\delta$	56.5	32.0	27.4	23.7	18.6	18.5	18.8	23.3	22.5	29.7

Table 1. The impedance of the normal skin of the face.

The resistance factor of the impedance component is high at low frequency ranges, such as 2.1 mega ohms at 20 c/s, while it becomes lower at higher frequency ranges. The curve of the capacity factor has a similar pattern to that of the resistance factor. The "loss angle frequency curve" which is defined as a calculated ratio of the reactance component to the resistance component, is triphasic.

On the skin of the face, neck and upper chest of those with nasal diseases, we found several points, which had electro-physiologically lower resistance and larger capacity than the same points in normal individuals. We termed these "electro-dermal points".

After we had measured the impedance of these points with the skin impedance bridge, we then biopsied and examined histologically the skin at the points

which had given abnormal values of the loss angle curve. We divided the specimens into three groups called "A", "B" and "C". Histologically we obtained the following findings in each of these groups (Table 2).

Table 2.

group	loss angle at 2Kc/s	histological findings
A	about 25	clear cells and intracellular edema in the basal cell layer of the epidermis
B	about 40	intracellular edema in the middle part of the epidermis
C	about 70	cuneiform and vacuolar necrobiotic change

The electro-physiologic characteristics of the electrodermal points and the histologic findings.

In group "A" localized areas of clear cells appeared and there was slight intracellular edema in the basal cell layer of the epidermis. And cell infiltration was also observed around the peripheral arterioles which supplied this area. The loss angle of the impedance at these points was found to be about 25. In group "B" intracellular edema was observed in the middle part of the epidermis and this change was cuneiform. The loss angle curve was found to be about 40.

Group "C" was of a more advanced type of change. The involved area was cuneiform shape and was demarcated from the surrounding tissue. Necrobiotic changes with vacuoles were observed. The loss angle curve was found to be about 70.

From the histological observations we concluded that the electro-dermal points might result from an impairment in the subepidermal arteriole caused by vasomotor nervous impulses, the edema and cuneiform vesicular degenerations of the skin being secondary to arteriolar changes. We made investigations on the electro-dermal points with the bridge and electro-dermometer, which was especially designed for clinical use, in seventy patients with varied types of nasal disease. The seventy patients included 10 cases of mucous cysts of the right frontal sinus, 30 cases of bilateral chronic paranasal pansinusitis, 15 cases of postoperative maxillary cysts and 15 cases of maxillary cancer on the right side.

The distribution of electro-dermal points in the diseases mentioned above was as follows: with the mucous cysts of the right frontal sinus, more "electro-dermal points" were observed on the same side of the forehead. With the right maxillary cancer more electro-dermal points were also concentrated on the cheek of the affected side as with the cases with postoperative maxillary cysts. With bilateral chronic paranasal sinusitis, "electro-dermal points" were more densely distributed on the cheeks, the infraorbital areas of both sides and the upper part of the chest.

At one of the "electro-dermal points" on the cheek the impedance component was found to be smaller in the resistance factor and larger in the capacity factor with increasing of the loss angle at frequencies below 2 Kc/s, than that of the normal skin.

Three months after operation treatment there was tendency which had a high parallelism to the degree of improvement of the diseases, for the "electrodermal points" which had been previously observed on the affected side, largely or completely disappeared. The impedance component had the tendency to rise to normal after successful treatment.

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