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Space Weather and Tachysystolic Sudden Cardiac Death (Scd)- Lessons from Clinical Cosmobiology

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Citation: Eliyahu Stoupel (2017), Space Weather and Tachysystolic Sudden Cardiac Death (Scd) - Lessons from Clinical Cosmobiology. Int J Car & Hear Heal. 1:1, 09-11. DOI: [10.25141/2575-8160-2017-1.0009](https://doi.org/10.25141/2575-8160-2017-1.0009)

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Received: July 30, 2017; **Accepted:** August 11, 2017; **Published:** August 11, 2017

Abstract:

This old proverb is for Mors certa, hora incerta (Death imminent, time not known) affect our life and plans. Most sudden deaths are of cardiac origin –Sudden Cardiac death (SCD) Despite It's one of most often groups of sudden death, especially in middle and old age Despite very often of SCD great progress in diagnostics and prevention we still are witness

About Space Weather Activity(SA)

We are steady under influence of Space Weather components. Geomagnetic Activity (GMA), Cosmic Ray (Neutron) Activity (CRA). Neutron on the surface of our planet (Imp/min.) the indicator of CRA. SA and GMA are correlated by $r=0.5$, $p<0.0001$. Both SA and GMA are inverse related to CRA and serve as a shield of our Planet from CRA. SA/CRA $r=-0.85$, $p<0.0001$; GMA/CRA $r=-0.66$, $p<0.0001$. In the last years studies were published confirming CRA links with cardiac arrhythmia. The aim of this paper is to review studies in the field of SCD In connection with Space Weather effects, accompanying our life from conception to death.

Abbreviations List

SCD- sudden cardiac death

GMA -geomagnetic activity, SA-solar activity.

GMA-geomagnetic activity

NA- neutron activity

AMI-acute myocardial infarction

R-correlation coefficient

P- probability

VT—ventricular tachycardia

VF- ventricular fibrillation

ICD -implantable cardiac device

AF- atrial fibrillation

BBB-bundle branch block

AV-atrio-ventricular

Introduction

Space Weather as an object of SCD studies is discussed in the literature for a long time. We studied this problem since the middle of the last century, and published our observations in the last two decades of the Century (1-2) and in later studies (3-8)

the progress in Space exploration human astronauts-cosmonauts history and knowledge in space physics, computerization of physical data opens new possibilities to learn details of Environmental Physical Activity links with human health and medical emergencies. We used to compare SCD with a number of physical factors: Solar Activity (SA), represented by Sunspot Number (that was introduced by Swiss astronomer Wolf in the XIX C.-1848), Solar Flux at 2500 MGH and 10.7cm wavelength Geomagnetic Activity (GMA) According to A and K indices and divided in Quiet (A-0-7), Unsettled (A-8-15), Active (A-15-29) and Stormy (A-≥30); Cosmic Ray Activity (CRA) Measured by Neutron Activity on the Earth's surface in Impulse/minute (imp/min).

Data about Space Weather Components and SCD

1. 43 SCD, out of the hospital, with postmortem examination (1974-1977): (Solar-Terrestrial Predictions, 1980. Boulder, Co.) Quiet GMA- 0.055 daily; Active, Stormy GMA days- 0.018, $p>0.001$.

2. SCD (n=480) IN 1229 Quiet GMA days -0.1456; SCD IN 265 Stormy GMA days -0.1079, $p<0.01$ (1993, Reviews in Clinical & Basic Physiology and Pharmacology).

3. SCD (n=651) correlation with GMA level (I^0-IV^0) $r=-0.804$; $P=0.05$ (J.of Clin. & Basic Cardiology, 1999.2)

4. At a day of extreme high GMA in year 2000, July 14, the "Bastille Day Event" (strongest GMA storm in Solar Cycle 23) SCD were absent in a city that had 152 such events in 1998-1999, SCD inverse correlated with daily GMA by $p=-0.512$, $p=-0.50$ for male and $p=-0.26$ for woman). At all July, 2000 SCD WERE INVERSE CORRELATED WITH GMA ($r=-0.35$, $p=0.05$) ((Seminars in Cardiology 2002, 8, 3).

5. SCD (n=848, 579-68.28% male) higher Neutron Activity (NA) (imp/min) in SCD accompanied by 1.myocardial rupture,2. Repeated AMI, and Coronary Atherothrombosis without fresh AMI (mostly arrhythmic and in Younger patients). Daily Neutron activity for all 2002-2004 time was 8299+- 294.2 imp/min; the highest Neutron Activity was at days with SCD and myocardial rupture (8567imp/min), p with all days of SCD =0.0037). (JB-CPP,2006,17,1).

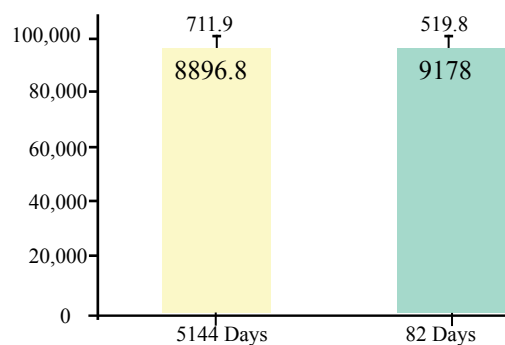
6. In hospital cardiac arrhythmia in AMI patients: number of patients, n=14529, 8586 male years 1983-2001). Female age average 70y., male 60y. 13.7% male and 14.3 female AMI patients had cardiac arrhythmia in the Acute stage of AMI .052% combined Atrial and Ventricular Fibrillation. Atrial Fibrillation and Bundle Branch Block (BBB) -2.4%. Left BBB 7.76%; Right BBB -4.75%, all BBB-5.55%. II⁰-III⁰ degree AV Block - 5.5%. Sinus Bradycardia -8.08%. GMA in inverse correlated with cardiac arrhythmia (r=0.98, p=0.01; ratio of VF / level of GMA inverse correlated in male patients (r=-0.96, p=0.035; on days of IV degree (Stormy) GMA VF in female patients was twice as in male : 9.09%/4.15% Chi Square 5.179, p=0.02. At days of LOWEST GMA (I⁰) IT WAS MORE CARDIAC ARRHYTHMIA (P=0.0006), new AF (p=0.039), atrial and ventricular Tachycardia (p=0.01). For VF -non significant, as a result of a high number of VF in female patients at IV⁰ level of GMA. (Seminars in Cardiology, 2004,10, 3.).

7. In 85 patients with implanted Cardioverter-Defibrillator (ICD) , 73 male, most with Ischemic Cardiomyopathy. in years 1995-2006 discharges for life threatening arrhythmia (VT,VF) inverse correlated with GMA level at r=-0.974, p=0.02. The Neutron Activity for the all observation period were 8805.33+- 411.4 imp/min. -4383 days (For days of VT,VF -284 days, 580 treatments) were 9246.8+- 299.0 imp/min. (p<0.0001) (Cardiology Journal 2008,15,5.).

8. Implatable Cardioverter Defibrillator and Geomagnetic Activity-Mayo Clinic study involving US, Italian and Chech cardiologists (February, 2015,). (25). 59468+-11397 patients. Results: inverse correlation between GMA and ICD discharges for life threatening cardiac arrhythmia (VT,VF) -P=- <0.0001, and, also, Antitachycardia Pacing were seen. (Mayo Clinic Proceedings 2915,90,2). (25). (The authors quoted 9 our publications in this study).

9. Electrical Heart Storm (EHS) (3 or more VT, VF episodes daily)and Environmental Physical Activity, Pace ,August 2014.).At days of EHS it was a significant higher Neutron Activity (8896+-711.9 imp/min. in 5114 days of total observation versus 82, 82 pts., 71 men. on days of EHS (1999-2012y.) with Neutron Activity 9118.+519.8 imp/min.(p=0.0001). Here also we have the link between Electrical Heart Instability and Cosmic Ray (Neutron)Activity association with the most severe cardiac arrhythmia -EHS. (PACE, August 2014) (1-10)

Figure 1.



Daily neutron activity (Imp./min.) on days (N=82) of Electrical heart storm (EHS) and total observation time (1999-2012)

Summary

The cosmophysical data came from Space Science Institutions in the USA,Russia,Finland. (11-17). The presented data show that SCD related to tachysystolic cardiac arrhythmia (VT,VF, excluding asystole) is linked with Cosmic Ray (Neutron) activity. Neutrons on the Earth surface are markers of Cosmic Ray activity. The energy of Cosmic ray includes very high energy fractions, achieving 10²⁰⁻²² Electron -Volt. The maximal terrestrial limit of energy is accepted as 10¹⁹ Electron- Volt , and only the assumption of the thesis that Cosmic Ray are outside (but close) to our Galaxy prevent us of necessity to change many physical equations, including to them the Plank coefficient. Under action of such energies the atoms, contacting with Cosmic Ray under unprecedented pressure impress their electrons in their nuclei, transforming to Neutrons. The Neutrons migrating from the periphery of our Galaxy close to our Planet , serve as a marker of Cosmic Ray Activity. (18-22) Additional possibilities of Neutron activity, in addition to be a Cardiovascular Events Trigger (23-26), can be their interaction with Gene's (27) , use of Air Pollution nanoparticles as an additional way for invasion in biological (including human) objects (28). It's accepted that such invasion is followed by Neutron contact with H +anions in our tissues and other parts of body, and conversion to Protons that serve as aggressive intruders for many elements of our organism.(29.30). Solar and Geomagnetic Activity are natural shields from Cosmic Ray related medical events, including part of SCD. (31).

Conclusion

1. Tachysystolic Sudden Cardiac Death (related to Ventricular Tachycardia and Ventricular Fibrillation) (VT,VF) is significantly more often in conditions accompanied by higher Cosmic Ray (Neutron) activity and ,also, lower Geomagnetic Activity (GMA).
2. Additional (artificial magnetic field), maybe, can serve as preventive measure for such arrhythmia candidates.

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