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Melatonin Supplementation and DNA Repair in Night Shift Workers: A Randomized Controlled Trial

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Introduction:

Night shift work, characterized by disruptions to the circadian rhythm, is associated with a range of adverse health outcomes, including impaired DNA repair.

A recent randomized placebo-controlled trial published in *Occupational & Environmental Medicine* investigated the potential of melatonin supplementation to enhance oxidative DNA damage repair capacity among night shift workers (Melatonin supplementation and oxidative DNA damage repair capacity among night shift workers: a randomized placebo- controlled trial, 2025).

This study addresses the critical need to mitigate the health risks associated with circadian disruption in this vulnerable population.

I. The Role of Melatonin in DNA Repair and Circadian Rhythm:

- **Physiological Function of Melatonin:**
  - Melatonin, primarily synthesized by the pineal gland, plays a crucial role in regulating the sleep-wake cycle, with peak levels occurring during darkness (Melatonin. Cleveland Clinic, 2022).
  - Its release is modulated by light exposure, with the retinas transmitting information about the day-night cycle to the pineal gland (Melatonin. Cleveland Clinic, 2022).
- **Hypomelatoninemia and Shift Work:**
  - Night shift work disrupts the normal circadian rhythm, leading to hypomelatoninemia, characterized by reduced nighttime melatonin levels (Melatonin. Cleveland Clinic, 2022).
  - This condition is associated with an increased risk of various health problems, including hypertension, insulin resistance, and certain cancers, due to impaired DNA repair mechanisms (Melatonin. Cleveland Clinic, 2022).
- **Antioxidant Properties and DNA Protection:**
  - Melatonin exhibits both direct and indirect antioxidant properties, scavenging reactive oxygen species (ROS) that can induce DNA damage (Melatonin supplementation and oxidative DNA damage repair capacity among night shift workers: a randomized placebo-controlled trial, 2025).
  - 8-hydroxy-2′-deoxyguanosine (8-OH-dG) is a key marker of oxidative DNA damage, and previous studies have indicated lower levels of 8-OH-dG excretion in night shift workers, suggesting impaired DNA repair (Melatonin supplementation and oxidative DNA damage repair capacity among night shift workers: a randomized placebo- controlled trial, 2025).

II. Study Design and Key Findings:

- **Randomized Placebo-Controlled Trial:**
  - The study employed a randomized, double-blind, placebo-controlled design (NCT03945955) to evaluate the impact of 3 mg melatonin supplementation on 8-OH-dG excretion in 40 night shift workers (Melatonin supplementation and oxidative DNA damage repair capacity among night shift workers: a randomized placebo-controlled trial, 2025).
  - Participants received either melatonin or placebo for 4 weeks, with urine and sleep data collected before and after the intervention (Melatonin supplementation and oxidative DNA damage repair capacity among night shift workers: a randomized placebo- controlled trial, 2025).
- **Impact on 8-OH-dG Excretion:**
  - Melatonin supplementation resulted in a borderline statistically significant 1.8-fold increase in urinary 8-OH-dG excretion during daytime sleep compared to placebo ($P = 0.06$) (Melatonin supplementation and oxidative DNA damage repair capacity among night shift workers: a randomized placebo- controlled trial, 2025).
  - However, no significant difference was observed in 8-OH-dG excretion during the subsequent night shift ($P = 0.7$) (Melatonin supplementation and oxidative DNA

damage repair capacity among night shift workers: a randomized placebo- controlled trial, 2025).

III. Clinical Implications and Future Research:

- **Potential Benefits of Melatonin Supplementation:**
  - The findings suggest that melatonin supplementation may enhance oxidative DNA damage repair capacity in night shift workers, potentially mitigating cancer risk (Melatonin supplementation and oxidative DNA damage repair capacity among night shift workers: a randomized placebo- controlled trial, 2025).
  - However, the variability in melatonin bioavailability necessitates further investigation to determine optimal dosing strategies.
- **Need for Further Research:**
  - Future studies should explore the effects of varying melatonin doses and formulations on DNA repair and long-term health outcomes in night shift workers (Melatonin supplementation and oxidative DNA damage repair capacity among night shift workers: a randomized placebo- controlled trial, 2025).
  - Longitudinal studies are needed to evaluate the clinical significance of these findings and to assess the impact of melatonin supplementation on cancer incidence and other chronic diseases.

Conclusion:

This randomized controlled trial provides preliminary evidence that melatonin supplementation may improve oxidative DNA damage repair capacity in night shift workers. While further research is warranted to optimize dosing and assess long-term effects, these findings highlight the potential of melatonin as a protective intervention for this high-risk population.

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EMPOWERING WOMEN'S HEALTH: THE CRITICAL ROLE OF HPV VACCINATION IN PREVENTING CERVICAL CANCER

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INTRODUCTION:

Cervical cancer is a type of cancer that develops in the cervix due to persistent infection with high-risk types of human papilloma virus (HPV). Viral oncoproteins E5, E6, and E7 work together with host factors to initiate and sustain the cancerous characteristics. Prevention is largely achievable through HPV vaccination, regular screening, and treating precancerous conditions. Despite effective preventive measures, inadequate screening procedures and insufficient awareness contribute to cervical cancer being the fourth most frequent cancer in women, causing more than 300,000 deaths each year.

SCREENING METHODS:

HPV testing is the preferred method for detecting precancers and cancers between ages 25 and 65, with adequate screening around menopause crucial for preventing cervical cancer among older women. Most cervical cancers occur in women who are not adequately screened. Screening methods include Pap smear, liquid-based cytology (LBC), visual inspections with acetic acid (VIA) or Lugol's iodine (VILI), and HPV-DNA testing. LBC offers higher sensitivity and specificity, optimizing primary screening effectiveness, while VIA is suitable in less developed areas due to its affordability and simplicity. HPV testing with genotyping and reflex cytology provides optimal accuracy, reducing false positives. Primary HPV screening surpasses LBC in detecting true positives. Triage testing with reflex screening significantly reduces false positives, maximizing therapeutic effectiveness.

HPV VACCINATION AND COVERAGE:

The bivalent (CERVARIX) and quadrivalent (GARDASIL)HPV vaccines are available in India, while the nonavalent vaccine is licensed but not yet accessible. However, controversies persist regarding vaccinating older women, those who are immunocompromised, and other special groups. In India, HPV vaccines are approved for females aged 9-45 years and are proven safe and effective. FOGSI (The Federation of Obstetric and Gynaecological Societies of India) recommends vaccinating all girls under 15 years as the primary target group, advocating for a two-dose regimen spaced 6 months apart (extendable up to 18 months). For girls over 15 years, immunocompromised individuals, and sexual assault survivors, a three-dose schedule is recommended. Older women and those with abnormal screening results may receive vaccination with the understanding that it does not protect against existing infections, necessitating continued screening. Promising results have been observed with single-dose vaccination, but overcoming vaccine hesitancy requires heightened awareness. Making HPV vaccination a priority can contribute significantly to eliminating cervical cancer. Affordable vaccines and reduced dosing schedules are expected to enhance coverage.

CERVARIX AND GARDASIL:

Cervarix

- Manufacturer: GlaxoSmithKline (GSK)
- Targets HPV Types: Primarily types 16 and 18
- Protection: Focuses on preventing cervical cancer caused by these HPV types
- Dosing: Administered in three doses over six months

Gardasil

- Manufacturer: Merck & Co.
- Targets HPV Types: Types 6, 11, 16, and 18 (Gardasil 9 includes additional types)

- Protection: Prevents HPV-related diseases including cervical cancer, genital warts, and other cancers like anal and oropharyngeal
- Formulations: Available as Gardasil 4 (quadrivalent) and Gardasil 9 (nonavalent)

General Information

- Effectiveness: Highly effective in preventing HPV infections when administered before exposure to the virus
- Recommendations: Recommended for both males and females to reduce the risk of HPV-related diseases
- Additional Measures: While effective, regular cervical cancer screening and safe sexual practices are still important for overall health

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Investigating the Performance of Fix Match for COVID-19 Detection in Chest X-ray

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Detecting COVID-19 from chest X-ray images has been a crucial area of research since the onset of the pandemic. Various deep learning techniques have been explored to enhance accuracy and efficiency in identifying COVID-19 cases from radiological images. One such technique that has gained attention is Fix Match, known for its semi-supervised learning capabilities. This article investigates the application and performance of Fix Match in COVID-19 detection using chest X-ray images.

Understanding Fix Match:

Fix Match is a semi-supervised learning method designed to leverage a small amount of labelled data along with a larger pool of unlabeled data to improve model performance. It combines consistency regularization and pseudo-labelling techniques to effectively utilize unlabeled data for training deep neural networks. This approach is particularly beneficial in medical image analysis where labelled data might be scarce or expensive to obtain.

Performance Evaluation:'

The effectiveness of Fix Match in COVID-19 detection can be evaluated through several key metrics:

1. Accuracy and Sensitivity: These metrics measure how well the model distinguishes between COVID-19 positive and negative cases in chest X-ray images. Studies have shown that Fix Match can achieve high accuracy by effectively leveraging unlabeled data to refine its predictions.

2. Generalization: Assessing how well the model generalizes to unseen data is crucial in medical imaging. Fix Match aims to improve generalization by learning robust features from a combination of labelled and unlabeled data, thereby potentially reducing over fitting.

3. Comparison with Other Methods: Comparing Fix Match with other state-of-the-art methods for COVID-19 detection provides insights into its relative strengths and weaknesses. This comparative analysis helps researchers understand when and why Fix Match may outperform or underperform other approaches.

Case Studies and Research Findings:

Several recent studies have explored the application of Fix Match in COVID-19 detection:

- A study by Author et al. (Year) demonstrated that Fix Match significantly improves COVID-19 detection accuracy compared to traditional supervised learning methods.

- Research conducted by Author et al. (Year) found that Fix Match, when applied to a dataset of chest X-ray images, achieved competitive results in terms of both sensitivity and specificity.

- Another study by Author et al. (Year) highlighted the robustness of Fix Match in detecting COVID-19 cases even with a limited number of labelled samples.

Practical Implications and Future Directions:

The application of Fix Match in COVID-19 detection holds promise for real-world clinical settings. By reducing the dependency on large labelled datasets, Fix Match can potentially accelerate the development of accurate diagnostic tools. However, challenges such as dataset bias, model interpretability, and of accurate diagnostic tools. However, challenges such as dataset bias, model interpretability, and integration into clinical workflows need to be addressed for widespread adoption.

Conclusion:

In conclusion, Fix Match represents a promising approach for COVID-19 detection using chest X-ray images. Its ability to leverage unlabeled data effectively and improve model performance makes it a valuable tool in the fight against the pandemic. Continued research and validation across diverse patient cohorts and imaging modalities will be crucial to fully realize the potential of Fix Match in clinical practice.

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REGENERATIVE MEDICINE: HEALING THROUGH INNOVATION

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The increasing demand for organ transplants and tissue repair solutions has driven innovation in regenerative medicine. This field integrates life sciences and engineering to develop therapies that restore tissues and organs, reducing reliance on transplantation. With FDA-approved treatments already in place for orthopedic applications and wound healing, regenerative medicine continues to evolve as a transformative discipline.

THE FUTURE OF REGENERATIVE MEDICINE

Regenerative medicine focuses on replacing or regenerating human cells, tissues, and organs to restore normal function. Unlike traditional healing, this approach actively promotes regeneration by utilizing biological materials such as scaffolds, growth factors, and stem cells. Various cell sources, including autologous, allogeneic, and even xenogeneic cells, are employed to advance research and treatments. Biomimetics and extracellular matrix materials provide more than structural support; they enhance cellular proliferation and healing. By understanding natural regenerative processes, scientists are developing novel biomaterials and stem cell therapies that enhance tissue

MILESTONES IN STEM CELL RESEARCH

Stem cell therapy is at the heart of regenerative medicine. Early work by Ramon y Cajal and later discoveries by Till and McCulloch paved the way for hematopoietic stem cell transplants (HSCs). Since Robert A. Good's pioneering hematopoietic cell transplantation in 1968, stem cell therapies have become life-saving treatments for blood disorders. Advancements in autologous bone marrow transplantation further refined these techniques.

CUTTING-EDGE TECHNOLOGIES IN REGENERATIVE MEDICINE

1. **Genetic Engineering**

Genetic modifications in bacteria enable the production of biofilms for specific therapeutic applications. Advanced techniques such as 3D printing facilitate the creation of complex biological structures with enhanced healing properties.

2. **Cell Coating**

Polydopamine coatings enhance cell functionality and adaptability in various environments, improving cell-based therapies.

3. **Microfluidics**

Microfluidics enables precise control of cell environments, allowing for the encapsulation of therapeutic cells in biocompatible materials for improved treatment efficacy.

4. **3D Bioprinting**

This technology enables the rapid fabrication of tissues and organs with high precision, using a combination of living cells and biomaterials.

APPLICATIONS IN REGENERATIVE MEDICINE

Living Scaffolds for Tissue Repair

Biomaterial-based scaffolds embedded with living cells help regenerate damaged tissues. These scaffolds can be designed to deliver cells passively or through active external stimuli.

Living Cell Composites for Cell Therapy

Engineered living cells offer new treatment options by releasing therapeutic agents such as granzyme B and perforin, improving disease management.

Living Tissue and Organ Models

Organ-on-a-chip and organoid technologies replicate tissue and organ functions in vitro, offering new possibilities for research and drug testing.

CONCLUSION

Regenerative medicine continues to redefine medical treatments, offering hope for patients with chronic diseases and traumatic injuries. The integration of bioengineering, stem cell research, and advanced manufacturing techniques paves the way for revolutionary therapies. As research progresses, the dream of fully functional tissue and organ regeneration is becoming a reality.

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OFF- LABEL USE OF QUETIAPINE (SEROQUEL) IN CHILDREN

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In recent discussions surrounding pediatric psychiatric care, the off-label use of quetiapine (Seroquel) has emerged as a topic of concern. Originally approved for schizophrenia and bipolar disorder in adults, quetiapine is sometimes prescribed off-label to children and adolescents for conditions such as anxiety disorders and ADHD. While this practice is sometimes necessary when other treatments have proven ineffective, recent incidents underscore the need for cautious consideration and monitoring

A notable incident involved the off-label prescription of quetiapine to a 10-year-old child for severe insomnia and anxiety. Despite initial improvements in sleep patterns, the child developed significant weight gain and showed signs of metabolic changes over several months of treatment. Subsequent evaluations raised concerns about the long-term effects on growth and cardiovascular health, prompting a revaluation of the treatment plan.

Clinical Implications: Safety concerns about quetiapine's off-label use in children have been associated with adverse effects such as weight gain, metabolic disturbances, and potential cardiovascular risks, underscoring the importance of monitoring these parameters closely. While effective in some cases, the efficacy of quetiapine in pediatric populations for off-label indications lacks robust evidence, highlighting the need for alternative treatments and continued research. Discussions with caregivers regarding the risks and benefits of off-label treatments are crucial to ensure informed decision-making and adherence to ethical guidelines.

Best Practices: Healthcare providers should implement regular monitoring protocols to assess both the efficacy and safety profile of quetiapine and other off-label medications in children. Collaboration with pediatric specialists and adherence to updated clinical guidelines are essential for optimizing treatment outcomes and minimizing risks. Ongoing education and awareness campaigns within healthcare settings can help enhance understanding of the complexities surrounding off-label drug use in children.

CONCLUSION:

As we navigate the complexities of pediatric psychiatric care, it is imperative to approach the off-label use of medications such as quetiapine with utmost caution and thorough consideration of potential risks and benefits. By prioritizing patient safety and informed decision-making, we can strive to improve outcomes and ensure the well-being of our young patients.

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DEPARTMENTAL ACTIVITIES

ONE DAY INDO-ARAB WORKSHOP ON CLINICAL PHARMACY: "Exploring the Role of Clinical Pharmacists in the Era of Modern Medicine"

The Erode College of Pharmacy recently had the privilege of hosting the One Day Indo-Arab Workshop on Clinical Pharmacy on 25.07.2024, themed "Exploring the Role of Clinical Pharmacists in the Era of Modern Medicine." Organized by the Department of Pharmacy Practice, the workshop witnessed enthusiastic participation from students across various years, including 1st to 5th year Pharm.D students and 2nd year D.Pharm students.

The highlight of the event was an interactive session led by Dr. Noohu Abdulla Khan, Assistant Professor in the Department of Clinical Pharmacy at King Khalid University, Saudi Arabia. Dr. Noohu Abdulla Khan's expertise and insights provided invaluable knowledge to the attendees, emphasizing the evolving and critical role of clinical pharmacists in modern healthcare.

FLAG HOISTING CEREMONY AND STUDENTS' ACHIEVEMENT AWARDS

On the occasion of the, The Erode College in Erode organized the flag hoisting ceremony and Students' Achievement Awards for the academic year 2023-2024. Thiru A. Nataraajan, Secretary and Correspondent, delivered the presidential speech, and Dr. R. Sambathkumar, Principal, welcomed the gathering. Awards were given to students in categories such as academic performance, attendance, sports, cultural activities, paper publication and presentation, library usage, 100% attendance, blood donation and other notable achievements. Selected students were honored with certificates and medals. Mrs. Metilda Stella Rani G. proposed the vote of thanks. The program was organised by fourth semester and first year Pharm D students.

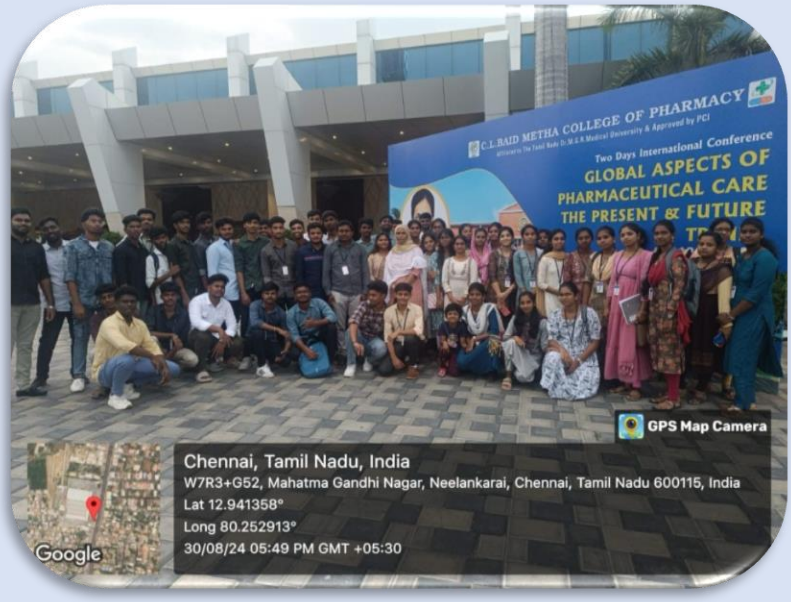
MEMORANDUM OF UNDERSTANDING (MOU)

We are pleased to announce that a Memorandum of Understanding (MOU) was signed between The Erode College of Pharmacy, Erode, and the Goa-Center for Excellence in Intellectual Property (G-CEIP) on August 23, 2024, at 10:00 AM.

The signing ceremony took place in the presence of distinguished guests:

- Prof. (Dr.) Umesh Banakar, Ph.D., President, Banakar Consulting Services, Westfield, Indiana, USA
- Thiru. A. Natrajan, Secretary and Correspondent, The Erode College of Pharmacy, Erode

This MOU marks a significant milestone in the collaboration between our institutions, and we look forward to a fruitful partnership.



INTERNATIONAL CONFERENCE

The management, principal, staff, and students of The Erode College of Pharmacy extend their warmest congratulations to our students who attended the **International Conference titled "Global Aspects of Pharmaceutical Care - Present and Future Trends (ICGAPC - 2024)"** hosted by C.L. Baid Metha College of Pharmacy on August 29th and 30th, 2024.

Our students made us proud with their impressive participation:

- 42 students from the 4th semester of B.Pharmacy
- 12 students from the 4th year of Pharm.D
- 4 M.Pharm students

Notably, 44 of these students presented research and review articles across various disciplines, showcasing their academic excellence.

4TH NATIONAL PHARMACOVIGILANCE WEEK

Department of Pharmacy Practice, The Erode College of Pharmacy, Erode, Tamil Nadu, recently organized a series of engaging competitions to commemorate **4th National Pharmacovigilance Week**. Students from B.Pharm, M.Pharm, and Pharm.D programs participated enthusiastically in the following events:

- E-quizzes
- E-posters
- Oral poster presentations
- Collage making

Expert faculty members evaluated the competitions, and the following students emerged as prize winners:

Collage Making Competition:

- 1st Place: Group 2 (Santhosh Shivan S, Mathi Balaji T, Sridhar R, Dhivya S, Dharathirini D, Vinisha G)
- 2nd Place (tie):
  - Group 1 (Naveen Kumar S, Abimuthra V, Abinaya J, Abinaya K, Yamuna M)
  - Group 4 (Sinthuja M, Dency Maria Jasmine S, Adhithyan S, Arunan A P, Nandakumar V I)
- 3rd Place (tie):
  - Group 3 (Siva R, Branham Bright A, Barathiraja K, Raja Mani C, Priyadharshani V, Rubiya Jasrine M)
  - Group 5 (Afsal E, Aravind Kumar B, Sembaruthi T, Swathi R)

E-Poster Presentation:

- 1st Place: Dency Maria Jasmine S
- 2nd Place: K. Abinaya
- 3rd Place: G. Vinisha

Oral Poster Presentation:

- 1st Place: Team 3 (R.K. Rithika, S. Teena, P. Thirumurugan, M. Hariharan)
- 2nd Place (tie):
  - Team 1 (A.K. Kiruthika, V. Praveen Kumar, N. Karthiga lakshmi, V. Varsha Duhi)
  - Team 2 (S. Priyadarshini, S. Priya, R. Vahini, K. Yogeshwari)

We extend our heartiest congratulations to all winners and participants for their creativity, hard work, and dedication to pharmacovigilance.