IAA Study Group 2.12 Status Report #4

Responsible Commission:
Commission 2

Study Number and Title:
2.12-Effectiveness of Countermeasures

Short Study Description (repeat from Study Group Proposal):
To collect and summarize evidence of the effectiveness of physiological countermeasures for the protection of human health in space and present a state of the art and needed forward work for future manned deep space exploration missions.

Progress in past six months (Meeting list)

1. **Meeting no. 3: April 7, 2014 – 7:00-8:00 am (US CST) telecon**: Documents from Milestone 1 and 2 (a list of physiologic countermeasures currently used and a method to score or evaluate the effectiveness of countermeasures) were discussed and revised.

2. **Meeting no. 4: April 29, 2014 – 7:00-8:00 am (US CST) Telecon**: Milestone 1, 2a and 2b were further revised and discussed.

3. **Informal face-to-face Meeting: May 12, 2014 5:30 pm San Diego, CA**: No decisions made.

4. **Meeting no. 5: May 27, 2014 – 7:00-8:00 am (US CST)**: Milestones 1, 2a and 2b were further discussed, but no major changes were made. Milestone 3 (evaluation of countermeasures being tested in a research setting in space) was prepared for the next meeting and milestone 4 (evaluation of countermeasures tested in ground analogs) was prepared and discussed based on inputs from Dr. Cromwell, who had supplied a list of references.

5. A face-to-face meeting was held during the 6th International Congress of Medicine in Space and Extreme Environments (ICMS) in Berlin, Germany on September 16, 2014, in conjunction with the International Countermeasures Working Group meeting. The state of the art of the Study Group documents were presented by the secretary, Peter Norsk.

6. **Meeting no. 6: October 21, 2014 – 07:00-08:00 am (US CTD)**: Milestones 1 – 3 were all discussed and further developed.
7. **Meeting no. 7: December 9, 2014 – 07.00-08.00 am (US CTD):** Milestones 1 – 3 were again worked on and discussion on the next milestones initiated.

8. **Meeting no. 8: February 9, 2015 – 07.00-08.00 am (US CTD):** Further updates for milestone documents 1-3 were discussed and drafts of milestones 4-8 were presented. In addition, the outline of the final document was presented by the secretary and discussed.

9. **Forward Work:** A face-to-face meeting is planned for the ISS MMOP Countermeasure Working Group, which is planning a meeting in Houston on April 29th to May 2nd 2015. It is the plan to have an IAA Study Group face to face meeting in connection with this because of overlap of the two memberships.

10. **Updated list of milestones:**

    **Milestone 1,**
    February 2014: Establish a list of physiological countermeasures used in manned spaceflight programs divided up into short (<30 days) and long (>30 days) duration flights (A joint U. S./Russian publication in 5 volumes entitled “Space Biology and Medicine” edited by Nicogossian, Mohler, Gazenko and Grigoriev will be the basis of this work).

    **Milestone 2,**
    February 2014: Establish a method to score or evaluate the effectiveness of countermeasures based on previous U. S and Russian experience (2a) and score/evaluate previously used countermeasures based on milestone 1 (2b).

    **Milestone 3,**
    May, 2014: Describe and evaluate countermeasures that have been tested during ground analog conditions, and which are not operational yet but have shown potentials for future use.

    **Milestone 4,**
    April 2015: Describe and evaluate countermeasures that have been tested in a research setting in space, and which are not operational yet but have shown potentials for application.

    **Milestone 5 - 6,**
    April 2015: Based on milestones 1 - 4, recommend the most efficient integrated countermeasure suite for investigation in space before the end of ISS and establish a vision for a future integrated human countermeasure suite during deep space
exploration missions related to the most likely mission scenarios (e. g., divided into missions with or without planetary surface investigations and shorter or longer than 6 months and combinations thereof).

Milestone 8, April 2015: Discuss and describe the usefulness of artificial gravity for future deep space exploration missions and describe the advantages and disadvantages, and how use of artificial gravity during future exploration missions will influence the utilization of ISS.

Milestone 7, June 2015: Describe the expected gaps of knowledge regarding countermeasure development from the end of ISS to the initiation of future deep space exploration missions

Presentation of draft report on Effectiveness of Countermeasures for HIS audience, July 2015: Discussion and afterwards implementation of comments for improvement of report.

Milestone 9, October 2015: Revision of report based on HIS and other inputs.

Milestone 10, December, 2015: Final report.

Presentation to IAA, Spring 2016.

Notes:

- Presentations on progress will be delivered to IAA at their regular meetings.
- Each milestone will be discussed and approved at IAA study group telecons closely related to the dates of milestones, and for each telecon the secretary is responsible for presentation of a draft section of the report for discussion and comments.
- In between milestones and telecons/meetings, email exchanges between IAA study group members on content of report will be conducted as the basic working tool coordinated by the secretary.
Website Study Information up to date? (Study Group Membership, Study Plan and Schedule):

Study Plan and Schedule: See above.

Membership:

John B. Charles (NASA)
Inessa Kozlovskaya (IBMP)
Peter Norsk (USRA-NASA)
Patrik Sundblad (ESA)
Jörn Rittweger (DLR)
Chiaki Mukai (JAXA)
Sh. Chen (China)
Natalie Hirsch (CSA)
Perry Johnson-Green (CSA)
Valerie Gil (CSA)
Hiroshi Ohshima (JAXA)
Nora Petersen (ESA)
Oliver Angerer (ESA)
Judith Hayes (NASA)
William H. Paloski (NASA)
Elena Fomina (IBMP)
Elena Tomilovskaya (IBMP)
Jonathan Scott (ESA-EAC)
Lena Norrbrand (Swedish Aerospace Physiology Centre)
Ronita Cromwell (USRA-NASA)
Yael Barr (Wyle-NASA)

Next Meeting:

1. A face-to-face meeting is planned for the ISS MMOP Countermeasure Working Group, which is planning a meeting in Houston on April 29th to May 2nd 2015.
2. Telecon, April 14, 2015, 07.00 am (US CST).

Forward Work:

Completion of milestones 4-8 and first draft of final document to be presented to the IAA in the summer of 2015.

Issues requiring resolution? (recommend approach):

None
Product Deliveries on Schedule? (If modified explain rationale):

All deliveries are on schedule except for the revisions indicated above.

Study Team Member Changes? (List any Study Team Members that you wish to discontinue, and provide names plus contact coordinates of any Members you wish to add on the second page of this Study Update form.) Note: Complete contact information including email, tel. and fax must be provided for all additions. Only Members with complete contact information will be listed and receive formal appointment letters from the IAA Secretariat.)

The following new members have been added to the group: (See Appendix 1 for complete contact information)

The following member was added to the Study group on February 9th, 2015:

Yael Barr. M.D.
NASA/Johnson Space Center
37, mail code SK111
2101 NASA Parkway
Houston, TX 77058
USA

Name of person providing Study Group Status (Study Group Chair or Co-Chair):

Study update:
Peter Norsk, Secretary (USRA-NASA)

Chairs:
John Charles (NASA)
Inessa Kozlovskaya (IBMP)

Status Report Date:
02/26/2015

Study Team Membership Changes:

See above

Effective Date:
02/26/2015
APPENDIX 1.

IAA study group 2.12 - Effectiveness of Countermeasures

List of participants, May 2014.

Chairs:
John B. Charles  
NASA/Johnson Space Center  
1:755, mail code SA211  
2101 NASA Parkway  
Houston, TX 77058  
USA

Inessa Kozlovskaya  
IBMP  
123007, 76A Khoroshevske bshosse,  
Moscow,  
Russian Federation

Secretary:
Peter Norsk  
NASA/Johnson Space Center  
37:140, mail code SK111  
2101 NASA Parkway  
Houston, TX 77058  
USA

Other Members:
Oliver Angerer  
Human Exploration Science Coordinator  
ESA/ ESTEC, HSO-US  
Keplerlaan 1, P. O. Box 299  
2200 AG Noordwijk ZH, The Netherlands

Sh. Chen
Elena Fomina
IBMP
123007, 76A Khoroshevskoe shosse,
Moscow,
Russian Federation

Valerie Gil (CSA alternate)
Astronauts, Life Science and Space Medicine
Space Exploration
Canadian Space Agency
6767 route de l'Aéroport, Saint-Hubert (Québec) J3Y 8Y9
Tel: (450) 926-4735 | Fax: (450) 926-4707

Judith Hayes
NASA/Johnson Space Center
37:114B, mail code SK111
2101 NASA Parkway
Houston, TX 77058
USA

Natalie Hirsch
Astronauts, Life Science and Space Medicine
Space Exploration
Canadian Space Agency
6767 route de l'Aéroport, Saint-Hubert (Québec) J3Y 8Y9
Tel: (450) 926-4741 | Fax: (450) 926-4707

Perry Johnson-Green (CSA alternate)
Astronauts, Life Science and Space Medicine
Space Exploration
Canadian Space Agency
6767 route de l'Aéroport, Saint-Hubert (Québec) J3Y 8Y9
Tel: (450) 926-4780 | Fax: (450) 926-4707

Chiaki Mukai
Center for Applied Space Medicine
JAXA
Tsukuba Space Center
2-1-1 Sengen
Tsukuba, Ibaraki
305-8505
Japan

Hiroshi Ohshima
Space Biomedical Research Office
JAXA
Tsukuba Space Center
2-1-1 Sengen
Tsukuba, Ibaraki
305-8505
Japan

William H. Paloski
NASA/Johnson Space Center
1.753F, mail code SA2
2101 NASA Parkway
Houston, TX 77058
USA

Nora Petersen
Crew Medical Support Office (HSO-UM)
European Astronaut Centre
Linder Hoehe
Cologne
51147
Germany

Jörn Rittweger
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)
German Aerospace Center, Institute of Aerospace Medicine
Linder Hoehe
51147 Cologne
Germany

Patrik Sundblad
Human Research Coordinator at ESA
Berzelius väg 13
171 77 Stockholm
Sweden
patsu@kth.se
Elena Tomilovskaya
IBMP
123007, 76A Khoroshevskoe shosse,
Moscow,
Russian Federation

Jonathan Scott
Crew Medical Support Office (HSO-UM)
European Astronaut Centre
Linder Hoehe
Cologne
51147
Germany

Lena Norrbrand
KTH Royal Institute of Technology
Swedish Aerospace Physiology Centre
Berzelius väg 13
171 65 Solna
Sweden

Ronita L. Cromwell
NASA/Johnson Space Center
mail code SK111
2101 NASA Parkway
Houston, TX 77058
USA

Yael Barr
NASA/Johnson Space Center
37, mail code SK111
2101 NASA Parkway
Houston, TX 77058
USA