

# Dedication

*I dedicate this thesis*

*To my parents...*

*Sami*

# Acknowledgement

*My heartfelt thanks are due to all those who helped with their opinions, suggestions or encouragement. Special thank is due to Dr. Mubarak Dirar Abd- Allah . Thanks also extend to University of Science and Technology, College of Science □ Department of Physics, SAEC, and the support from Leiden University.*

*. My humble thanks to everyone who helped me during this work. And thanks before and after to God.*

# Abstract

There is an increase in high-voltage towers numbers and reinforcement stations in Sudan and the world at large. For the purpose of protection; numbers of high-voltage towers in Khartoum were surveyed on the basis of the global protection standards. The measurements were made for 10 towers and near fan keys. The measurements were taken at different distances from the selected towers and fan. The study concluded that no biological hazard exists around all tested towers. This is since the magnetic flux density values are beyond the permissible level. The magnetic field strength generated by these towers decreases with distance in accordance with the theoretical relation of the same. The effect of static magnetic field on blood lymphocyte cells transformation was studied in this work. Blood samples from 3 healthy people were collected, the blood samples are 90. Some of them are considered as control. The rest were exposed to magnet field of different values 0.1, 0.2, 0.3 0.4 and 0.5 teals for different exposure times which are 30, 60, 90, 120, 180 and 180 minutes, respectively. The blood cells were stimulated with photo heamgg luteinizes. Then they inoculated for 72 hours. The magnetic field increases lymphatic transformation percentage to about double value compared to control samples. The exposure time increase, increases lymphatic transformation percentage also compared to control samples.

**Keywords:** High-voltage, Towers, Biological, Magnetic, Blood

## ملخص البحث

هنالك تزايدا في أعداد ابراج الضغط العالي ومحطات الضغط العالي في السودان والعالم بشكل عام. بغرض الحماية، تم إجراء عمليات مسح وحسب مطابقة مقاييس الحماية العالمية للابراج الموجودة في الخرطوم. تمت القياسات على عشرة أبراج ومفاتيح بالقرب من المروحة وأخذت القياسات من أبعاد ومسافات مختلفة من ابراج و مراوح مختارة. وأثبتت نتائج الدراسة على أنه لا توجد أي مخاطر صحية حول كل الأبراج مجال الدراسة، طالما كان ابراج في الإطار المسموح.

شدة المجال المغناطيسي المولدة من تلك الأبراج تقل ببعدها المسافة بالاتساق مع العلاقة النظرية. أيضا تمت دراسة تأثير المجال المغناطيسي الثابت في تحول خلايا الدم الليمفاوية المحفزه في هذا البحث أخذت تسعون عينة من ثلاث أشخاص أصحاء لائقين طبييا، و تركت بعض العينات كعينات قياسية للدراسة. وتم تعريض باقي العينات لمجال مغناطيسي ثابت تتراوح كثافته ما بين 0.1، 0.2، 0.3، 0.4، 0.5 تسلا . بأزمنة تعرض 30- 60 -90- 120- 150 - 180 دقيقة بالترتيب.

وحفزت خلايا الدم ضوئيا. وأدخلت في مجال مغناطيسي ثابت لمدة 72 ساعة فنتج عنه زيادة نسبة التحول لليمفاوي بنسبة الضعف مقارنة مع العينات المرجعية. كما أن زيادة زمن التعريض يزيد أيضا نسبة .

**الكلمات الدالة:** الضغط العالي، ابراج، المجال المغناطيسي، الليمفاوية، خلايا الدم .

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