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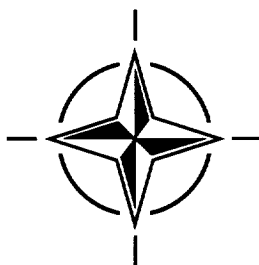
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RTO MEETING PROCEEDINGS 31

Individual Differences in the Adaptability to Irregular Rest-Work Rhythms/Status of the Use of Drugs in Sleep-Wakefulness Management

(les Différences entre individus concernant les facultés d'adaptation aux rythmes irréguliers activité-repos/Le point sur l'utilisation des médicaments pour la gestion des périodes veille-sommeil)

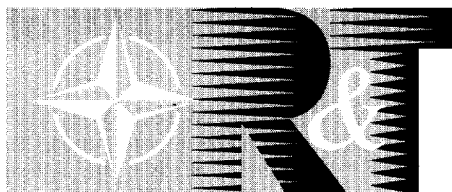
Papers presented at the RTO Human Factors and Medicine Panel (HFM) Workshop held at the Scuola Navale Militare "Francesco Morosini" in Venice, Italy, 3-4 June 1999.



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The Research and Technology Organization (RTO) of NATO

RTO is the single focus in NATO for Defence Research and Technology activities. Its mission is to conduct and promote cooperative research and information exchange. The objective is to support the development and effective use of national defence research and technology and to meet the military needs of the Alliance, to maintain a technological lead, and to provide advice to NATO and national decision makers. The RTO performs its mission with the support of an extensive network of national experts. It also ensures effective coordination with other NATO bodies involved in R&T activities.

RTO reports both to the Military Committee of NATO and to the Conference of National Armament Directors. It comprises a Research and Technology Board (RTB) as the highest level of national representation and the Research and Technology Agency (RTA), a dedicated staff with its headquarters in Neuilly, near Paris, France. In order to facilitate contacts with the military users and other NATO activities, a small part of the RTA staff is located in NATO Headquarters in Brussels. The Brussels staff also coordinates RTO's cooperation with nations in Middle and Eastern Europe, to which RTO attaches particular importance especially as working together in the field of research is one of the more promising areas of initial cooperation.

The total spectrum of R&T activities is covered by 7 Panels, dealing with:

- SAS Studies, Analysis and Simulation
- SCI Systems Concepts and Integration
- SET Sensors and Electronics Technology
- IST Information Systems Technology
- AVT Applied Vehicle Technology
- HFM Human Factors and Medicine
- MSG Modelling and Simulation

These Panels are made up of national representatives as well as generally recognised 'world class' scientists. The Panels also provide a communication link to military users and other NATO bodies. RTO's scientific and technological work is carried out by Technical Teams, created for specific activities and with a specific duration. Such Technical Teams can organise workshops, symposia, field trials, lecture series and training courses. An important function of these Technical Teams is to ensure the continuity of the expert networks.

RTO builds upon earlier cooperation in defence research and technology as set-up under the Advisory Group for Aerospace Research and Development (AGARD) and the Defence Research Group (DRG). AGARD and the DRG share common roots in that they were both established at the initiative of Dr Theodore von Kármán, a leading aerospace scientist, who early on recognised the importance of scientific support for the Allied Armed Forces. RTO is capitalising on these common roots in order to provide the Alliance and the NATO nations with a strong scientific and technological basis that will guarantee a solid base for the future.

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Individual Differences in the Adaptability to Irregular Rest-Work Rhythms/Status of the Use of Drugs in Sleep-Wakefulness Management

(RTO MP-31)

Executive Summary

The Human Factors and Medicine Panel (HFM) of the NATO Research and Technology Organization (RTO) held a Workshop entitled “Individual Differences in the Adaptability to Irregular Rest-Work Rhythms/Status of the Use of Drugs in Sleep-Wakefulness Management” at the Scuola Navale Militare “Francesco Morosini” in Venice, Italy, 3-4 June 1999.

The Workshop was held to address both the individual difference implications during irregular sleep-wake regimens and the state of the art in the pharmacological management of sleep-wake rhythms. Wide psychophysiological differences exist in some functions not well investigated in the past: tendency to fall asleep, capability to resist sleepiness and mental fatigue, adaptability to time-zone shifts and to irregular rest-work rhythms. The flexibility and adaptability of individuals is obviously very important in modern military Contingency Operations, commonly characterized by the need for effective performance at any time of day or night. In these contexts, selected categories of drugs may be employed in operational conditions to sustain wakefulness and/or induce sleep.

The Workshop addressed a number of topics that will benefit the military, including:

- the individual difference implications in the adaptation to shift work and to new time zones; in the tendency to fall asleep; in reactions to sleep deprivation; in the ability to adapt to polyphasic rest-work schedules and to benefit from napping strategies; in sleep inertia;
- the individual difference implications in reaction to pharmacological and non-pharmacological management of the sleep-wake rhythm, such as: bright light; melatonin; hypnotics; stimulants.

The Workshop also provided useful practical recommendations with regard to pharmacological and non-pharmacological approaches to sleep-wake management. However, it was pointed out that present knowledge on individual differences in human adaptability to irregular rest-work rhythms is quite scarce. Since more accurate methodologies to select and train people to comply with irregular schedules may guarantee the welfare and the effectiveness of the NATO soldier, a multicentric international preliminary protocol aimed to extensively address the biological and psychological markers of individual adaptability to irregular rest-work rhythms has been proposed.

Les différences entre individus concernant les facultés d'adaptation aux rythmes irréguliers activité-repos/Le point sur l'utilisation des médicaments pour la gestion des périodes veille-sommeil

(RTO MP-31)

Synthèse

La commission facteurs humains et médecine (HFM) de l'Organisation pour la recherche et la technologie de l'OTAN (RTO), a organisé un atelier sur « Les différences entre individus concernant les facultés d'adaptation aux rythmes irréguliers activité-repos/Le point sur l'utilisation des médicaments pour la gestion des périodes veille-sommeil » à la Scuola Navale Militare « Francesco Morosini » à Venise, en Italie, du 3 au 4 juin 1999.

L'atelier a eu pour objectif d'examiner à la fois l'incidence des différences entre individus au cours de cycles veille-sommeil irréguliers et l'état actuel des connaissances dans le domaine de la gestion pharmacologique des rythmes veille-sommeil. Certaines fonctions présentent des grandes différences psychophysiologiques qui n'ont pas été bien étudiées dans le passé : la tendance à s'endormir, la capacité à résister à la somnolence et à la fatigue intellectuelle, la faculté d'adaptation aux changements de fuseau horaire et aux rythmes activité-repos irréguliers. La flexibilité et la faculté d'adaptation des individus sont, évidemment, des qualités très importantes pour les opérations d'urgence militaires modernes, qui sont souvent caractérisées par la nécessité d'être très performant de jour comme de nuit. Dans ce type de situation, il est envisageable d'utiliser des catégories de médicaments spécifiques dans des conditions opérationnelles pour prolonger un état de veille et/ou pour provoquer le sommeil.

L'atelier a examiné un certain nombre de sujets susceptibles d'intéresser les militaires, dont :

- L'incidence des différences entre individus sur l'adaptation au travail par équipes et aux nouveaux fuseaux horaires; sur la tendance à somnoler; sur les réactions au manque de sommeil; sur la faculté d'adaptation aux cycles d'activité/repos polyphasiques, sur les profits à tirer de siestes planifiées; et sur l'inertie provoquée par le sommeil.
- l'incidence des différences entre individus sur les réactions à la gestion pharmacologique et non pharmacologique des rythmes veille/sommeil, telles que : la lumière forte; la mélatonine; les hypnotiques et les stimulants.

L'atelier a également fourni des recommandations pratiques concernant les approches pharmacologiques et non pharmacologiques de la gestion des cycles de veille/sommeil. Cependant, il a été précisé que très peu d'informations sont disponibles sur les différences entre individus concernant la faculté d'adaptation aux rythmes activité-repos. Etant donné que des méthodologies plus précises pour la sélection et l'entraînement des équipages adaptées aux horaires irréguliers pourraient garantir le bien-être et l'efficacité des troupes de l'OTAN, il a été proposé d'établir un projet de protocole international multicentrique en vue d'étudier en détail les marqueurs biologiques et psychologiques de la faculté d'adaptation aux rythmes irréguliers activité/repos.

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† Paper not available at time of printing

Preface

Contingency Operations (peacekeeping, humanitarian aid, peace enforcement, full scale offensive operations) in NATO provide new challenges to military personnel's health, safety and performance. In fact, these operations are commonly characterized by the need for effective performance at any time of the day or night, consequently involving sleep deprivation and fragmentation, rapid troop deployment across different time-zones, inversion of sleep-wakefulness rhythms, sleepiness on the job, and performance degradation due to fatigue.

There is a growing body of knowledge pointing to the existence of important individual psychophysiological differences that may enable some individuals to better adapt to irregular rest-work rhythms. Furthermore, selected categories of drugs may be employed in operational conditions; individual compliance to drugs acting on sleep and wakefulness needs specific evaluation protocols. The purpose of this Workshop was to address both the individual difference implications during irregular sleep-wake regimens and the state of the art in the pharmacological management of sleep-wake rhythms.

Topics addressed include:

- individual difference implications in:
 1. sustained and continuous operations
 2. flash adaptation to shift work and to new time zones
 3. tendency to fall asleep
 4. sleep deprivation
 5. polyphasic rest-work schedules and napping strategies
 6. sleep inertia
 7. bright light therapy
 8. melatonin therapy
 9. use of hypnotics to promote sleep
 10. use of stimulants to sustain performance

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14. Abstract																		
<p>These proceedings include the Technical Evaluation Report, two Keynote Addresses and 20 solicited papers of the Workshop sponsored by the NATO Human Factors and Medicine Panel and held at the Scuola Navale Militare "Francesco Morosini" in Venice, Italy, from 3-4 June 1999.</p> <p>NATO Contingency Operations provide new challenges to military personnel's health, safety and performance. In fact, these operations are commonly characterized by the need for effective performance at any time of the day or night.</p> <p>There is a growing body of knowledge pointing to the existence of important individual psychophysiological differences that may enable some individuals to better adapt to irregular rest-work rhythms. Furthermore, selected categories of drugs may be employed in operational conditions. The purpose of this Workshop was to address both the individual difference implications during irregular sleep-wake regimens and the state of the art in the pharmacological management of sleep-wake rhythms.</p> <p>The papers addressed the individual difference implications in: a) sustained and continuous operations; b) flash adaptation to shift work and to new time zones; c) tendency to fall asleep; d) sleep deprivation; e) polyphasic rest-work schedules and napping strategies; f) sleep inertia. In addition, the papers also addressed the usefulness in operational settings of: a) bright light therapy; b) melatonin therapy; c) hypnotics to promote sleep; d) stimulants to sustain performance.</p> <p>These proceedings will be of interest to those who are concerned with the sleep-wake management of personnel in air, sea and land operations; to aerospace scientists, as well as to people working in the field of applied sleep research, wanting an updated review of relevant research in the field of individual difference implications and the pharmacological/non-pharmacological management of irregular rest-work schedules.</p>																		



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