

POSSIBLE EFFECTS OF MAGNESIUM SULPHATE
UPON THE EYES

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History strongly suggests that the monks of Europe were the precursors of the modern physician and indeed bridged over the period of scientific darkness from the time of Charles the Fifth to the eighteenth century. Because the knowledge of the physicist and the chemist was neither in good repute nor widely disseminated during these centuries the monastic school of medicine depended chiefly upon empirical knowledge of the physical properties of salts and their solutions. The anti-septic action of alcohol in wines, cathartic and diuretic action of certain herbs and many other pieces of useful material medical, for which the monks were constantly besought, for the relief of human sufferings.

The fame of certain centers of Europe spread throughout the population because of the healing effects of the waters or earth containing medicinal chemicals. The apparent action of spring water containing magnesium sulphate, the dehydrating and favorable heart action of bathing in spring water or mud containing a high percentage of magnesium salts, and the soothing effect on joint and muscular injuries when wrapped in solutions of medicinal spring water rich in magnesium sulphate, were, even then, well recognized.

There are many forms of medicinal magnesium, official and nonofficial. To mention a few of the more common will suffice at the present time. These are: Magnesium Chloride N.F., Magnesium Oxide U.S.P., Magnesium Carbonate U.S.P., Magnesium Nitrate, Mixture of Magnesium Sulphate U.S.P., and, of course, a host of others less common in use.

Magnesium Nitrate is so rapidly soluble that it is generally considered toxic. The chloride solution acts solely to readily provide magnesium ions in the blood stream. The medicinal use of the other forms of magnesium, except one, are so small that their interest here is nil.

Without a doubt if these various forms of magnesium were listed according to their daily use, magnesium sulphate would head the list because, not only of its low cost of production but because of its many uses both in medicine and in industry.

This letter mentioned preparation of magnesium is more commonly known as Epsom Salts, and it is that one from of magnesium salts that we are interested in here.

Magnesium sulphate is incompatible with vegetable astringents, dyes and hydroxides.

Magnesium sulphate is contraindicated in infants and small children, except in very desperate circumstances. Its use is absolutely contraindicated whenever an acute surgical abdomen is even remotely suspected. Despite the fact that it is much safer in this use than castor oil, it is never justifiable to run the risk of precipitating a patient into a general peritonitis, by the premature administration of magnesium sulphate.

The better surgeons frown upon the practice of placing cold, wet packs of magnesium sulphate upon an abdomen which has cries about to be operated upon. Its use, as a treatment in nephritis is contraindicated when large quantities of sulphate are absorbed.

Also its use is contraindicated as a treatment in cases of cranial fracture, but only so in cases of having large hemorrhages.

Ordinarily magnesium sulphate is administered by mouth but in some cases it is given by intraspinal and intramuscular injections, but it is never under any circumstances injected intravenously for fear of poisoning and sudden central nervous action, particularly in this true for the more rapidly soluble form of magnesium chloride, which acts directly upon the central nervous system and is followed by general motor disturbances, paralysis, narcosis, dyspnea and respiratory death.

Winter and Richy (Pharmacological and Experimental Therapeutics Feb. 1931) "The use of magnesium sulphate intravenously may be dangerous but there are no objections to its use intramuscularly and intra-spinally if it be necessary. The sulphate form has a somewhat less solubility from the bowel than the magnesium chloride solution."

Magnesium sulphate is never administered subcutaneously.

Briefly, I have given to you some of the contraindicated, prohibited, if you may, uses of magnesium sulphate. Let us analyze some of these prohibited uses and we shall see what we shall see.

First, why is magnesium sulphate prohibited to infants and young children? Anyone knows that the cells, tissue and organs of children are not matured, and as Syntonists, you and I know from our results in an abnormal structure. The use of magnesium sulphate has an abnormal function by irritating the bowel.

Why is its use prohibited before or immediately following an abdominal operation, and also in cases of cranial fractures accompanied with massive hemorrhages? Because it tends to dilate the capillaries thereby allowing more blood to the area. Incidentally it lowers blood pressure but only slightly.

If administered subcutaneously (hypodermic) it may osmose through the veins thereby entering the blood stream.

Magnesium poisoning is uncommon but acute conditions are made manifest by aggravating a nephritis or by its direct action on the brain.

It has been noted that decayed teeth from dental caries contain a magnesium content higher than normal.

The advised uses of magnesium sulphate are so many and varied that we shall here deal with a few of the more important and more common.

As a cathartic and as a purgative its value has long been recognized. Its physiological action is purely that of a slowly absorbable magnesium salt. It acts in the intestine by salt action, by partial conversion into sodium chloride and by direct action up on the intestinal muscles. During this process it has been shown that considerable magnesium enters the blood stream. This entire process is held to be due to the poor absorption of both the magnesium ion and the sulphate ion, and the tendency of the salt to be excreted into the intestines. It probably relaxes the muscles of the small intestine and by osmosis draws fluid into the gut and washes it clean.

When applied topically it has the property of preventing capillary engorgement and inflammation as is found in sprains and minor injuries. Since it reduces swellings it is not advisable to use in cases of local hemorrhages.

It is very occasionally given in some modification for the induction of anesthesia and in nephritis may be used to induce coma.

It is administered intra-spinally or intramuscularly for the treatment of tetanus and paroxysm of the insane.

Its use in dehydrating the central nervous system in acute brain and spinal traumata is one of the most striking of therapeutic effects of purely physiological reaction. So efficient has it proved that it has greatly reduced the mortality from cranial fractures.

Some other uses of magnesium sulphate are: For the dehydration of some heart cases, eclampsia, and is also useful in dehydrating some edematous nephritis cases if the patient responds with a diarrhea.

As a treatment in cases of Ophthalmoplegic migraines, magnesium sulphate is indicated not solely as a saline cathartic, for its possible action on the fluid equilibrium, but because the magnesium ion is useful in operating to stabilize the sympathetic-parasympathetic vascular system. It's a funny thing how nicely this fits in with our Syntonic prescription of ω or δ . Neurasthenia with no chocolate which is somewhat constipating, or should I say Syntonics fits with it? I wonder.

From the therapeutic standpoint it would not be wrong to conclude from the works of Delbert (Bull. Acad. Of Med. Paris, July 9, 1929) that the moderate intake of magnesium salts in the ADULT life would not appear to be unwise and certainly no contraindications to large quantities in cases of carcinoma that otherwise being adequately treated by electrical and radiant methods.

Soluble form of magnesium probably increase phagocytosis.

It has long been known that the magnesium ion has a peculiar specificity for certain nerve cells and also probably for the myoneural junction.

Over doses of magnesium sulphate intra-spinally or intramuscularly cause an extreme depressing feeling.

Jacques Loeb in 1890 showed by experiments the effects of various salt on mono-cellular organism. This aroused interest in the semi-specific or selective action of magnesium upon various specialized cells. However, very little progress has been made in the interval since this work was done.

Although cellular life may exist without magnesium salts, it apparently has some distinct effect upon tissue respiration, contractility and vitamin metabolism.

For the past quarter century the interest of most investigators has turn to the effect of the magnesium ion on animal organism. The keenness with which the physiological chemists probes into the chemical activities of cellular metabolism and reproduction is responsible for a closer and closer approximation of this cellular metabolism and reproduction process by the interaction of organic and inorganic substances. Little progress has been made to determine whether, for example, magnesium plays any active role in the cure or prevention of degenerative diseases, carcinoma, etc. but the mere hint that is not only possible but highly likely injects an intense interest into the scientific studies now preceding upon these subjects.

Not let us digress for a minute to find out just what the eye is and from whence it is developed.

All tissues and organs develop from one of three germ layers, the ectoderm, the mesoderm and the endoderm. The ectoderm divides into the brain ectoderm and the superficial ectoderm. The nervous system and its derivatives as well as the retina and the lens of the eye originate from the ectoderm.

From the brain ectoderm is developed the neural canal, the closed anterior end of which becomes the primary brain vesicle, the central canal of the spinal cord and the spinal nervous system.

The primary brain vesicle develops into five secondary vesicles from which comes the brain and the rest of the nervous system.

From the superficial ectoderm is derived the lens, anterior epithelium of the cornea, skin of the eyelids, conjunctive and lachrymal apparatus. The other structures of the eye are derived from the mesoderm. Also from the mesoderm is derived connective tissue, bone, teeth, all muscle tissue, circulatory organs, serous lining of body cavities, internal reproductive organs, kidneys and ureters.

We have seen some of the effects of magnesium salts upon the nervous system and the close relationship of the nervous system and the eyes. To ask the question, "What effects have magnesium salts upon the eye", seems only a natural question to be asked by the scientific mind when we consider that the eye is a protrusion of the same vesicle that goes to the formation of the nervous system.

Definite answer to this question, to the knowledge of the writer, is unavailable, although experimentations with guinea pigs are not in progress.

Serious reports that "an added amount of magnesium sulphate in sea water will make the two normal eyes of fishes unite into one middle eye."

This is a matter worthy of consideration.

But fishes are not warm blooded animals, which according to some authorities is due to the absence of an inactive pituitary. Guinea pigs are warm blooded animals and like humans have an active pituitary. Whether magnesium sulphate has the same effect upon warm blooded animals as in fish only time and experimentation will tell.

To the writer this seems to be an experiment worthy of time and patience.

As mentioned aforehand, experiments with guinea pigs to determine what effect magnesium sulphate may have on warm blooded animals are not in progress. To give you some idea of how this is carried out, let us enumerate a few of the more important steps. This is how the writer is proceeding:

1. We have two groups of pairs, that is two males and two females of healthy species. We have them so separated and paired that each male has one and only one female mate.
2. Both pairs are in the same environment so that both pairs have the same amount of sunlight, same air, subject to same changes in climate, etc.
3. Both pairs are fed the same kind and amount of food.
4. Both pairs receive fresh water daily.
5. One group's vegetables, etc. are dried and then freshened with a strong solution of magnesium sulphate, and a strong solution of magnesium ,fresh daily, as drinking water.
6. Each animal is regularly subjected to an Ophthalmoscopic examination and a dental observation.
7. The second group is used as a comparative group to see to what degree the first group will digress from normal under the one abnormal condition.

Of course we cannot expect any great changes immediately, probably several generations will be required to note an appreciable digression from normal. One great reason why this is very highly probable is the fact that it is more difficult to get the solution in guinea than it is in fish.

In vision you know the physiological effects on the nervous tissue. It is hoped to show that this development in utero may act upon the development of the eye stalks and consequently alter the development of the eyes.

It may also alter the development of the brain, who knows. I don't. All we can do is try, wait and see what effect magnesium sulphate has upon our warm blooded pets, guinea pigs.

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References:

Cyclopedia of Medicine, Vol. 8, Magnesium, Metabolism, Mouth Disease
Encyclopedia Britannica 11th edition, Magnesium, Brain Embryology, Eye Embryology
Gould's Medical Dictionary, 3rd edition
Annual Lectures on Glandular Therapy, by A. Lowenthal, M.D.
Embryology by Northern Illinois College of Optometry
Cyclopedia of Medicine, Eye Development
Endocrine Glands.