



Occupational
Health Clinics
for Ontario
Workers Inc.

Centres de
santé des
travailleurs (ses)
de l'Ontario Inc.

Shiftwork – Health Effects and Solutions

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RSI Day+ 2018

Introduction



What is Shiftwork

Normal Human Rhythm

What are the Health Effects of Shiftwork?

Blue Light

Prevention

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What is Shiftwork?

- Includes any arrangement of daily working hours other than the standard daylight hours (8/9 am – 5/6 pm)
- Schedules change impacts
 - Social life
 - Family life
 - Health



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Facts

- Shiftwork is a reality for about 25 percent of the North American working population.
 - Is it really more than that? Moonlighting – Uber.
- Industries and Services
 - Manufacturing, energy production, transportation, health care, law enforcement and military.



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Facts

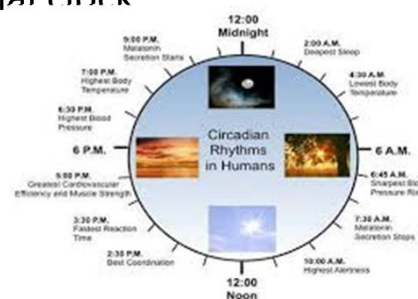
- Incidents in, Bhopal, Chernobyl and the Exxon Valdez oil spill occurred between midnight and 4 AM.
- “Night owl” types personalities adapt better to night and rotating shifts than “morning larks”



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Normal Human Rhythm

- Humans are “programmed” to be awake during daylight hours and to sleep/reduce activity levels at night
- These rhythms are managed by an internal clock
 - *Circadian Rhythm*



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Circadian Rhythm

- "about a day "
 - sleep-wake cycle which is related to the cycle of the sun
 - Social activities
 - Meal times
- Circadian functions
 - Sleeping
 - Waking
 - Digestion
 - Secretion of hormones
 - Blood pressure

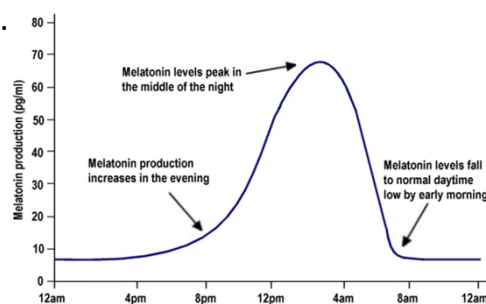


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Circadian Rhythm

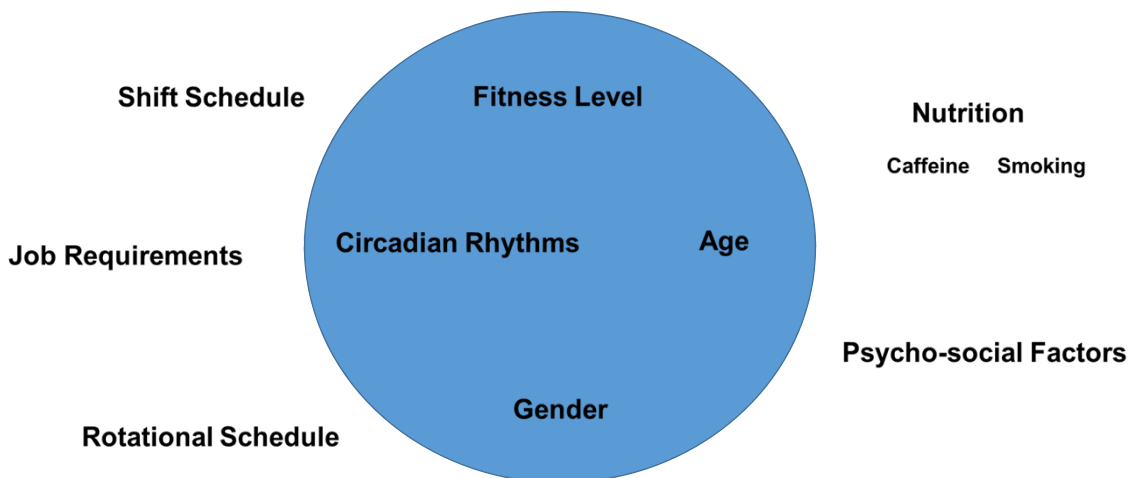
- Leading up to sleep, glands activated by darkness begin to secrete hormones (melatonin) to signal that our body is preparing for sleep.
- Normally, biologic cycles are kept in rhythm by signal hormones such as melatonin
 - Disruption in these systems have health effects.
 - Disrupted by both internal and external signals



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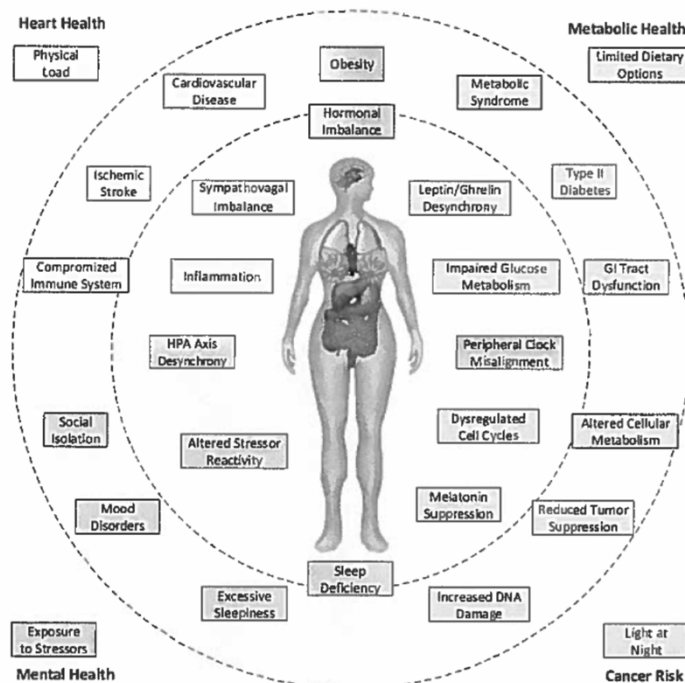
Circadian Rhythm – Internal/External Factors



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Health Effects

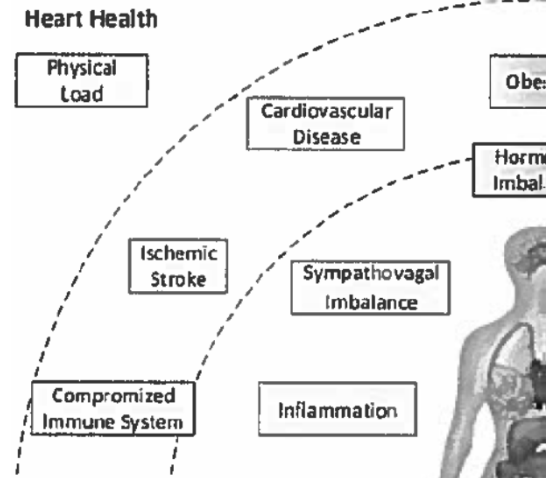
- Inner circle
 - systems disturbed by circadian misalignment
- Outer circle
 - medical conditions
- Outer Quadrant
 - broad components



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Health Effects of Shiftwork

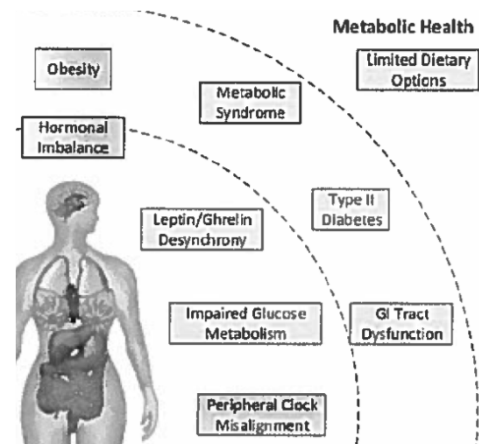
- Heart Health
- Associated with elevated risk of heart disease and ischemic stroke
- Coronary heart disease
- Disrupts blood pressure
- Fatigue



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Health Effects of Shiftwork

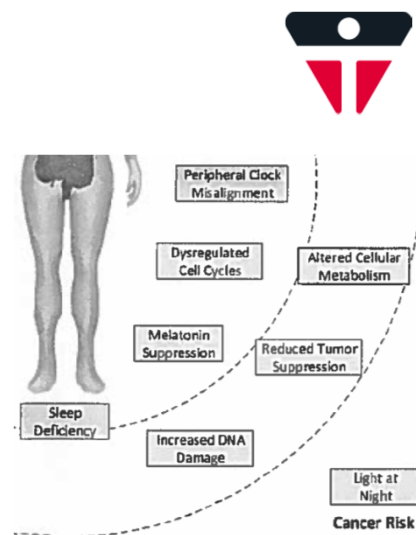
- Increased risk of type II diabetes
 - Altered meal timing
 - Crave foods with carbohydrate content
 - Convenience foods available 24-hrs are predominantly processed and fried



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Health Effects of Shiftwork

- IARC (International Agency for Research on Cancer)
 - Shiftwork that involves circadian disruption
 - group 2A - Probably carcinogenic to humans (2007)
 - Based on long-term night workers who have shown a to have a higher risk of breast cancer than women who do not work at night.
 - Mainly nurses and flight attendants



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Health Effects of Shiftwork

- They concluded that “shift-work that involves circadian disruption is probably carcinogenic to humans.” This places shift-work in Group 2A.
- IARC Evaluation of Carcinogens
 - Group 1: Carcinogenic in humans
 - **Group 2A: Probably carcinogenic in humans**
 - Group 2B: Possibly carcinogenic in humans
 - Group 3: Not classifiable, generally inadequate evidence in humans and limited or inadequate in animals
 - Group 4: Evidence of a lack of carcinogenicity in both humans & animals

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Health Effects of Shiftwork

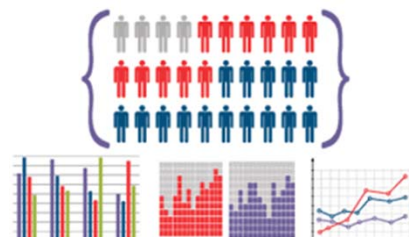
- 2018: Systematic Review of Primary Cancers in Women
- In addition to breast cancer a positive relationship between long term shift work and
 - digestive system cancer
 - skin cancer
- Nurses: Increasing the number of years working shiftwork increase the risk of breast cancer and increases risk of
 - digestive system cancer
 - lung cancer

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Health Effects of Shiftwork

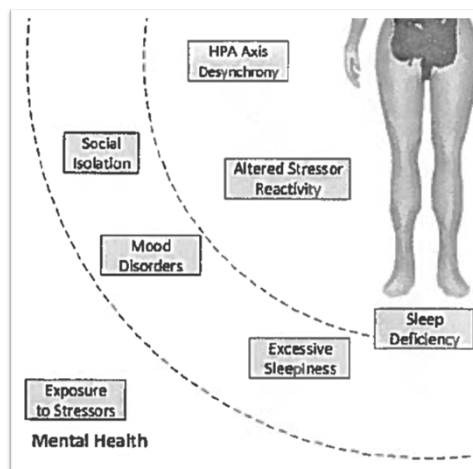
- 2015: Does night-shift work increase the risk of prostate cancer? a systematic review and meta-analysis
 - Conclusion: night-shift work is associated with an increased risk of prostate cancer



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Shift Work and Mental Health

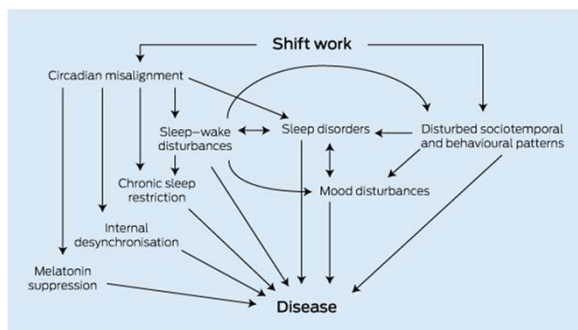
- Abnormal or heightened response to stress
 - results in difficulty managing response to stress
- Inability to regulate emotions
- Shift work limits social interactions
 - lack of social support system
- Work-life interference (timing of events)
- Fatigue



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Shift Work and Mental Health

- Chronic Stress associated with shift work has been associated with an increased risk for coronary heart disease
- Law enforcement workers have higher risk of stress-related mood disorders.
- 2013 Medical Journal of Australia
 - Mood disturbances

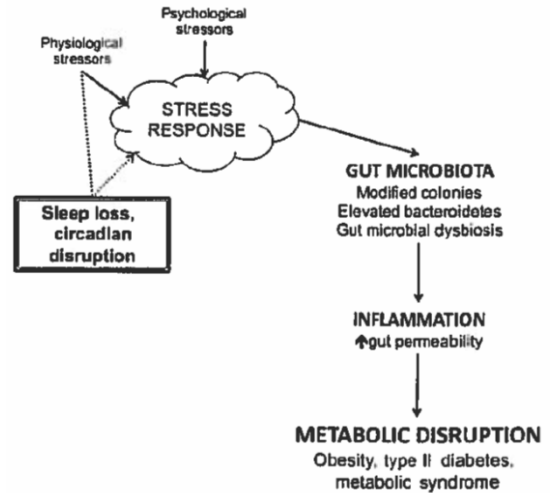


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Health Effects of Shiftwork

- Journal: Sleep Medicine Reviews (2017)

- Solid lines are an established response stress disrupts the healthy functioning of the intestinal gut
- Hypothesize that sleep and circadian disruption alters gut microflora (bacteria normally found in the digestive tract) contributing to inflammation and metabolic disease.



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Fatigue

- A state of being exhausted
 - Difficulty concentrating
 - Decreased reaction times
- Both safety and productivity are reduced at night
- Safety declines over successive night shifts



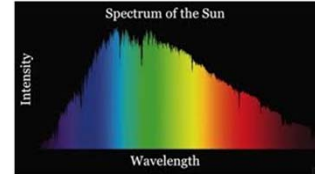
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Blue Light

- Sources

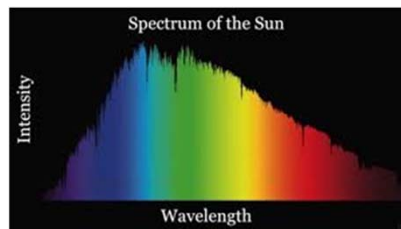
- Sun
- LED tablets, phones, computers and TVs.

- Sunlight and white light all contain a combination of various wavelengths
- Getting blue light from the sun is essential during the day for remaining awake and improving mood.
- These benefits are great but only during natural day light.



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Blue Light

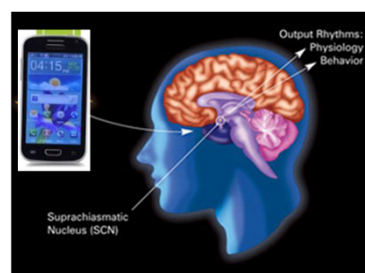
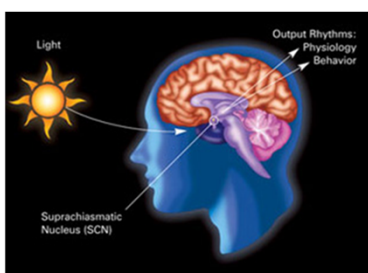


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Blue Light

- Brain Interprets blue light from LED screen as daytime



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Blue Light

- 2015: Study on the use of light-emitting eReaders in the evening
- Participants reading an eBook (compared to reading printed book)
 - took longer to fall asleep
 - had reduced evening sleepiness
 - reduced melatonin secretion
 - later timing of their circadian clock
 - reduced next morning alertness



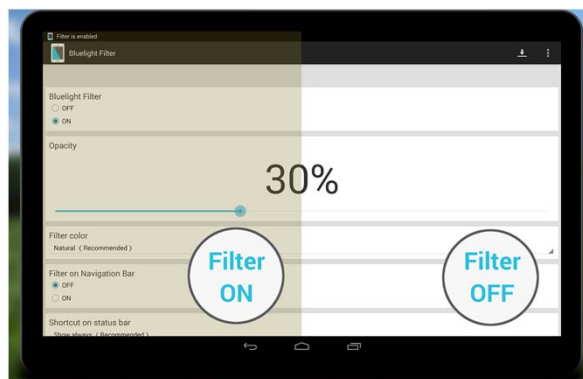
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Blue Light

- Avoid looking at bright screens beginning two to three hours before bed.
- App/filters that filter out the blue light



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Blue Light

- Increased use of technology in the workplace
 - workplace provided tablets
- Technology has made us available 24/7
 - need to respond to e-mails at anytime
- Flexible working arrangements
 - working and/or responding to emails beyond the 9 - 5

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Prevention

- The Occupational Hygiene approach is to apply hazard control in the following order:
 1. Engineering controls
 2. Administrative controls
 3. Personal protective Equipment



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Prevention – Engineering Controls

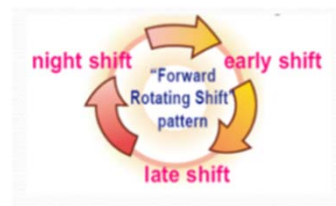
- Work environment designed to improve alertness
 - Appropriate lighting levels (bright vs. dim)
 - Task variation
- Eliminate or substitute
 - Is shiftwork appropriate/necessary?
 - Are resources (human and otherwise) right?

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Prevention – Administrative Controls

- Rotate shifts forward
 - Days – afternoons – midnights (preferred)
- How long is the shift
 - 8 hour vs. 12 hour
 - Longer shift advantage: fewer consecutive night shifts
 - Additional fatigue from longer shift
- Timing of shift
 - Start/end time
 - Early morning shifts (5/6am) are associated with shorter sleep and greater fatigue



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Prevention – Administrative Controls

- Rapid rotating shifts
 - Switch once or twice during a week
 - Found to cause the least disturbance to the circadian rhythm
- Permanent night shift
 - Circadian adjustment can be achieved

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Prevention – PPE (at the worker)

- Sleep
 - Make sure family and friends are aware of your schedule and sleep needs
- Work-life balance
 - There's an app for that
- Napping strategies
 - Mixed results



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Prevention

- Some people adapt after 2-3 days, others much longer.
 - Generally, all systems can shift 1 - 2 hrs per day
- Exercise regularly
 - Reduce stress
 - Avoid vigorous exercise right before you plan to sleep.
- Limit caffeine intake
- Education
 - On the potential health and safety effects of shiftwork



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Prevention

- Sleep on a set schedule to help establish a routine
- Healthy eating habits



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More Information

- Canadian Centre for Occupational Health and Safety - Rotational Shiftwork
 - <https://www.ccohs.ca/oshanswers/ergonomics/shiftwrk.html>
- The National Institute for Occupational Safety and Health (NIOSH)
 - <https://www.cdc.gov/niosh/topics/workschedules/education.html>
- Simple Calendar App For Shift Workers
 - <http://www.myshiftworkapp.com/>

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