

Proposal for Forming an IAA Study Group SG 2.16

Title of Study: "SPACE ADAPTATION MARKERS"

Proposer(s): Chrysoula Kourtidou-Papadeli, Joan Vernikos

Primary IAA Commission Preference: COMMISSION 2

(From Commission 1 to Commission 6)

Commissions: 1 Space Physical Sciences, 2 Space Life Sciences, 3 Space Technology & Systems Development, 4 Space Systems Operations & Utilization, 5 Space Policy, Law & Economics, 6 Space and Society: Culture and Education

Secondary IAA Commission Interests: COMMISSION 1 and 6

(From Commission 1 to Commission 6)

Members of Study Team

Chair (s): Jean Claude Gharib, Joan Vernikos

Co-chair: Chrysoula Kourtidou-Papadeli

Co-chair: *to be appointed*

Secretary: *to be appointed*

(Open to members and non- members of the Academy)

Members:

MEMBERS of the STUDY GROUP "SPACE ADAPTATION MARKERS"

1. Antunano Melchor
2. Bamidis Panagiotis,
3. Blanc, Stephane
4. Clement Gilles,
5. Frey Mary Anne,
6. Gerzer Rupert,
7. Galina Yu. Vassilieva
8. Gargir Genevieve
9. Graef Peter
10. Green David,
11. Gharib Jean Claude
12. Gzeisler Charles
13. Haigneree Claudie
14. Heer Martina
15. Horneck Gerda
16. Iwase Satoshi

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17. Kanas Nick
18. Kourtidou-Papadeli Chrysoula,
19. Kozlovskaya Inessa,
20. Kyparos Antonios,
21. MacLeish, Marlene
22. Mukai Chiaki,
23. Mukhamedieva Lana N.,
24. O’Gorman Donal,
25. Papadelis Christos
26. Reitz Günther
27. Rittweger Joern,
28. Russomano Thais,
29. Strollo Felice,
30. Sundblad Patrik
31. Tsarkov Dmitriy,
32. Vernikos Joan,
33. Zhuang Fengyuan

Short Description of Scope of Study

Since the beginning of the study of evolution, people have been fascinated by the most recent changes in human evolution and adaptation. Despite great progress in our understanding of human history, we still know relatively little about the selection pressures and historical factors that have been important over the past 100,000 years. At that time human populations spread around the world and adapted in a wide variety of ways to the new environments they encountered.

The projected long-duration space flights will include astronauts who will be returning to the moon as well as those who will take part in human exploration missions to Mars and possibly other planets. Successful exploration will require first, a better understanding of the effects that extended missions in terms of years, pose to the physiological, emotional and behavioral health of astronauts. This would include not just during flight, but also in adjusting post-flight to new conditions, whether that be re-adapting to Earth or another space destination. To approach this, space adaptation markers for tracking responses to these changes, survival, and predicting the progression of adjustments of human biology to new environments in future colonization in Space will need to be identified and developed. Human adaptation in space will encounter two main stresses – environmental and social transitions and depend on genetic and physiological predisposition. Additionally, there are two major types of adaptation related to those stresses, namely physical and behavioural.

The environmental stresses have been acting as the major selective forces reshaping the genetic make-up of human populations. Time and intensity of exposure to environmental stresses are important factors determining the usefulness of adaptation markers. Among

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those are High altitude hypoxia/Air, Water and food, Extreme temperatures, Radiation, Gravity and Microgravity, and as yet Unknown hazards

Among Social transitions main interest is focused on Isolation, Separation, Hierarchy, Self-image and Others.

Overall Goal: New adaptation markers induced by space flight are to be discussed and a report with recommendations will be generated.

Intermediate Goals:

1. The initial strategy will be to concentrate on comprehensive markers focusing on common pathways involved in the overall adaptation process of all systems.
2. A core study group will be formed to review the evidence-based medicine on biomarkers studied so far for human adaptation in Space or in other extreme environment conditions as relevant.
3. The final product will be a report on the best studied and analyzed adaptation markers for each individual system.
4. Recommendations.

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Methodology:

(Email works, workshops, stand alone conferences, interim publications, etc.)

Literature reviews, e-mails, teleconferences, meetings and conference

Time Line:

2 YEARS

Final Product (Report, Publication, etc.):

The Final product will be a report with recommendations on new markers as predictors of physiological and psychological changes during human adaptation in space environment.

Target Community: Scientific research organizations, Space Agencies, Space Academies, and Biomedical research Centers, as well as other International scientific communities, and Exploration mission planners.

Support Needed:NO

Potential Sponsors: None

To be returned to the IAA Secretary General Paris

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by email: sgeneral@iaamail.org

Date: 10.03.2014

Name: Chrysoula Kourtidou-Papadeli

(No Signature required if document authenticated).

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Follow-up Section for IAA use only

Initial Phase

Application received:

Commission Approved:

SAC Approved:

Web Site Section opened:

Members Formally Appointed by IAA:

Final Phase

Peer Review by Commission Completed:

Recommended by the Commission:

Final Report Received:

SAC Approved:

BOT Accepted:

Publisher Selected:

Study Published: