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GeoMedicine in the Interdisciplinaric Field of Reserch – Possibilities in Austria

Abstract

Geomedicine may be defined as mutual influence of geological or geographic factors and the health of people respectively. Environmental influence may arise from the ground, underground or from the air. In every case, the influence from the environment on the health may be positive or negative. From the standpoint of medicine the main interest is directed obviously to the influence of environmental factors on the health. In other disciplines however, also the influence on environmental factors exerted by men is of interest. Medical disciplines interested in geomedicine are for instance bioclimatology, balneology and nutrition. With regard to the possible consequences of geomedical influence on health several examples can be illustrated. Bioclimatological influences for instance may be detrimental for the life of people, on the other side however in many European countries like Austria, Germany or in Switzerland climatologic factors are the basis of climatotherapy performed in climatic health resorts. Geomedical factors arising from underground are important in balneology. The composition of healing waters is dependent on hydrogeology circumstances. This is true for chemical elements or compounds which are essential for the healing power of the water as well as for contents with adverse effects on the organism. In balneology also muds, called peloids, will be applied. These peloids are defined as anorganic or organic material arising from geological or geological-biological procedures. Mineralized waters can be used as healing waters but also for drinking purposes. With this example a connection to nutrition appears. As with water also the composition of food is dependent on geological factors. This is true mainly for anorganic contents but has also influence on the organic compounds found in living organisms.

Geomedicine may be defined as mutual influence of geographic or geological factors on the one and the health of the people on the other side. In another sense, geomedicine is defined as the science dealing with the influence of ordinary environmental factors on the geographic distribution of health problems in man and animals. These definitions exclude medical problems caused by artificial or man made factors respectively. Generally it has to be considered, that factors from the natural environment may health promoting or detrimental for the health status of individuals.

By using the word geomedicine geochemical and geophysical factors are included. Therefore many scientific disciplines are involved in the geomedical research efforts. From the medical standpoint geomedical questions are of interest in nutrition, bioclimatology, balneology, chronobiology and so on. In the following, some examples of geomedical problems should be presented. In the field of nutrition especially the content of minerals and trace elements in the food is of interest. It is a well known fact, that there maybe great differences in the content of minerals and trace elements in food of plant origin. This food is the basis of human nutrition but also for animals. Because animals eat vegetables, also the content of minerals and trace elements in animals is dependent on the content of the plants eaten by the animal. In this way the alimentary supply of man with the essential nutrients mentioned before is dependent on the chemical composition of the upper layers of the earth. Some examples of geomedical problems in connection with anorganic micronutritients are the health consequences of the alimentary supply with iodine, magnesium or selenium. In case of iodine, it is a well known fact, that in all continents of the earth a deficiency status concerning this trace element is prevalent in regions far from the coast. The reasons for this fact are also well known. Several countries undertake efforts to improve the nutritional iodine status by iodizing foodstuffs like table salt (as in middle european countries) or oil (as in south America). On the other side it is not a common knowledge that several mineralised waters exhibit remarkable amounts of iodine, as can seen from the example of bottled natural waters from Austria. This fact, that waters arising from deeper layers underground contain several minerals and trace elements in amounts with importance for the alimentary supply is a typical problem of geomedicine. This is also true for magnesium. Another example however is selenium. The concentration of selenocompounds in water is generally low and therefore also drinking mineralised water cannot contribute to the improvement of

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the nutritional status with this chemical element. The content of selenium in unprocessed foodstuff however is extremely variable. So we can find regions with very low selenium contents of the ground and therefore also in food with the consequence of a higher risk for an alimentary deficiency pertaining to this trace element. On the other side however there are other regions with very high selenium content of the soil with the consequence of a possible poisoning by eating natural food.

The chemical composition and physical properties of water are of interest not only in nutrition but also in balneology. For the health power of water hydrogeological factors are of decisive importance. This is true not only for the contents of solids but also for gases like CO_2 and radon as well as for the temperature of the water.

The availability of minerals and trace elements for the plant is also dependent, at least in part, on climatological influences. Climatic conditions like temperature, precipitation, wind and air humidity exert their influences not only on the chemical composition of plants and on the availability of several chemical compounds, but these are also geomedical factors as such. Of course, climatic conditions are dependent on geological and geographic factors. Like other geomedical influences also climatic factors can be of positive or negative value for the human health. The possible adverse effects of certain climatologic influences like temperature extremes are evident and it is not necessary to discuss this in detail. It is, however, less well known, that climatic factors can be used as remedies for health. Climatotherapy as performed in climatic health resorts is therefore another field of geomedicine.

At least, also chronobiology can be included into geomedical considerations. The human, like all living organisms can be considered as rhythmic organized organism in a rhythmic organized environment. Rhythmicity is an inborn property of all living organism. The measurable appearance of this endogenous rhythms however is influenced by rhythmic influences from the environment. By far the most important influence in this regard is the rhythmic change of light intensity during the 24-hour period. Light intensity and duration of the lighting period are themselves dependent on geology and geography, at least in part.

In this presentation I have tried to give a short overview over the manifold faces of geomedicine. Geomedicine is a multidisciplinary field and research progress is only possible, if scientists coming from different scientific disciplines are working together.

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Name of bottled mineral water	Calcium content in mg/l	Name of bottled mineral water	Magnesium content in mg/l	Name of bottled mineral water	Iodine content in µg/l
Margarethenquelle (Astoria)	285,6	*Long Life*	197,4	*Martinsquelle*	270
Long Life	263,4	*Gleichenberger Johannisbrunnen*	111,2	*Vitusquelle*	160
Martinsquelle	262,9	*Margarethenquelle (Astoria)*	110,2	*Gleichenberger Johannisbrunnen*	160
Juvina	255,7	*Martinsquelle*	90,7	*Riedquell*	86
Preblauer Auenquelle	251,7	*Riedquell*	83,4	*Alpquell*	84
Riedquell	234,1	*Römerquelle*	77,9	*Sulzegger Styrianquelle*	60
Alpquell	224,4	*Juvina*	57,9	*Preblauer Auenquelle*	57
Gleichenberger Johannisbrunnen	175,2	*Preblauer Auenquelle*	55,0	*Güssinger*	50
Römerquelle	171,1	*Peterquelle*	44,0	*Margarethenquell (Astoria)*	50
Peterquelle	160,2	*Vitusquelle*	41,1	*Markus Quelle*	36
Güssinger	117,3	*Vöslauer*	39,2	*Juvina*	26
Vöslauer	98,2	*Alpquell*	39,1	*Long Life*	23
Markus Quelle	96,2	*Markus Quelle*	34,2	*Römerquelle*	14
Frankenmarkter	78,2	*Güssinger*	26,4	*Peterquelle*	14
Vitusquelle	63,9	*Sulzegger Styrianquelle*	7,0	*Frankenmarkter*	11
Sulzegger Styrianquelle	38,9	*Frankenmarkter*	5,0	*Gasteiner*	5
Gasteiner	15,2	*Gasteiner*	1,0	*Vöslauer*	3

Tab.1: Concentracions of Calcium, Magnesium and Iodine in botteld mineralwater

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Zoologisch-Botanische Datenbank/Zoological-Botanical Database

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