

50 Years in Research on Space Weather Effects on Human Health (Clinical Cosmobiology)

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Abstract

It was a time of great progress in human exploration of the Space, the 60-ties of the XX Century. The studies of A. Tshizhevsky about the Sun's role in human life were impressive. The will to see it and also the role of other Space factors influence on humans using the day-to-day clinical data and many years of Clinical Cardiologist experience were inviting. So, in year 1968, together with my Colleagues, I began to collect data about natural history of Acute Myocardial Infarction (AMI) In Lithuanian capital Vilnius in different Geomagnetic Activity (GMA), different parts of the 11-year Solar activity cycle (SA). It was a special opportunity to get this data from the IZMIRAN institute of the Soviet, now Russian, Academy of Sciences in Moscow District. At 1970 we could present the results of our study at a scientific medical conference in neighboring Latvia's capital Riga. The 50 year's work in this field began. The study was prolonged in new conditions since my transfer to Israel in year 1974 in another big University hospital, involving new sources of cosmophysical information (USA), new and old coauthors. The first part of studies included the second part of decades of the XX century concentrated on the effects of SA and GMA. Different patients were studied: cardiac, hypertensive, cerebral stroke, migraine attacks, newborns and their mothers, intraocular pressure data, Acute Glaucoma, Retinal Ablation, also Sudden Cardiac Death (SCD) victims, dangerous cardiac rhythm forms, related to SCD, heart pressure and blood pressure monitoring, methods of coronary disease treatment-transcatheter coronary interventions, patients with Implantable Cardioverter-defibrillators (ICD). In 1989 the term "Clinical Cosmobiology" (in Canada) was first used describing the clinical effects of changing Space Weather. GOOGLE offered a special chapter to data related to Clinical Cosmobiology. From the end of the XX century in addition to SA GMA we started to study also Space Protons of Solar and (Space Proton of Galactic and extragalactic origin) studies, also Cosmic Ray (CRA) effects, that are antagonistic to SA and GMA and their activity is measured by Neutron Activity at the Earth's surface in Impulse/Min. (imp/min). If GMA is related to Blood Pressure and Coagulation and Inflammation markers rise, low GMA-high CRA is related to rise of SCD, AMI, more Left Anterior Descending Coronary Artery lesions in AMI, more severe arrhythmia (VT, VF), more electrical Heat Storms (3 or more episodes of VT, VF in 24 hours). The aim of this paper is to propagate the results of Clinical Cosmobiology between clinicians.

Keywords: *Clinical; Cosmobiology; Solar; Geomagnetic; Cosmic; Ray; Neutron; Activity; Myocardial; Infarction; Sudden; Cardiac; Death; Arrhythmia; Ventricular; Tachycardia; Fibrillation; Implantable; Cardioverter; Defibrillator*

Introduction

When You are a young specialist, having three scientific degrees and a fresh Full professor in medicine, teaching doctors at a Postgraduate Institution of a prestigious University You think about the next steps. In the late 60-ties of the XX century it was my situation. It was a time of great progress in the Space exploration. The USSR was between the pioneers in this field. Together with some reading about the role of the Space in life brought me to a will to probe my ability in this field. Some connections with friends

in Moscow (I made my Cardiology training in Bakulev I-tute of Thoracic Surgery and was also in touch with this I-tute in my Dr. Science research) allowed me to obtain steady data about Space Weather daily and monthly from the IZMIRAN i-tute of the Soviet Academy of Sciences. The 16 years after graduate as a M.D. from Vilnius University I spent three years in a rural hospital as chief of Internal Medicine Department and, also, as chief of regional Health Department. After 3 years I returned to Vilnius as a Family physician in the University Hospital, also began work on my Ph.D. dissertation. The study was on complex treatment of patients with Arterial Hypertension by Rauwolfia Serpentina alkaloids. The supervisor was my teacher professor L. Laucevichius chef of the Hospital Therapy Clinic. The Phd degree I obtained in 1961. Since 1958 I was a Cardiologist in the team of Cardiac Surgery in the same Hospital n.1 in the department of the known surgeon professor Pranas Norckunas. The chief of the team was a future professor young talented surgeon A. Pronckus. I must find the patients, prepare them to surgery, took part monitoring the patients, in the operation, threatened in the postoperative period, together with the surgeons and followed the patients long time post-surgery. All our team spent a couple of months in Moscow, in Bakulev I-tute learning the details of cardiology and cardiac surgery. The most popular operation was Mitral Commissurotomy. The specifics of this group of patients and the context of my second book (first was "Prognosis in Cardiology") were the patients with Mitral Valve Disease post Commissurotomy. It was also the name of my D.Sc. study. This degree I obtained in 1967. In 1962 I came to the Department of professor L. Laucevichius as an assistant professor, from 1967-Associate Professor and since 1970 as Full Professor of Medicine.

Some of the principal results of our studies in the last years were:

1. The Space Protons of Solar origin have, but not great influence on human mortality [1-12]. The extragalactic Protons, close connected to CRA and more energetic, have much stronger links to human mortality.
2. The relationship between SA, GMA, CRA compared at relatively long time (20 years) period was as follows: positive between SA and GMA $r = 0.55$, $p < 0.0001$; inverse for SA and CRA $r = -0.86$, $p < 0.0001$; and GMA with CRA $r = -0.66$, $p < 0.0001$ [13,14].
3. At days of zero GMA it was a 23% rise of admission of patients with AMI in the next 48 hours. An increase of ICD discharges for VT, VF [5]. More electrical heat storms (3, or more episodes of VT, VF in 24 hours [12]. Analogical observation published about ICD discharges for VT and VF VT and VF a group of US, Chech and Italian colleagues (quoting 9 our studies) on 57000 patients with implanted ICD at days of low (Quiet) GMA.
4. At days of stormy GMA (IV°) it was a rise of blood coagulation markers (Prothrombin Time 11.8%, $p = 0.007$, Blood Platelets Count 24,33%, $p = 0.002$; Blood Fibrinogen 11,18%, $p = 0.002$; $p = 0.003$). Concomitant Blood Basophil's drop by 63,33%, $p = 0.003$. Also rise of Inflammation markers C-reactive protein IV°/I° GMA $r = 0.96$, $p = 0.039$, rise of Immunoglobulins M and G and Anticardiolipin Syndrome cases [11,15]. GMA storm was accompanied by rise of Arterial Blood Pressure (fur Systolic by 4.06 mm.Hg, Diastolic 2.246 mm.Hg, maximal daytime Systolic 5.56 mm.Hg, Diastolic 6.04 mm. Hg. In low GMA and high CRA it was I°/IV° GMA - more supraventricular extrasystoles -31,57%, more ventricular extrasystoles (25%); VT, VF I°/IV° GMA $r = 0.97$, $p = 0.02$; more AMI, PAF, SCD; Cardiac Arrhythmia in AMI patients at all 14.1% GMA I°/IV° $r = 0.96$, $p = 0,001$. Implantable Cardioverter Defibrillator (ICD) discharges for VT, VF at Neutron Activity (CRA marker) at 9246 ± 299 imp/min, daily average for years 1995 - 2005 8865 ± 411 imp/min. I°/IV° GMA $r = 0.96$, $p = 0.001$. Cerebral Stroke (CVA) mortality/Neutron (CRA) marker $r = 0.41$, $p < 0.0001$, (132020 observations) [16].

Since 1974 these studies were done in Cardiology departments o of Hasharon hospital (1974) and from 1975 in Beilinson Medical Center, now both united under name of Rabin Medical Center with chiefs professors I. Zahavi, M. Aygen, J. Agmon, Sh. Scliarovski, Al. Battler and from 2012, R. Kornowski.

In addition, a group of close coauthors in Israel and abroad was born. Together with the team of the Cardiology Division in Rabin Medical Center many years I worked together with Dr. Evgeny Abramson, Dr. Jaqueline Sulkes, Dr. Peter Israilevich, Prof. M. Shimshoni and Prof. A Lerner from Weizmann Institute of Science, Prof. S. Manoach and prof Z.Laron and His team are endocrinologists and Professor. in Tel Aviv U-ty. Also, a great group of laboratory medicine specialists: Professors H. Joshua, J. Lahav, Dr. J. Monselize, Dr. D. Harrel, Dr. Ch. Kaufman.

Three groups in Lithuania under Prof. D. Zhemaityte in Klaipeda and Palanga, Professors S. Domarkiene and R. Radishauskas, Professors J. Petrauskiene and R. Kalediene, S. Sauliune (Starkuviene) and their colleagues in Lithuanian University of Medical Sciences in Kaunas; an additional positive factor here is the steady positive influence on this cooperation from the Rector of this University and Chief of Cardiology Department Professor R. Zhaliunas. Also, close Friends and Professors Al. Laucevichius, Chief of Cardiology and P. Sherpytis Chief on Intensive Care, in the faculty of Medicine in Vilnius University. Assoc. Professor E. Babayev and his colleagues at National Academy of Sciences in Baku, Azerbaijan.

In the last years close contacts were established with a well known astrophysicist Professor T. Breus from the Institute of Space Investigation in Moscow of the Russian Academy of Sciences that invited me to give a presentation of our work at the International Conference of the Institute in June 2012 and her coauthor Dr. Y. Gurfinkel.

Geomagnetic Activity (GMA) is connected with a number of coagulations [17], rise of inflammation marker (CRP) [18], Prolactin changes, higher Corticosteroids secretion changes [19,20]. SA is related to newborn number, weight and length [21,22], preterm births [23]. Changes, also, in admission of mental patients related to SA and GMA [24]. In year 1989 in Canada I described as a specific part of science "Clinical Cosmobiology" [25] that show the antagonism between SA and GMA from one side and Cosmic Ray activity from other on different sorts of human diseases and they natural history [3-8,13,14,18,26-30]. The Cosmic Ray is one of interesting parts of Space Physics that is intensive studied (Sigl G, Amelino Camelia, Chiao A, Dorfman L, Zey MG). It's supposed that Cosmic Ray comes in our Universe from a neighboring black hole (The Perre Auber Collaboration). The maximal energy limit in our Universe is 10^{19} Electron/Volt. The energies of part of Cosmic Ray are achieving 10^{21-22} Electron/Volt. If this sort of energy would come from our Universe, it would demanded changes in many parts of physical equation, adding the Planc coefficient. But, at this stage we are accepting the origin of Cosmic Ray as extragalactic and it's avoided. It's presumed that high energy Cosmic Ray in our galaxy are affecting atoms compressing their Electrons into the Nuclei and converting them to Neutrons. Neutron activity around our Planet is a marker of Cosmic Ray Activity. (CRA), measured by impulse/minute (imp/min).

SA and GMA are natural shields of our Planet from damaging effects of CRA. (SESC Glossary of Solar-Terrestrial Terms G. Heckman, 1988, 1992, NOAA, National Geophysical Data Center, 2015). The interrelationship of the antagonistic Space Weather components are: SA/CRA (Neutron Activity) $r = -0.86$, $p < 0.0001$; GMA/CRA (Neutron Activity) $r = -0.66$, $p < 0.0001$; SA//GMA, $r = 0.5$, $p < 0.0001$ [13]. In the last decades a number of publications appeared in the field of biological effects of both antagonistic parts of Space Weather [8,16,31-36]. Also some studies related to days with zero GMA and relatively high CRA (Neutron activity) were published [10,13,33,37]. Concomitant data was published about specific health problems occurring in high CRA (Neutron) activity.

In year 2012 my book named "Timing of cardiovascular events in changing space weather (Clinical Cosmobiology)" appeared. At the same time GOOGLE began concentrating publications in this field also under the name "Clinical Cosmobiology". As it was shown in a number of studies in days following zero GMA an increase in Acute Myocardial Infarction followed more than 20% in the first two days post zero GMA, and 18% in the week following zero GMA [13] and to a rise of a number of cardiovascular events also). A significant increase of CRA (Neutron) activity was seen at days of Inplatable Cardioverter Defibrillator (ICD) discharges and also, antitachycardia pacing at low GMA in a study of US, Italian and Chech colleagues, quoting 9 our studies in a Mayo clinic publication (Ebrille E, Konechny T, Spacek R, Konechny D, Jones P, Ambroz R, *et al.* 2015). Our separate study published in "Pace" was for ICD discharges on days of Electrical Heart Storms (days with 3 and more episodes of Ventricular Tachycardia (VT) and/or Ventricular Fibrillation (VF) by patients with ICD demanding additional discharges [12]. It was shown that at this days a significant higher Neutron activity was registered [12]. Another study confirmed an additional coronary events risk rise at days of high CRA [1-3,26,38,39]. A hypothesis explaining the role of air pollution as a risk factor in Acute cardiac events was the assuming that Neutrons use the air pollution nanoparticles as an additional way for invasion human body, were joining the H^+ anions they transform to Protons and are attacking different parts of human cardiovascular system [16,34]. Possible action affecting genes was also discussed [40]. The most important time is not only the time of birth but beginning from the conception [5,41-96].

Conclusion

Summarizing the presented data, we can conclude that:

1. Space Weather has some effects on the Natural History of many sides of human life and is involved in the occurrence of many medical events.
2. Two opposite forces are acting as triggers of medical-biological forces: from one side Solar and, connected, Geomagnetic Activity, and from other side the Cosmic Ray, that is represented by Neutron Activity around our Planet in impulses/minute (imp/min) and rise when the first two are weak.
3. Possible action on human genetic components and connection with air pollution of the mentioned Space Weather components and their interaction with meteorological and environmental factors need additional studies.
4. More information about environment, biology and medicine for practical medical personal.

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