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# **SHIFTWORK INTERNATIONAL NEWSLETTER**

*The official newsletter of the*

Scientific Committee on Shiftwork of the  
International Commission on Occupational Health

*and the*

Working Time Society

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## CONTENTS

Editorial.....	3
President's Report .....	4
Current Membership of the WTS Board .....	5
Symposium report: Santos, Brazil .....	5
XVIIth International Symposium on Night & Shift Work: First Announcement .....	8
Conference report: <i>Long working hours, safety and health: Towards a national research agenda</i> .....	9
Recent Publications.....	
In-Depth Reviews: Shift Work, <i>Occupational Medicine</i> (Lond), 53 (2,) 2003.....	12
Fatigue at work, <i>Occupational and Environmental Medicine</i> , 60 (Supp. 1), 2003 ...	19
Announcements.....	
Host for the XVIII International Symposium on Night & Shiftwork .....	20
Special issue of <i>Industrial Health: Workers' Sleep</i> .....	20
Erratum:.....	21
Subscriptions SIN .....	22

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## EDITORIAL

### *Welcome from the new editors*

With this issue a new editorial team takes over the *Shiftwork International Newsletter*. We hope to continue the excellent work done by Tsuyoshi Kawakami and Kazutaka Kogi during their long tenure as editors. No doubt you will join with us in thanking them warmly for the major contribution they have made to the Society and the Scientific Committee on Shiftwork through S.I.N. We hope to carry on their excellent work.

### *Contributions please*

Most readers will have received this issue of S.I.N. electronically. The shift from hard copy will undoubtedly assist us to produce and distribute the newsletter more rapidly and contain costs. However, electronic delivery offers a great deal more to readers. Over the next few issues we shall strive to realize this potential to make S.I.N. more attractive and to enhance its value as a vehicle for scientific exchange. An important objective is to encourage more reader participation and facilitate direct communication between readers. The first small step has been the inclusion of hot links to the editors, the S.I.N. Web site and the Symposium organizers. Soon, we plan to introduce new columns, such as a new researchers forum, in which recent entrants to the field can describe projects and seek advice and support from other readers, and a 'viewpoint' section in which a reader presents a critical, and preferably controversial, perspective on a cutting edge issue. We clearly need assistance from you to achieve these objectives. Ultimately, S.I.N.'s potential will be best fulfilled if you advise us on what it should offer. Please also consider making content contributions, such as short articles describing new projects and research developments, announcements of upcoming scientific meetings and news about members, research and practice. Your contributions, suggestions and feedback can be sent to:

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### *Web Site Update*

Johannes Gaertner and Michael Kundi are continuing to develop and update the S.I.N. Web site. In addition to copies of current and past issues of S.I.N., the site provides information about the Working Time Society and its committees and links to other material of interest to S.I.N. readers. Please take a few minutes to admire their work! The Web address is:

<http://time.iguw.tuwien.ac.at/index.htm>

Feedback or enquiries regarding the Web site should be sent to:

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## ***President's Report***

Dear members and friends

As the newly-elected President of the Working Time Society and Chair of the ICOH Scientific Committee on Shiftwork I wish to thank you all very much for your support and confidence, that I hope I will be able to repay following the line traced by my eminent predecessors, Joseph Rutenfranz, Kazutaka Kogi and Simon Folkard, to whom I am in debt for their mastery and friendships.

I wish to express my congratulations to the other elected members: Sonia Hornberger as new Secretary, and Claudia Moreno, Friedhelm Nachreiner and Stephen Popkin, as new Board members. I wish also to thank very much the other nominated members (Johannes Gaertner, Mikko Härmä, Philip Bohle, Diane Boivin, Lee DiMilia, and Shantha Rajaratnam) who expressed their kind and generous willingness to participate in these elections.

On behalf of all WTS members I wish also to express my deep gratitude and esteem to the past President and Secretary, Simon Folkard and Don Tepas, for their incessant and irreplaceable work, without which our new Society would have never been established. They will still give us their precious and clever contribution as ex-officio members of the Board, together with those who are now directly involved in promoting and facilitating our scientific contacts and exchanges, such as Frida Marina Fisher, who organised the last Symposium held in Santos, which had a large success in terms of both scientific knowledge and participation; Ben Jansen, who very generously have been taking the charge of organising the XVII Symposium next year in the Netherlands; Philip Bohle, who is now in charge (together with Masaya Takahashi, Akinori Nakata and Shun Matsumoto) of editing this Newsletter, taking over the fruitful job carried out by Tsuyoshi Kawakami and Kazutaka Kogi; and Johannes Gaertner, who is making the WTS-SIN website more and more interesting and appealing. We are in debt to them for their precious job, carried on with great enthusiasm and competence, spending their free hours (and money) without any reward except for our sincere gratitude.

As co-opted members of the Board, I have asked Kazutaka Kogi and Mikko Härmä to continue giving us their precious and wise support in consideration of their very important contributions to our Society over the years.

I believe that the present composition of the Board is able to represent at their best the different scientific disciplines and cultural backgrounds that are now converging on the more and more crucial theme of working hours.

A hard job is facing our newborn Society, which needs to strengthen its legs and acquire more and more visibility and recognition both at scientific and socio-political level. In parallel also the ICOH Scientific Committee on Shiftwork it must reinforce its position inside ICOH and share common strategies and co-operation with other Committees (e.g. Ageing, Health Care Workers, Education and Training).

Therefore, the agenda is already full of important items we have to debate in the near future: the organisation of our Society (e.g. the treasurer and other vacancy in the board, committee activities), external relations (e.g. contact and co-operation with institutions and social parties) and scientific activities (e.g. training and support for young researchers). The "shopping list" from Santos (see p.6) is evidence of how many and strong our expectations are, and how many ways we could act to improve our performance and competence.

Other topics will be certainly added soon, thanks to the suggestions and proposals from you we are warmly requesting. The active participation of all the members is not only right but also indispensable for making our Society more and more present and influential, at both scientific and social levels, in promoting workers' health and well-being.

With the best wishes of good work

*Giovanni Costa*

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## **Current Membership of the Working Time Society (WTS) Board**

Following the recent elections, there have been some changes in the membership of the WTS Board. As of June 2004, the Officers and Board Members of the WTS are as follows:

*President:* Giovanni Costa (to 31/12/2006)

*Secretary:* Sonia Hornberger (to 31/12/2006)

*Treasurer:* Vacant, to be elected or appointed when a Treasury exists

*Elected Members (in alphabetical order):*

Torbjörn Åkerstedt (to 31/12/2005)

Peter Knauth (to 31/12/2005)

Vacancy (to be appointed until 31/12/2005)

Claudia Moreno (to 31/12/2007)

Friedhelm Nachreiner (to 31/12/2007; also SINET Webmaster)

Stephen Popkin (to 31/12/2007)

*Ex Officio Members:*

Philip Bohle (S.I.N. Editor)

Johannes Gaertner (Website Manager)

Frida Marina Fischer (previous Symposium Organiser, until 22/9/2005)

Ben Jansen (current Symposium Organiser, until 31/12/2007)

Simon Folkard (Past President, to 31/12/2006)

Donald Tepas (Past Secretary, to 31/12/2006)

*Presidential Appointments:*

Natalia Bobko

Adam Fletcher

Mikko Härmä

Irena Iskra-Golec

Kazutaka Kogi

Alexander Wedderburn

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## **Symposium Report: XVIth International Symposium on Night and Shift Work, Santos, Brazil, November 2003.**

*Equity and Working Time: A Challenge to be Achieved* was the theme of the XVIth International Symposium on Night and Shift Work held in Santos, Brazil, November 18-21, 2003. Although these scientific meetings have been held since 1959, this was the first to be hosted in a South American country. One hundred and fifty-two researchers from 22 countries participated. Topics discussed included new work relations and health impacts, management and safety in transportation, physiology and chronobiology of night and shiftwork, participative processes and autonomy at work and many others. The great variety of working time arrangements discussed at the Symposium reflects the growing international trend toward extending the traditional boundaries of shiftwork. Many people and institutions

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contributed to the success of the event. They include Brazilian and international institutions, who provided valuable financial support, and the great team of researchers whose scientific collaboration was essential to the revision of the abstracts and manuscripts submitted for publication in the proceedings of the Symposium. The refereed proceedings will be published in two journals, the *Journal of Public Health* and *Chronobiology International*, late in 2004.

### ***Tips for improving future symposium***

Participants in the Santos symposium were asked to provide feedback and suggestions for improvement of future symposia. The following is an unedited list of their responses:

### ***Themes and topics***

#### ***Intervention studies***

- Intervention studies with control groups
- Intervention methods to improve both health/safety and business profit
- Methods for affecting change in the workplace: science and cooperation and key ingredients
- Participatory multidimensional change steps (best practices)
- Research regarding training programmes to the shift workers in order to help them to identify the possible effects of their symptoms and react at a safety time
- Wages related to changing schedules
- Coping strategies and social isolation
- Risks of melatonin
- Risks of light treatment
- Shiftwork in extreme environment

#### ***Sleep and fatigue***

- Shiftwork and sleep
- Countermeasures for sleepiness
- The role of dehydration and water intake on night work-related sleepiness and health
- Models to assess the fatigue and risk on different work schedules
- Understand/fleshout concept of social recovery (as opposed to only thinking of recovery sleep) in understanding adaptation to shift work
- Irregular work hours (as in transportation)
- Impacts of shift work on breast cancer
- Jet-lag

#### ***Industry-based studies***

- Focus on continuous metallurgical process: aluminum, steel
- Research on service industry
- 24-hour services/retail shops, call centers
- Legal problems for health professions when they work in shifts commit an error
- Sustainability – health, economic, regional

#### ***Flexibility-variability issues***

- How will work change in the future (flexibility, insecure jobs, aging workplaces, etc)
- Person-oriented flexible shift systems
- Individualization
- Diversity
- Autonomy: does it improve health and/or well-being?
- Variability and flexibility in relation to predictability in social life
- “Balancing interests” – In western countries shift workers tend to demand more influence on their working hours. This may result in staffing problems during inconvenient hours; another possibility is that workers – for balancing work and private life (child care) – organize schedules for themselves that are bad from an ergonomic perspective
- Influence in shift design, work-life balance: how free can employees be?

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- 24h society – good or bad?
  - 12 h shift – eating schedules, warm up exercises, post journey exercises

### *Tolerance*

- Improving shiftwork tolerance (state-of-the-art recommendations)
- Shiftwork tolerance, definition
- Selection for shiftwork? – ethical and scientific aspects
- Individual difference/predictors
- Sex and age differences
- Aging and Shiftwork
- How to prevent aging

### *Methodology*

- Studies for rotating speed, rotating orientation, shift length, and intervals between shifts
- How we may integrate large amount of information to make better decision (Pro & Con)
- How health/safety levels at a worksite relates to the stock rate
- Productivity of shift systems
- Methodology for research in real work situations
- Integration methods for shifts selection
- Methodological problems in shift studies, as shown by Prof. Knutsson
- Methodological considerations in data analysis
- Scientific definitions and concepts that are understandable and measurable
- Differentiation vs. standardization
- Longitudinal approach
- Less studies in here, all data (IV + DVI are gathered) by questionnaire

### ***Symposium organization***

#### *Keynotes*

- Less poster, less keynote, more oral presentations
- Less keynotes – Key notes should not only ask questions, but they should show us the way in their subjects (like meta-analysis more or less)
- Keynotes from speakers – adjacent but outside our community
- Minimum of 5 keynotes
- Minimize the number of keynote speakers (max 1 per session)
- Less keynotes (a few invited speakers that usually not come to our meetings)
- A few invited keynote speakers who do not normally come
- Keynote speakers with future topics

#### *Oral presentations*

- No parallel oral presentation (2)
- Maintain the single session of speakers
- Some parallel sessions to have shorter days
- Set a limit to the number of presentation by one author
- Limit one oral presentation per author
- Let those who want to speak have an oral presentation – thus, parallel sessions are the solution
- More focused content for oral sessions
- Improve the selection of oral presentations – several are very good

#### *Poster presentations*

- Parallel guided poster session (as here)
  - Continue the “guided” poster sessions
  - Guided poster tours are very good (keep this)
  - See the same kind of organization on the poster session. I appreciate very much the guided poster session and I'd suggest to keep it like this, from now on
  - No parallel session for posters
  - Put poster or display in the place where everybody is on coffee break
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### *Evening sessions*

- Serious evening sessions are a bummer
- Shorter evening sessions of fewer would be better
- At least one evening off
- Better working hours – only light debates in evening
- Not more than 1 evening debate
- Limit of one evening shift session
- Organize social activities in the evening

### *Group discussions*

- Organize group-discussion or workshop sessions on selected research topics (4)
- More active methods involving participants in discussions (like in Connecticut)

### *General Organization*

- Abstracts should be available in searchable PDF format on a CD. In addition, CD should include MS and contact info for each WTS member/symposium attendant + EndNote format file that includes all abstract info.
  - Some of the really poor abstracts – without any results/not even a study! – have been oral presentation – why?
  - Classify the whole symposium in different committees which we can have simultaneous presentations. In that case it is possible to reduce the duration of seminar and we can manage our time better. It is very difficult to manage tasks of the university for a week
  - Enlist “membership” volunteers to assist in abstract development for non-English speaking participants
  - Good journals for publishing paper
  - Try to have clear themes, such as the transportation forenoon
  - Have a doctoral students “half-day” (at least)
  - Student education day for student participants
  - Powerpoint presentations and posters should – if authors are willing to share them – be available on the SIN-website.
  - Limit of 2 hours between tea/coffee breaks
  - Consultants can have a pre-congress day. They should not be given oral presentation
  - Sports facilities
  - Next meeting in Oshuaia, Argentina (2)
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## **XVIIth International Symposium on Night & Shift Work: First Announcement**

The *XVIIth International Symposium on Night and Shiftwork*, hosted by *ATOS Consultancy and Research*, will be held from 18 to 22 September 2005 in Hoofddorp, The Netherlands. The theme of the symposium, which will be chaired by Ben Jansen, is ‘Balancing interests’.

### ► *Deadlines*

- |                  |  |
|------------------|--|
| 1 November 2004: | Second announcement with Call for Papers |
| 1 March 2005:    | Submission of abstracts                  |
| 1 May 2005:      | Notification of acceptance of abstracts  |
| 1 May 2005:      | Early registration                       |
| 18 August 2005:  | Final deadline for registration          |
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Further information can be obtained by visiting:

<http://www.shiftwork2005.atos.nl/>

or e-mailing:

[email: shiftwork2005@atos.nl](mailto:email: shiftwork2005@atos.nl)

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### **Conference report:**

## ***Long working hours, safety and health: Toward a national research agenda, National Conference, Baltimore, Maryland, April 29-30, 2004***

Masaya Takahashi<sup>1</sup>, Kenji Iwasaki<sup>1</sup>, and Fumio Kobayashi<sup>2</sup>

1. National Institute of Industrial Health, 6-21-1, Nagao, Tama-ku, Kawasaki 214-8585, Japan
2. Department of Health and Psychosocial Medicine, Aichi Medical University School of Medicine, Nagakute-cho, Aichi 480-1195, Japan

It was really fortunate for three of us from Japan to participate in this excellent conference on long hours of work, which was convened under the auspices of the Organization of Work Priority Research Area of the National Occupational Research Agenda (NORA) in the US. The organization committee consisted of experts from the NORA/National Institute for Occupational Safety and Health (NIOSH) team and the University of Maryland School of Nursing team.

The superiority of this conference may result from a variety of factors, but the most notable feature was a multidisciplinary approach to understanding and exploring interventions against long work hours. As you can see in the agenda shown below, we were able to get an insight into a wide spectrum of topics from sociological, economic, safety, health, family, and well-being perspectives. A good partnership between the relevant organizations and people (government, industry, academia, workers) under the NORA has made it possible.

Another attractiveness of the conference was related to significant contributions by the WTS members, Tepas, Folkard, Åkerstedt, and of course, Caruso and Rosa. This fact clearly indicates the essential roles of the WTS in progress of research and practice to improve the quality of working life. The outstanding activities by those members can be taken as messages to stimulate and encourage other WTS members, particularly the younger generations.

Also, breakout group discussions enhanced motivation of the participants. As reflected in requests from the participants in Santos (see "Tips for improving future symposium"), it would be a good idea to include such an opportunity in our future symposium.

Proceedings or some documents for the long work hours conference will be published soon. At the site, however, an important material was available: Claire C. Caruso, et al., Overtime and Extended Work Shifts: Recent Findings on Illnesses, Injuries, and Health Behaviors, NIOSH Publication No. 2004-143, 2004. You can download this at <http://www.cdc.gov/niosh/docs/2004-143/>.

The post conference focused on two target populations, police officers and healthcare workers. Again, we were so impressed with substantial efforts to determine an occupation-specific strategy in managing fatigue and work hours. Obviously, those efforts have been

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made on the basis of research findings for sleep-wakefulness, circadian rhythms, or other scientific areas.

In the current conference, the authors have realized the urgent need for research of preventive measures and actions by the authorities, workplaces, and workers themselves more intensively than ever. These tasks should be started immediately, given that we are in a country where long hours of work are highly prevalent and sometimes an undesirable consequence of “Karoshi” (death due to excessive work) occurs.

## **Schedule and Speakers**

*Thursday, April 29, 2004*

### **WELCOME**

Janet Allan, Dean, University of Maryland School of Nursing  
John Howard, Director, National Institute for Occupational Safety and Health (NIOSH)

### **PATTERNS AND TRENDS IN HOURS OF WORK**

(Moderator: Tim Bushnell, Economist, NIOSH)

**Time Pressures in American Life:** Jerry A. Jacobs, Merriam Term Professor, Department of Sociology, University of Pennsylvania

**Changes in Long Work Hours: An Occupation/Industry Analysis:** Peter Kuhn, Professor of Economics, University of California, Santa Barbara

### **STATE OF RESEARCH ON THE HEALTH EFFECTS OF LONG HOURS OF WORK**

(Moderator: Donald I. Tepas, Professor Emeritus, University of Connecticut and Secretary, Shiftwork Committee International Commission on Occupational Health)

**Modeling the Impact of the Components of Long Work Hours on Injuries and “Accidents”:** Simon Folkard, Professor Emeritus, Department of Psychology, University of Wales, United Kingdom and Chair, Shiftwork Committee of the International Commission of Occupational Health

**Total Work Hours, Job Fatalities, and Prospective Mortality:** Torbjörn Åkerstedt, Professor of Behavioral Physiology, Karolinska Institute, Stockholm, Sweden

### **STATE OF RESEARCH ON SOCIAL AND FAMILY EFFECTS OF LONG WORK HOURS**

(Moderator: Donald I. Tepas, Professor Emeritus, University of Connecticut and Secretary, Shiftwork Committee International Commission on Occupational Health)

**The Role of Meaning in the Relationship between Working Hours and Health:** Rosalind Chait Barnett, Senior Scientist, Women’s Studies Research Center and Director of Community, Families & Work Program, Brandeis University.

**Working in a 24/7 Economy: Challenges for American Families:** Harriet B. Presser, Distinguished Professor, Department of Sociology, University of Maryland

### **IMPACT ON INDUSTRY AND LABOR AND THEIR RESPONSES**

(Moderator: Gordon Smith, Epidemiologist, Liberty Mutual Research Center for Safety and Health, Hopkinton, MA)

**Industry Trends, Costs and Management of Long Working Hours:** Todd Dawson, Director of Research and Development, Circadian Technologies, Lexington, MA

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**Organized Labor's Response to Long Work Hours:** Bill Kojola, Industrial Hygienist, AFL-CIO, Washington, D.C.

**Overtime, Occupational Stress, and Related Health Outcomes:** A Labor Perspective: David LeGrande – Communication Workers of America, Washington, D.C. - Case Study

**Human Factors:** Billy Smitha, Exxon Mobil Global Safety Advisor - Case Study

### **TOWARD IMPROVED METHODS AND A SHARED RESEARCH AGENDA: CONCURRENT BREAKOUT GROUP DISCUSSIONS**

- A) Long Work Hours And Schedules: Definitions And Measurement
- B) Impact Upon The Individual: Fatigue, Stress, Health, Safety, And Work
- C) Impact Upon Family And Community
- D) Mitigating And Aggravating Factors: Job And Personal Characteristics
- E) Programs and Policies for Prevention: Research Priorities
- F) Large Scale Surveys And Studies: Opportunities And Directions For

### **POST CONFERENCES**

*Friday, April 30, 2004*

#### **LONG WORKING HOURS AND HEALTH CARE WORKERS**

##### **Long Work Hours in Healthcare Research:**

Charles Muntaner, University of Maryland School of Nursing  
Claire Caruso, National Institute for Occupational Safety and Health  
Alison Trinkoff, University of Maryland School of Nursing  
Jeanne Geiger-Brown, University of Maryland School of Nursing

##### **Advocating to Reduce Long Work Hours in Healthcare:**

Katherine Kany, Director of Public Policy, American Nurses Association  
Carol Bragg, President, Local 1998 SEIU  
Mark Levy, Director, Committee on Interns and Residents, SEIU

#### **WORKSHOP ON POLICE FATIGUE AND LONG WORK HOURS**

**Welcome and Opening Remarks:** Sarah V. Hart, Director, National Institute of Justice

**What We Know and What We Don't Know About Police Fatigue:** Bryan J. Vila, Chief, Crime Control and Prevention Research Division, National Institute of Justice

**How to Measure Fatigue: Strengths and Weakness of Different Fatigue Management Technologies:** Melissa M. Mallis, Principal Investigator, Fatigue Counter Measures Group, NASA Ames Research Center

**Study on Police Health and Stress: The Buffalo, New York, Longitudinal Study:** John M. Violanti, Associate Research Professor, School of Public Health and Health Professionals, University at Buffalo, State University of New York

**Sleep and Fatigue in a Prospective Study of Police Officers:** Thomas C. Neylan, Medical Director, Post-Traumatic Stress Disorders Program, Associate Professor of Psychiatry, Veterans Affairs Medical Center, University of California, San Francisco

Saturday, May 1, 2004

## **WORKSHOP ON POLICE FATIGUE AND LONG WORK**

**NIJ's Solicitation: Testing the Effectiveness of Comprehensive Police Fatigue Management Programs:** Margaret Heisler, Senior Social Science Analyst, Crime Control and Prevention Research Division, National Institute of Justice

**Tailoring the National Occupational Research Agenda to Work in a Policing Environment: Identifying the Potential Challenges and Strategies:** Edward F. Connors, President, Institute for Law and Justice

**Summary and Closing Remarks:** Bryan J. Vila, Chief, Crime Control and Prevention Research Division, National Institute of Justice

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## **Recent Publications**

### **Special Issue on Fatigue at work: *Occupational and Environmental Medicine* (Volume 60, Supplement 1, 2003)**

#### **Measurement quality and validity of the "need for recovery scale"**

van Veldhoven M, Broersen S  
Department of Human Resource Studies, Tilburg University, Netherlands  
Dutch Foundation for Quality in Occupational Health Care (SKB), Amsterdam, Netherlands

The "need for recovery scale" is suggested as an operationalisation for the measurement of (early symptoms of) fatigue at work. Definition of and background on the concept of need for recovery are briefly discussed. Details about scale construction are summarised. Correlations with other relevant measurement scales on fatigue at work are presented to validate the operationalisation claim, as are early results on predictive validity. A study is presented that further investigates the measurement quality and validity of the scale. The data used in this study were collected by Occupational Health Services for 68 775 workers during the period 1996-2000. Comparing the measurement quality of subgroups (Cronbach's alpha) differing in terms of age class, sex, and education level, the general applicability of the scale was shown. The validity of the scale was studied by analysing its association with psychosocial risk factors. Multiple regression analyses of need for recovery were performed on individual and department level data, using 10 psychosocial job characteristics as independent variables. The two most important factors in the explanation of variance at the individual level were also dominant at the department level: pace and amount of work, and emotional workload. The percentage of explained variance was higher at the department level than at the individual level, and increased with department size. Results suggest that the need for recovery scale is an adequate scale, both for applications at the individual and at the group (department/organisation) level.

#### **Assessment of fatigue among working people: a comparison of six questionnaires**

De Vries J, Michielsen HJ, Van Heck GL  
Department of Psychology and Health, Tilburg University, and Research Institute for Psychology and Health, Netherlands

AIMS: To compare the psychometric qualities of six fatigue questionnaires in a sample of working persons. METHODS: Internal consistency and test-retest reliability, content validity, convergent

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validity, and the dimensionality of the fatigue instruments were explored. RESULTS: All scales had a satisfactory internal consistency. Furthermore, based on factor analyses and Mokken scale analyses, all scales were unidimensional and appeared to measure an identical construct. The Fatigue Assessment Scale (FAS) had the highest factor loading on the one factor solution obtained in a factor analysis of the total scores of all scales. CONCLUSIONS: All the questionnaires were unidimensional and had good reliability and validity. The FAS was the most promising fatigue measure.

### **How to conduct research on burnout: advantages and disadvantages of a unidimensional approach in burnout research**

Brenninkmeijer V, VanYperen N  
University of Groningen, Netherlands

When conducting research on burnout, it may be difficult to decide whether one should report results separately for each burnout dimension or whether one should combine the dimensions. Although the multidimensionality of the burnout concept is widely acknowledged, for research purposes it is sometimes convenient to regard burnout as a unidimensional construct. This article deals with the question of whether and when it may be appropriate to treat burnout as a unidimensional variable, and presents a decision rule to distinguish between people high and low in burnout. To develop a guideline for obtaining a dichotomous measure of burnout, the scores on the Utrecht Burnout Scale (UBOS) of 44 well functioning individuals were compared with the scores of 29 individuals diagnosed as suffering from burnout. Based on these data, the authors recommend the "exhaustion + 1" criterion for research in non-clinical populations. Following this criterion, individuals can be considered as burnt out when they report, compared to a norm group, high emotional exhaustion, in combination with high depersonalisation or low personal accomplishment. The criterion may be used to estimate the percentage in a sample of individuals in a state of burnout.

### **Quality of rehabilitation among workers with adjustment disorders according to practice guidelines; a retrospective cohort study**

Nieuwenhuijsen K, Verbeek JH, Siemerink JC, Tummers-Nijssen D  
Coronel Institute for Occupational and Environmental Health, Academic Medical Center, AmCOGG, University of Amsterdam, Netherlands

AIMS: To assess the quality of occupational rehabilitation for patients with adjustment disorders and to determine whether high quality of care is related to a shorter period of sickness absence. METHODS: A retrospective cohort study was conducted by means of an audit of 100 files of patients with adjustment disorders who visited their occupational physicians. Quality of rehabilitation was assessed by means of 10 performance indicators, derived from the guidelines for the treatment of employees with mental health disorders. Performance was dichotomised into optimal and deviant care according to explicit criteria. The performance rates were related to time until work resumption during a one year follow up period. Kaplan-Meier survival analyses and Cox proportional hazards analysis were used to study this relation. RESULTS: Four of 10 performance rates were below 50%: continuity of care (34%), interventions aimed at providers of care in the curative sector (39%), assessment of impediments in the return to work process (41%), and assessment of symptoms (45%). The highest performance rate concerned assessment of work related causes (94%). Overall optimal care was found in 10% of the cases. Median time to complete recovery was 195 days (IQR 97 to 365), and 73% of all patients recovered completely after one year. Optimal continuity of care was significantly related to a shorter time to both partial and complete work resumption (hazard ratio (HR) 0.3; CI 0.2 to 0.6) independently of other performance indicators. Performance regarding interventions aimed at the organisation was also related to a shorter time until first return to work (HR 0.5; CI 0.3 to 0.9). CONCLUSIONS: This study shows that the rehabilitation process of employees with adjustment disorders leaves significant room for improvement, especially with regard to continuity of care. Quality of care was partly related to a better outcome. More rigorous study designs are needed to corroborate these findings.

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## **Fatigue, burnout, and chronic fatigue syndrome among employees on sick leave: do attributions make the difference?**

Huibers MJ, Beurskens AJ, Prins JB, Kant IJ, Bazelmans E, Van Schayck CP, Knottnerus JA, Bleijenberg G  
Department of Epidemiology, Maastricht University, Netherlands

**BACKGROUND:** Persistent fatigue among employees, burnout, and chronic fatigue syndrome (CFS) are three fatigue conditions that share some characteristics in theory. However, these conditions have not been compared in empirical research, despite conceptual similarities. **METHODS:** This cross sectional study aimed to investigate relations between persistent fatigue, burnout, and CFS by describing the clinical features of a sample of 151 fatigued employees on sick leave. Using validated instruments, subgroups based on research criteria for CFS and burnout within the sample of fatigued employees and a reference group of 97 diagnosed CFS patients were compared. Analyses of covariance were performed. **RESULTS:** A total of 66 (43.7%) fatigued employees met research criteria for CFS (except symptom criteria) and 76 (50.3%) met research criteria for burnout. "CFS-like employees" (fatigued employees who met CFS criteria) reported stronger somatic attributions than "non-CFS-like employees". Burnt out CFS-like employees were more depressed and distressed than CFS-like employees who were not burnt out. Burnout cases among the non-CFS-like employees had stronger psychological attributions than fatigued employees who were not burnt out. Compared to diagnosed CFS patients, CFS-like employees merely had a shorter duration of fatigue complaints. Burnt out CFS-like employees had stronger psychological attributions and were more distressed than CFS patients. **CONCLUSIONS:** Fatigued employees shared many important characteristics with CFS patients, regardless of burnout status, and many fatigued employees met CFS criteria and/or burnout criteria. Differences however concerned the causal attributions that were made. This raises questions about the role of causal attributions: are they modified by fatigue complaints or do they determine illness outcome?

## **An epidemiological approach to study fatigue in the working population: the Maastricht Cohort Study**

Kant IJ, Bultmann U, Schroer KA, Beurskens AJ, Van Amelsvoort LG, Swaen GM  
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In 1998, a large scale prospective cohort study of prolonged fatigue in the working population was started in the Netherlands. The ultimate goal of this Maastricht Cohort Study was to identify risk factors involved in the aetiology and natural course of prolonged fatigue in the working population and to develop preventive measures and treatments that can be used in occupational health settings. In this paper, a conceptual model for epidemiological research on prolonged fatigue is presented. This model is the basis for the Maastricht Cohort Study. Alongside the model and design, the characteristics of the study population, the prevalence and one year cumulative incidence of prolonged fatigue, as well as its relation with secondary health outcomes (psychological distress, need for recovery, and burnout) are presented. Furthermore, model, design, and the presented results are discussed.

## **Acute and chronic job stressors among ambulance personnel: predictors of health symptoms**

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**OBJECTIVES:** To predict symptomatology (post-traumatic distress, fatigue, and burnout) due to acute and chronic work related stressors among ambulance personnel. **METHODS:** Data were gathered from 123 ambulance workers in The Netherlands in a longitudinal design. At two measurements they completed standardised questionnaires to assess health symptoms, such as the Impact of Event Scale, the Maslach Burnout Inventory, and the Checklist Individual Strength. Acute stressors were assessed with specific questions, and chronic work related stressors were measured with the Questionnaire on the Experience and Assessment of Work. **RESULTS:** Most of the ambulance workers had been confronted with acute stressors in their work. They also reported more chronic work

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related stressors than a reference group. Of the participants, more than a tenth suffered from a clinical level of post-traumatic distress, a tenth reported a fatigue level that put them at high risk for sick leave and work disability and nearly a tenth of the personnel suffered from burnout. Best predictors of symptomatology at time 2 were lack of social support at work and poor communication, such as not being informed about important decisions within the organisation. CONCLUSIONS: Ambulance personnel are at risk to develop health symptoms due to work related stressors. Although, acute stressors are related to health symptoms, such as fatigue, burnout, and post-traumatic symptoms, it was not found to predict health symptoms in the long term. Main risk factors have to do with social aspects of the work environment, in particular lack of support from the supervisor as well as colleagues and poor communication. When implementing workplace interventions these social aspects need to be taken into account.

### **Work schedules and fatigue: a prospective cohort study.**

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Maastricht, Netherlands

AIMS: (1) To describe the prevalence of fatigue among employees in different work schedules (day work, three-shift, five-shift, and irregular shift work); (2) to investigate whether different work schedules are related to increasing fatigue over time, while taking into account job title and job characteristics; and (3) to study fatigue among shift workers changing to day work. METHODS: Data from nine consecutive four-monthly self administered questionnaires from the Maastricht Cohort Study on Fatigue at work (n = 12 095) were used with 32 months of follow up. Day and shift workers were matched on job title. RESULTS: The prevalence of fatigue was 18.1% in day workers, 28.6% in three-shift, 23.7% in five-shift, and 19.1% in irregular shift workers. For three-shift and five-shift workers substantial higher fatigue levels were observed compared to day workers at baseline measurement. In the course of fatigue over the 32 months of follow up there were only small and insignificant differences between employees in different work schedules. However, among employees fatigued at baseline, fatigue levels decreased faster over time among five-shift workers compared to fatigued day workers. Shift workers changing to day work reported substantially higher fatigue levels prior to change, compared to those remaining in shift work. CONCLUSIONS: Substantial differences in fatigue existed between day and shift workers. However, as no considerable differences in the course of fatigue were found, these differences have probably developed within a limited time span after starting in a shift work job. Further, evidence was found that fatigue could be an important reason for quitting shift work and moving to day work. Finally, in the relation between work schedules and fatigue, perceived job characteristics might play an important role.

### **Physiological differences between burnout patients and healthy controls: blood pressure, heart rate, and cortisol responses**

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OBJECTIVES: To investigate differences between burnout patients and healthy controls regarding basal physiological values and physiological stress responses. Measures of the sympathetic-adrenergic-medullary (SAM) axis and the hypothalamic-pituitary-adrenal (HPA) axis were examined. METHODS: SAM axis and HPA axis activity was compared between 22 burnout patients and 23 healthy controls. SAM axis activity was measured by means of heart rate (HR) and blood pressure (BP). HPA axis activity was investigated by means of salivary cortisol levels. Resting levels of HR, BP, and cortisol were determined as well as reactivity and recovery of these measures during a laboratory session involving mental arithmetic and speech tasks. In addition, morning levels of cortisol were determined. RESULTS: Burnout patients showed higher resting HR than healthy controls. BP resting values did not differ between burnout patients and healthy controls, nor did cardiovascular reactivity and recovery measurements during the laboratory session. Basal cortisol levels and cortisol reactivity and recovery measures were similar for burnout patients and healthy controls. However, burnout patients showed elevated cortisol levels during the first hour after awakening in comparison to healthy controls. CONCLUSIONS: The findings provided limited proof that SAM axis and HPA axis are disturbed among burnout patients. Elevated HR and elevated early morning cortisol levels may be indicative of sustained activation.

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## **Need for recovery from work related fatigue and its role in the development and prediction of subjective health complaints**

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**AIMS:** To present the available empirical evidence for the assumed position of the concept of work related fatigue as: (1) short term effect of the working day; and (2) an intermediate variable between work demands and the development of subjective health complaints and sickness absence. **METHODS:** Results from six single occupation studies, conducted between 1996 and 2002, are presented. Work demands (working hours, decision latitude, break control/autonomy, and mental, emotional, and physical demands) were assessed through validated scales. Work related fatigue was represented and assessed by means of the need for recovery after working time scale in all studies. Subjective health complaints and duration of sickness absence were quantified with the same instruments in most studies as well. Both cross sectional studies (four) as well as prospective studies (two; up to two years follow up) were performed. Cross sectional data of 3820 workers, in total, were available. Prospective data were accessible for 1200 workers in industry and health care. Models were tested with stepwise multiple regression analyses. **RESULTS:** Strong associations between work demands and need for recovery were found in different occupations. The variance explained in need for recovery by work demands, age, and (baseline) need for recovery ranged between 14% and 48% in both types of studies. The amount of explained variance by work demands, age, and (baseline) need for recovery in subjective health complaints ranged between 24% and 58% in the different occupations. The prospective data showed the prognostic value of need for recovery in relation to subjective health complaints (in terms of psychosomatic complaints, emotional exhaustion, or sleep problems) and duration of future sickness absence. **CONCLUSIONS:** The hypothesised role for work related fatigue as a link in the causal string of events, that is assumed to exist between repeated adverse work demands and the development of work related stress reactions, (psychological) overload and, eventually, health problems, was confirmed.

## **Fatigue as a predictor of sickness absence: results from the Maastricht cohort study on fatigue at work**

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The Netherlands

**OBJECTIVES:** To investigate whether there is a relationship between fatigue and sickness absence. Two additional hypotheses were based on the theoretical distinction between involuntary, health related absence and voluntary, attitudinal absence. In the literature, the former term is usually used to describe long term sickness absence, the latter relates to short term sickness absence. In line with this, the first additional hypothesis was that higher fatigue would correspond with a higher risk of long term, primarily health related absence. The second additional hypothesis was that higher fatigue would correspond with a higher risk of short term, primarily motivational absence. **METHODS:** A multidimensional fatigue measure, as well as potential sociodemographic and work related confounders were assessed in the baseline questionnaire of the Maastricht cohort study on fatigue at work. Sickness absence was objectively assessed on the basis of organisational absence records and measured over the six months immediately following the baseline questionnaire. In the first, general hypothesis the effect of fatigue on time-to-onset of first sickness absence spell during follow up was investigated. For this purpose, a survival analysis was performed. The effect of fatigue on long term sickness absence was tested by a logistic regression analysis. The effect of fatigue on short term sickness absence was investigated by performing a survival analysis with time-to-onset of first short absence spell as an outcome. **RESULTS:** It was found that higher fatigue decreased the time-to-onset of the first sickness absence spell. Additional analyses showed that fatigue was related to long term as well as to short term sickness absence. The effect of fatigue on the first mentioned outcome was stronger than the effect on the latter outcome. Potential confounders only weakened the effect of fatigue on long term absence. **CONCLUSIONS:** Fatigue was associated with short term but particularly with long term sickness absence. The relation between fatigue and future sickness

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absence holds when controlling for work related and sociodemographic confounders. Fatigue as measured with the Checklist Individual Strength can be used as a screening instrument to assess the likelihood of sickness absence in the short term.

### **The Depression Anxiety Stress Scales (DASS): detecting anxiety disorder and depression in employees absent from work because of mental health problems**

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Netherlands

**AIMS:** To (1) evaluate the psychometric properties and (2) examine the ability to detect cases with anxiety disorder and depression in a population of employees absent from work because of mental health problems. **METHODS:** Internal consistency, construct validity, and criterion validity of the Depression Anxiety Stress Scales (DASS) were assessed. Furthermore, the ability to identify anxiety disorders or depression was evaluated by calculating posterior probabilities of these disorders following positive and negative test results for different cut off scores of the DASS-Depression and DASS-Anxiety subscales. **RESULTS:** Internal consistency of the DASS subscales was high, with Cronbach's alphas of 0.94, 0.88, and 0.93 for depression, anxiety, and stress respectively. Factor analysis revealed a three factor solution, which corresponded well with the three subscales of the DASS. Construct validity was further supported by moderately high correlations of the DASS with indices of convergent validity (0.65 and 0.75), and lower correlations of the DASS with indices of divergent validity (range -0.22 to 0.07). Support for criterion validity was provided by a statistically significant difference in DASS scores between two diagnostic groups. A cut off score of 5 for anxiety and 12 for depression is recommended. The DASS showed probabilities of anxiety and depression after a negative test result of 0.05 and 0.06 respectively. Probabilities of 0.29 for anxiety disorder and 0.33 for depression after a positive test result reflect relatively low specificity of the DASS. **CONCLUSION:** The psychometric properties of the DASS are suitable for use in an occupational health care setting. The DASS can be helpful in ruling out anxiety disorder and depression in employees with mental health problems.

### **Need for recovery after work and the subsequent risk of cardiovascular disease in a working population**

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**BACKGROUND:** A high need for recovery after work can be regarded as a short term adverse effect of working day stressors and the person's inability to cope and recover. Consequently, it might be an intermediate factor between job stressors and cardiovascular disease (CVD). **Aim:** To investigate, in a longitudinal study, the relation between need for recovery and subsequent CVD. **METHODS:** Data from the Maastricht Cohort Study of 12 140 workers were used, with 42 incident self reported CVD cases during 32 months of follow up. Cox proportional hazards analysis was used to calculate age, gender, smoking status, and educational level adjusted relative risks. **RESULTS:** The adjusted relative CVD risk for the second compared to the first tertile of the need for recovery score was 1.22 (95% CI: 0.49 to 3.04), and for the third compared to the first tertile was 3.16 (95% CI: 1.34 to 7.48). When need for recovery was entered as continuous score, an adjusted relative risk per SD increase of 1.54 (95% CI: 1.15 to 2.03) was found. Additional adjustment for several work related factors as job demands, did not notably change the observed relation between need for recovery and CVD. Moreover, the increased risk for subjects reporting high job demands (1.38 per SD increase; 95% CI: 1.02 to 3.92) decreased substantially after adjustment for need for recovery. **CONCLUSION:** The results show that need for recovery is a strong predictor of subsequent cardiovascular disease and might be an intermediate factor between job stressors and cardiovascular disease.

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### **Fatigue as a risk factor for being injured in an occupational accident: results from the Maastricht Cohort Study.**

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**AIMS:** To determine whether fatigue and need for recovery are risk factors for being injured in an occupational accident. **METHODS:** These associations were investigated within the Maastricht Cohort Study of "Fatigue at Work", a prospective cohort study of employees from a wide range of companies and organisations. For 7051 employees information was available on fatigue as measured with the Checklist Individual Strength (CIS), need for recovery as measured with the VBBA, and possible confounding factors such as age, smoking, alcohol consumption, educational level, shift work, and work environment. Information on the risk factors was collected in May 1999 and January 2000, before the occurrence of the occupational accidents. The incidence of being injured in an occupational accident was inventoried over the year 2000. A total of 108 employees reported having been injured in an occupational accident in 2000. **RESULTS:** For the highest CIS fatigue score tertile a for age, gender, educational level, smoking, shift work, and work environment, adjusted relative risk for being injured in an occupational accident of 1.29 (95% CI: 1.03 to 2.78) was found compared to the lowest tertile, and for the highest tertile of need for recovery a relative risk of 2.28 (95% CI: 1.41 to 3.66) was found. **CONCLUSIONS:** Fatigue and need for recovery were found to be independent risk factors for being injured in an occupational accident. This means that in the push back of occupational accidents, fatigue, and even more importantly need for recovery, need special attention.

### **Fatigue in employees with diabetes: its relation with work characteristics and diabetes related burden**

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**AIMS:** To examine the relations between work characteristics as defined by the Job Demand-Control-Support model (JDCS) (that is, job demands, decision latitude, and social support), diabetes related burden (symptoms, seriousness of disease, self care activities, and disease duration), and fatigue in employees with diabetes mellitus. **METHODS:** Employees (n = 292) aged 30-60 years, with insulin treated diabetes, filled in self administered questionnaires that assess the above mentioned components of the JDCS model and diabetes related burdens. **RESULTS:** Both work and diabetes related factors are related to fatigue in employees with diabetes. Regression analyses revealed that work characteristics explain 19.1% of the variance in fatigue; lack of support, and the interaction of job demands and job control contribute significantly. Diabetes related factors explain another 29.0% of the variance, with the focus on diabetes related symptoms and the burden of adjusting insulin dosage to circumstances. Fatigue is more severe in case of lack of social support at work, high job demands in combination with a lack of decision latitude, more burden of adjusting insulin dosage to circumstances, and more diabetic symptoms. Furthermore, regression analysis revealed that diabetic symptoms and the burden of adjusting the insulin dosage to circumstances are especially relevant in combination with high job demands. **CONCLUSIONS:** Both diabetes and work should be taken into consideration-by (occupational) physicians as well as supervisors – in the communication with people with diabetes.

### **Associations between fatigue attributions and fatigue, health, and psychosocial work characteristics: a study among employees visiting a physician with fatigue**

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**AIMS:** To study associations between characteristics of employees active at work and making a fatigue related visit to the general practitioner (GP) or occupational physician (OP) in terms of fatigue, physical health problems, mental health problems, psychosocial work characteristics, and attributions

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of their fatigue complaints. METHODS: Self report questionnaires from the Maastricht Cohort Study Fatigue at Work were used to measure fatigue (Checklist Individual Strength, Maslach Burnout Inventory-General Survey), physical health problems (chronic illness), mental health problems (Hospital Anxiety and Depression Scale), psychosocial work characteristics (Job Content Questionnaire), and fatigue attributions (somatic, psychological, none) in employees who made a fatigue related visit to the GP or OP over a six month period. RESULTS: In employees visiting only the GP, fatigue was an important reason to visit in one of seven (13.9%) employees. These fatigue related visits were in particular associated with high fatigue levels and mental health problems. A psychological fatigue attribution was reported by 41.8%, a somatic fatigue attribution by 44.0%. On a multivariate level, mental health problems showed the strongest association with psychological fatigue attributions, over and beyond fatigue itself. No associations were found between fatigue attributions and psychosocial work characteristics. Attributional patterns appeared to be different between visitors of the GP and the OP. CONCLUSIONS: Fatigue is a common reason among employees to consult a GP. Asking employees for their own fatigue attributions in terms of somatic or psychological causes may be useful for the GP-and possibly also the OP-to gather information about underlying health problems in employees active at work and making a fatigue related visit.

### **In-Depth Reviews: Shift Work, Occupational Medicine (Lond) (Volume 53, Issue 2, 2003).**

#### **SHIFT WORK AND OCCUPATIONAL MEDICINE: AN OVERVIEW**

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Keywords: Health; medical surveillance; nightwork; occupational medicine; shift work; work hygiene; work tolerance

In modern society, more and more people work during 'non-standard' working hours, including shift and night work, which are recognized risk factors for health, safety and social well-being. Suitable preventive and protective measures are required to mitigate the adverse effects and ensure that the worker can cope satisfactorily. These are based mainly on the organization of shift schedules according to ergonomic criteria and on specific medical surveillance. Occupational medicine has to consider very carefully the several factors (psycho-physiological, pathological and social) that can influence tolerance and/or maladaptation.

#### **SHIFT WORK AND DISTURBED SLEEP/WAKEFULNESS**

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Keywords: Accidents; fatigue; health; long hours; performance; shift work

Of the many health-related effects of shift work, disturbed sleep is the most common. This review describes the main observed effects of the three principal shifts (night, morning and afternoon) on patterns of sleep and wakefulness. The mechanism of sleep disruption in relation to circadian rhythms and the specific impact of aspects of shift organization (speed and direction of rotation) are discussed. The most troublesome acute symptoms are difficulty getting to sleep, shortened sleep and somnolence during working hours that continues into successive days off. These are only partially amenable to amelioration by manipulating shift patterns. However, there is no clear indication that chronic sleep problems result from long-term shift work.

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## SHIFT WORK, SAFETY AND PRODUCTIVITY

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Keywords: Circadian rhythms; fatigue; performance; productivity; safety; shift work; sleep

The arguments in favour of introducing shift work clearly depend on productivity and safety being maintained at an acceptable level. However, the evidence reviewed in this paper clearly indicates that both productivity and safety may be compromised at night. More specifically, safety declines over successive night shifts, with increasing hours on duty and between successive rest breaks. The only known way to minimize these problems is to improve shift systems with respect to these factors. However, these factors need to be considered in combination with one another since, for example, a long night shift that includes frequent rest breaks might well prove safer than a shorter night shift with less frequent breaks.

## HEALTH DISORDERS OF SHIFT WORKERS

Anders Knutsson

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Keywords: Cardiovascular diseases; gastrointestinal diseases; health; medical surveillance; night work; pregnancy; shift work

The effects of shift work on physiological function through disruption of circadian rhythms are well described. However, shift work can also be associated with specific pathological disorders. This article reviews the evidence for a relationship between specific medical disorders and working at night or on shift systems. The strongest evidence exists for an association with peptic ulcer disease, coronary heart disease and compromised pregnancy outcome.

## PREVENTIVE AND COMPENSATORY MEASURES FOR SHIFT WORKERS

Peter Knauth and Sonia Hornberger

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Keywords: Alertness; coping strategies; ergonomic design of shift systems; health care; night work; participation; shift work; sleep; social support; working conditions

Shift systems are known to be associated with a variety of psychosocial and physiological problems that can affect the health of workers. This review focuses on measures that can be taken to optimize the well-being of shift workers and to identify ill-health at an early stage. The discussion includes specific aspects of the design of shift systems, taking account of variation in the views and circumstances of employees, and strategies to combat sleepiness at work and elsewhere. Although an ideal shift system does not exist, a holistic approach comprising education of managers, employees and their families can ameliorate some of the health consequences

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## Announcements

### 1. Host for the XVIIIth International Symposium on Night and Shift Work

The Board of the WTS/ICOH Shiftwork committee is seeking proposals to organise and host the XVIII International Symposium on Night & Shiftwork to be held 2007. If you feel that you could offer to organise this 2007 meeting, please contact Dr Giovanni Costa (E-mail: giovanni.costa@univr.it) or Dr Don Tepas (E-mail: tepas@rcn.com) as soon as possible.

### 2. Special issue of Industrial Health: *Workers' Sleep*

The National Institute of Industrial Health, Japan, has been publishing an international journal, *Industrial Health*, for over 30 years ([http://www.niih.go.jp/en/indu\\_hel/index.html](http://www.niih.go.jp/en/indu_hel/index.html)). The special

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issue in 2005 will focus on workers' sleep, with the tentative title "*SLEEP HEALTH – Implications for Workers and Workplaces*", to disseminate scientific knowledge and information to improve sleep and waking of working people.

Now, we are calling for papers concerning epidemiology, experimental and field studies, clinical problems (OSAS, OSH staff's role, etc), consulting firms, NPOs, and legally-correct thinking (sleep-related accidents at work). At this stage, contributions are expected from over 20 internationally recognized experts regarding sleep, sleepiness, circadian rhythms, and work schedules - and we are looking forward to your important contribution.

► Publication schedules

31 August 2004: Final submission  
30 October 2004: Final notice of acceptance  
January 2005: Publication

For more information, please feel free to contact Masaya Takahashi (Fax: +81-44-865-6124, E-mail: [takaham@niih.go.jp](mailto:takaham@niih.go.jp)).

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## Erratum: Abstracts of the XVIth International Symposium on Night and Shiftwork

The abstract by James and Boivin published in *S.I.N.* 20(2), 2003 (p.99) contained typographical errors for which we apologise. The correct version is as follows:

### A light/darkness intervention to realign the cortisol rhythm to night shift work

**James FO** and **Boivin DB**

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*Department of Psychiatry, McGill University, Montreal, Qc, Canada*

**Introduction:** Many night shift workers experience a persistent circadian misalignment to their shifted rest/activity schedule despite years of experience (1). Based on the importance of judicious schedules of light and darkness exposure in circadian readaptation to shifted sleep-wake schedules (2), we tested the efficacy of a light/darkness intervention in a group of nurses working permanent night shifts.

**Methods:** We recruited 11 nurses working full-time night shifts for this combined field and laboratory study. Following a period of at least 10 vacation days during which they maintained day-oriented schedules, nurses were admitted to the laboratory for an assessment of endogenous circadian phase via a 36-hour constant routine technique. Following the circadian assessment, nurses returned to their habitual schedule for ~12 night shifts worked in a ~20-day period. During this period, they were observed under one of two experimental conditions. Nurses in the treatment group (n=6; mean age  $\pm$  SD: 37.1  $\pm$  8.1 years) received an intermittent exposure to bright light in the first 6 hours of each night shift (mean exposure  $\pm$  SD: 2,590  $\pm$  1,317 lux), and were shielded from morning light during the commute with darkened sunglasses. Control group nurses (n=5; mean age: 41.15  $\pm$  9.9 years) were observed in their habitual environments (131  $\pm$  122 lux). All nurses kept regular sleep-wake schedules. At the end of the night work period, nurses were readmitted to the laboratory for a final 36-hour constant routine. From data collected during constant routines, circadian phase was assessed as the time of fitted minima and maxima of salivary cortisol concentration based on a single harmonic regression. Bedtimes during the vacation period preceding the study, as well as times in bed following night shifts, were recorded in sleep-wake logs.

**Results:** At the time of the first constant routine, the cortisol rhythm was well adapted to a day-oriented schedule and comparable between groups (Mann-Whitney, fitted minimum: P=0.3, fitted

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maximum  $P=0.1$ ). Following the period of night work, the treatment group displayed delays of  $11:26 \pm 1:26$  and  $11:04 \pm 1:16$  in the fitted minima and maxima of cortisol, respectively. These phase shifts differed significantly from the phase delays observed in the control group for the fitted minimum ( $3:41 \pm 2:09$ ,  $P=0.006$ ) and the fitted maximum ( $3:03 \pm 2:07$ ,  $P=0.02$ ) of the cortisol rhythm.

**Discussion:** The significant phase shifts observed in the treatment group suggest an appropriate alignment of the circadian pacemaker with the shifted sleep-wake schedule. This suggests that a judicious pattern of light/darkness can significantly promote circadian readaptation to night shift work.

**References:**

1. Roden M et al. The circadian melatonin and cortisol secretion pattern in permanent night shift workers. *Am J Physiol* 1993; 265: R261-R267.
2. Eastman CI et al. Dark goggles and bright light improve circadian rhythm adaptation to night-shift work. *Sleep* 1994; 17: 535-543.

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## Subscriptions to S.I.N.

The Shiftwork International Newsletter is published twice annually. Subscriptions may be made in either of two ways:

- (1) participants in each *International Symposium on Night and Shiftwork* pay a two-year S.I.N. subscription as part of the symposium registration.
- (2) subscriptions can also be made by transferring \$US35 (for two years) directly to the editors' account (direct transfer is necessary because bank drafts for \$35 are not accepted by the bank):

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