



NTP

National Toxicology Program

Shift Work At Night, Light At Night And Circadian Disruption: **OHAT Activities On Non-Cancer Health Outcomes**

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Background

- Nomination for “exposure to light at night” received in November 2011
- Developing a concept for presentation at future BSC meeting

Activities to Refine Focus

- Follow oRoC efforts to define scope
- Release Request for Information (RFI)
 - Solicit comments on proposed focus, ongoing research, identify experts
- Engage technical experts
 - Overlap with oRoC in certain areas, e.g., defining “exposure”, effects of non-day shift work on circadian biomarkers such as melatonin
 - OHAT will also have unique needs, e.g., assessment of non-cancer health outcomes

Search Strategy to Assess Extent of the Literature

Shift work

Shiftwork terms	<p>Shiftwork*[tiab] OR shift-work*[tiab] OR shift-dut*[tiab] OR shift-hour*[tiab] OR hour-shift*[tiab] OR hours-shift*[tiab] OR shift-break*[tiab] OR shift-system*[tiab] OR call-shift*[tiab] OR extended-shift*[tiab] OR work-shift*[tiab] OR Nightshift*[tiab] OR night-shift*[tiab] OR nightwork*[tiab] OR night-work*[tiab] OR night-call*[tiab] OR night-float*[tiab] OR night-dut*[tiab] OR night-schedul*[tiab] OR Light-at-night[tiab] OR nocturnal-light*[tiab] OR night-light*[tiab] OR "long working hours"[tiab] OR "long work hours"[tiab] OR "Work schedule tolerance"[mh] OR One-shift*[tiab] OR two-shift*[tiab] OR 2-shift*[tiab] OR three-shift*[tiab] OR 3-shift*[tiab] OR Alternative-schedul*[tiab] OR alternative-shift*[tiab] OR rotating-schedul*[tiab] OR rotating-shift*[tiab] OR rotational-schedul*[tiab] OR rotational-shift*[tiab] OR floating-schedul*[tiab] OR ((on-call[tiab] OR oncall[tiab]) AND (duty[tiab] OR duties[tiab] OR hours[tiab] OR schedule[tiab] OR schedules[tiab] OR shift[tiab] OR shifts[tiab] OR work[tiab] OR worker[tiab] OR workers[tiab] OR working[tiab]))</p> <p>(Personnel staffing and scheduling[mh] OR (midnight[tiab] OR night*[tiab] OR evening*[tiab] OR overnight[tiab]) AND (call[tiab] OR calls[tiab] OR duty[tiab] OR duties[tiab] OR hours[tiab] OR schedul*[tiab] OR shift*[tiab] OR work[tiab] OR worker*[tiab] OR working[tiab]) OR work-schedul*[tiab] OR hour-call*[tiab] OR hours-call*[tiab])</p> <p>(Occupational groups[mh] OR worker*[tiab] OR staff[tiab] OR personnel[tiab] OR employee*[tiab] OR staff[tiab] OR crew[tiab] OR crews[tiab] OR ((airline OR aircraft OR flight) AND pilot*[tiab]) OR ((cockpit OR cabin OR flight OR flightdeck OR airline) AND (attendant*[tiab] OR crew[tiab] OR staff[tiab] OR personnel[tiab])) OR Police[mh] OR firefighters[mh] OR police*[tiab] OR firefighter*[tiab] OR firefighter*[tiab] OR Medical staff[mh] OR nurses[mh] OR nursing staff[mh] OR nurse[tiab] OR nurses[tiab] OR nursing[tiab] OR physicians[mh] OR physician*[tiab] OR doctor*[tiab] OR clinician*[tiab] OR residents[tiab])</p>
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OR

Circadian disruption

Circadian Rhythm	<p>(Circadian rhythm[mh] OR ((circadian[tiab] OR diurnal[tiab]) AND (rhythm*[tiab] OR disrupt*[tiab] OR disturbance*[tiab] OR imbalance[tiab] OR abnormal*[tiab] OR misalign*[tiab])) OR chronobiolog*[tiab] OR chronodisrupt*[tiab] OR Sleep disorders, circadian rhythm[mh] OR sleep-wake[tiab] OR wake-sleep[tiab])</p> <p>(Chronobiology disorders[mh] OR jetlag[tiab] OR jet-lag[tiab] OR time-zone-syndrome*[tiab] OR shift-lag[tiab])</p>
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= ~20K publications

~20K search [shiftwork OR circadian rhythm] AND a health outcome

Health Outcomes

- birth outcomes
- cardiovascular
- depression/mood, neurological
- gastrointestinal
- immune
- metabolic disorders
- reproduction & development
- acute safety

Metabolic Disorder

intolerance"[tiab] or hypersinsulin*[tiab] or "insulin"[mh] or "receptor, insulin"[mh] or "insulin resistance"[mh] or insulin*[tiab] or glucagon[mh] or glucagon[tiab] or "blood glucose"[mh] or "blood glucose"[tiab] or "plasma glucose"[tiab] or "blood sugar"[tiab] or pancreas[mh] or pancreas[tiab] or pancreatic[tiab] or "islets of langerhans"[mh] or "islets of langerhans"[tiab] or "islet cells" or "beta cell"[tiab] or "beta cells"[tiab] or "beta islet"[tiab] or "metabolic syndrome x"[mh] or "metabolic syndrome"[tiab] or "syndrome x"[tiab] or "reaven's syndrome"[tiab] or (glucose and (metabolic[tiab] or metabolism[tiab] or metabolite*[tiab] or homeosta*[tiab] or uptake[tiab])) or gluconeogenesis[mh] or gluconeogenesis[tiab] or "glycosylation end products, advanced"[mh] or glycosylat*[tiab] or glycat*[tiab] or "hemoglobin a, glycosylated"[mh] or "hemoglobin a"[tiab] or "haemoglobin a"[tiab] or "glycohemoglobin"[tiab] or "glycohaemoglobin"[tiab] or hba1c[tiab] or a1c[tiab]) OR (Metabolic diseases[mh] OR metabolism[sh])

Exploratory Screening Results

Health Outcome	Total Results	Relevant Reviews
Birth Outcomes	473	~10
Cardiovascular	3495	~55
Depression/Mood, Neurological	7720	~180
Gastrointestinal Disorders	574	~5
Immune	2097	~2
Metabolic Disorder	4802	~35
Reproduction and Development	3239	~25
Worker Safety	3875	~170

Issues to Consider for Developing Concept

- Scope of evaluation, e.g., emergency workers?
 - Given complexity and size of literature inclined to focus on non-day shift work
- Evaluate health outcomes where a number of systematic reviews have already been conducted?
 - Many reviews, some systematic
 - BUT, existing systematic reviews generally don't assess confidence in body of evidence or develop hazard ID label
- When to identify and consider supporting and mechanistic data
 - At outset or only for health outcomes associated with non-day shift work?

Charge: To review and comment on the draft concept document and advise whether the proposed evaluation is an appropriate use of NTP resources

1. Comment on whether, based upon the information provided in the draft concept, it is reasonable that a significant number of people living in the United States are exposed to light at night or other exposures that may cause circadian disruption.
2. Please comment on the potential contribution/importance to public health of OROc undertaking this evaluation. The NTP will use these comments in assessing the relative priority of evaluations of RoC candidate substances
3. Comment on whether the extent and nature of the scientific information on carcinogenicity is clearly described and adequate (studies in humans, animals, and/or mechanistic information) to support a RoC evaluation.
4. Advise as to whether the scientific issues identified as relevant are reasonable. Are you aware of any other scientific issues that should be considered?
5. Comment on whether the proposed strategy for obtaining scientific and public inputs in identifying the candidate substance and developing the cancer evaluation component of the draft RoC monograph is reasonable.
6. Provide any other comments you feel staff should consider in developing this evaluation.