THE INFLUENCE OF HOMOEOPATHIC SIMILLIMUM ON RAISED BLOOD LEAD AND URINE PORPHYRIN CONCENTRATIONS IN LEAD CHEMICAL COMPANY EMPLOYEES.

A dissertation submitted in partial compliance with the requirements for the Master's Diploma in Technology in the Department of Homoeopathy at Technikon Natal.

by

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Submitted in February 1994.

I, Karen Alexander, declare that this dissertation represents my own work, both in conception and execution : .....

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TO MY PARENTS

FOR EVERYTHING YOU HAVE DONE FOR ME

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ABSTRACT

This study contains a review of the major recognizable industrial problem of chronic lead toxicity. Lead poisoning has been recognized for thousands of years, dating back to the Roman Empire. Today, industries in South Africa and worldwide struggle to maintain low blood lead levels in their employees and companies have to abide by regulations to ensure they are doing all that is in their power.

Cookson Chemicals (Pty) Limited, in Durban, which has a factory which produces lead based chemicals, was approached with regard to treating the workers exposed to the lead dust and fumes with Homoeopathic Similiimum. This individualistic Homoeopathic treatment depends on the person's symptoms and signs on a physical, mental and emotional level, and by treating the person as a whole, the excretion of toxic lead occurs. Thus lower lead levels result. According to Homoeopathic methodology, it is the sum of all the symptoms and signs in each individual case of a disease that is the main pointer in the choice of the remedy. This is where despite many complaining of a similiar condition, or suffering from a common complaint, different Homoeopathic remedies may be prescribed.

Lower blood lead levels result in fewer retrenchments as once a factory employee continually presents with excessively high blood lead levels, he risks losing his job.

A sample group of twenty volunteers was obtained from this factory and each worker took his prescribed medication and had blood and urine tests taken at regular intervals over five months. The precise methodology and the consequent results are explained in this paper.

The results were analysed using the computer program, SGPLUS, to obtain summary statistics. The blood lead results were subjected to The Wilcoxon

Signed Rank Test to determine the increases and decreases in the levels over the monitoring period. Due to sample size and the presence of only one group in the research , the remaining results were from visual observation. Based on the problems encountered during this study, recommendations are made if further research is to be done along similiar guidelines. A final conclusion closes the study. The urine porphyrin tests are not a true indicator of lead metabolism or excretion and these results are therefore not valid. A slight change did occur in the blood lead levels as is discussed. A great deal of progress remains to be made with the aim of lowering blood lead levels in lead-exposed factory workers.

Homoeopathy has the potential to alleviate this serious problem of chronic lead toxicity. Further research could provide industry with the answer.

Presently the emphasis is on prevention of excessively high blood lead levels with only removal from exposure as the last possible means of alleviating the problem. If a method of solving lead toxicity in the industrial sphere can be found, it has numerous possibilities in non-industry. Thus an opening exists for Homoeopathy.

UITTREKSEL

Hierdie studie bevat 'n oorsig van die belangrikste herkenbaar industriele probleem van chroniese lood giftigheid. Lood vergiftiging is vanaf die Romeinse Ryk herken en vandag sukkel industrie wêreldwyd om lae bloed lood vlakke in hulle werknemers te handhaaf. Om dit te verseker moet maatskappye alles in hul vermoë doen om sekere regulasies na te kom.

Cookson Chemicals (Pty) Limited, in Durban, is 'n fabriek wat lood gebaseerde chemikalie vervaardig en was genader in verband met Homeopatiese Simillimum behandeling van die werknemers wat blootgestel is aan lood stof en dampe.

Hierdie individualistiese Homeopatiese behandeling hang af van die persoon se simptome en tekens van 'n liggaamlike, verstandelike en emosionele vlak. Deur die persoon as geheel te behandel verseker uitskeiding van giftige lood en dus 'n laer lood vlak.

Volgens Homeopatiese metodologie is dit die som van al die simptome en tekens in elke individuele geval van 'n kwaal wat die beslissende faktor is in die keuse van 'n geneesmiddel. Hier is waar, ten spyte van baie wat kla oor gelyke simptome of aan 'n gewone klag ly, verskillende Homeopatiese geneesmiddels voorgeskryf mag word.

'n Groep van twintig vrywilligers was van hierdie fabriek bekom en elke werker het sy voorgeskrewe medikasie geneem en sy bloed en urlene gereeld oor 'n tydperk van vyf maande laat toets.

Hierdie studie verduidelik die presiese metodologie en die konsekwent uitslag van hierdie toetse.

Om 'n statistiese opsomming te verkry is die resultate ontleed met gebruik van 'n rekenaar program SGPLUS. Om die vermeerdering en vermindering in die vlakke vas te stel oor die tydperk van die behandeling is die bloed lood resultate blootgestel aan The Wilcoxon Signed Rank Test. As gevolg van die

grote van die proef groep en die aânwesigheid van net een groep in die studie is die oorblywende resultate aan visuele waarneming gebaseer. As gevolg van die probleme wat ontdek is gedurende die studie is aanbevelings gemaak om verdere navorsing te doen. 'n Finale afloop beindig die studie. Die urlene toetse is nie 'n egte verwysing van lood metabolisme of uitskeiding en dus is hierdie resultate nie geldig nie. 'n Klein verandering het plaasgevind in die bloed lood vlakke soos bespreek. Groot vordering moet gemaak word om bloed lood vlakke in lood blootgestelde fabriek werkers te verminder. Homeopatie het die potensieel om die probleem van chroniese lood vergiftiging te verlig en verdere navorsing kan die industrie met 'n antwoord voorsien.

Op die oomblik is die klem op voorkoming van ultermatige hoë bloed lood vlakke deur verwydering aan blootstelling as die laaste poging om die probleem te verlig.

As 'n metode vir industriele lood vergiftiging gevind kan word het dit sterk moontlikhede vir ander omgewings, dus is daar 'n geleentheid vir Homeopatie.

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µg/dl : microgram per deciliter

SGPLUS : Statgraphics Plus Version 6

CHAPTER ONE

1. THE PROBLEM AND ITS SETTING.

1.1 Introduction

Occupational lead exposure has been recognized as a major problem to South African industry. Workers with lead toxicity develop, to name but a few; anaemia leading to weakness and tiredness, difficulty in breathing, neuralgic pains in the limbs, drowsiness and weakness of memory. This slow decline in general health of the workers leads to an unstable workforce, unable to provide maximum labour output.

A method of obtaining and maintaining healthy employees (physically, mentally and emotionally) would ensure great benefits. Improved relations within the company, due to healthy employees, would be followed by greater company efficiency and greater gross profit.

The treatment of the employees with Homoeopathic Simillimum could stimulate general well being and, if lead levels can be reduced, the company will save a great deal. This is not only the improved work output yielding higher profits, but a lessening of expenditures with regard to blood and urine tests for the employees. Despite the savings in financial costs, the psychological costs involved must not be dismissed. Each employee is an integral part of a workforce whose improved state of mental health will reflect on physical performance and their families can feel secure that their breadwinner is healthier and happier.

Occupational lead intoxication need not be an accepted problem. It may possibly be solved in a practical cost effective manner. After

the workers have personally benefitted, the improved functioning of the company will automatically follow.

1.2 The problem statement.

This study proposes to determine the influence of Homoeopathic Simillimum on blood lead and urine porphyrin concentrations of employees in a lead chemical company, in terms of their previous employment records and the employee's response to treatment, in order to establish the role of Homoeopathic Simillimum controlling raised lead levels.

1.3 The hypothesis.

It is hypothesized that the Homoeopathic Simillimum treatment will influence the blood lead and urine porphyrin levels, by reducing the blood lead levels and, concurrently, initially increasing the urine porphyrin levels, until normality of the levels occur after a period of three months.

1.4 Delimitations.

1. This study will be limited to employees at Cookson Chemicals (Pty) Limited, Durban.
2. As the emphasis of this study is on the response to Homoeopathic treatment, this study will not attempt to evaluate the effectiveness of any protective clothing worn by any employee.
3. This study will be limited to those employees of Cookson Chemicals (Pty) Limited, Durban with a blood lead level equal to, or greater than 18μg/100ml.

1.5 Assumptions

1. For the purpose of this study, it is assumed that all information given by the employees during the case-history and follow-up consultations, will be honest and as precise as possible.
2. It is assumed that each employee will receive and take the medication as specified.
3. It is assumed that the blood and urine test results are valid and reliable.
4. It is assumed that the employee's previous records are valid and reliable.
5. It is assumed that the results obtained from the employees at Cookson Chemicals (Pty) Limited, can be extrapolated to employees with raised blood lead levels at any company.

1.6 Definitions of the terms.

1. Simillimum is the Homoeopathic remedy, chosen from the entire range of Homoeopathic remedies, whose pathogenetic action matches the symptom-picture of the patient.
2. For the purpose of this study, a raised blood lead level, according to Cookson Chemicals (Pty) Limited, is a blood lead level equal to or greater than 18μg/100ml.
3. For the purpose of this study, the urine porphyrin level, measured according to the Corproporphyrin Test, is a level on a scale of 1 to 8 where 0-1 is normal.
4. Porphyrin is defined as any one of a group of derivatives of pyrrol, especially an iron-free decomposition product of hematin.
5. Hematin is defined as a pigment containing iron, formed in the decomposition of hemoglobin.
6. Hemoglobin is defined as a substance in the red corpuscles of blood, made up of iron and protein.

7. Potency is defined as the strength of the remedy according to the number of times it has been diluted and succussed.

8. Case history is the interview in which information is gathered from the patient, leading to the prescription of the correct homoeopathic remedy.

9. Repertorizing is defined as the looking up of symptoms in a repertory to find which remedy is common to the presenting symptoms.

10. Repertory is defined as an index of symptoms with a list of remedies indicated for each particular symptom.

1.7 Conclusion

This chapter explained the purpose and aim of this research, while clarifying assumptions, definitions and delimitations.

CHAPTER TWO

2. REVIEW OF THE RELATED LITERATURE.

2.1 Introduction.

Occupational lead poisoning is a recognized problem. Industries now have compulsory evaluations of their employees for raised lead levels if the employees are exposed to lead. Despite medical research on this matter,

" Much progress still remains to be made in the struggle against lead poisoning ". (Landrigan, 1989, p.595).

A solution to the raised lead levels in exposed workers must therefore be sought.

This chapter is a focus on occupational induced raised lead levels and other investigations performed, including other people's point of view on the topic.

2.2 History of lead poisoning.

Lead poisoning has been recognized for thousands of years and even in the Roman Empire, miners protected themselves against inhaling lead dust by wearing animal bladders tied across their faces. Lead poisoning was also common in the Roman Empire due to lead water pipes. Gelfillan attributes the fall of Rome to lead poisoning.

Paracelsus, an alchemist, was the first to recommend lead as a medicine and believed that all substances are poisons and that the right dose differentiates a poison and a remedy.(Fisher, 1989).

Today the level of atmospheric lead is alarming due to the motor fuel additives tetraethyl lead and tetramethyl lead. If Homoeopathy can aid in reducing raised lead levels in factory workers, one could

extrapolate the results to include any person affected by lead, thus Homoeopathy would be in a position to help millions of people.

In Britain, at the beginning of this century, the first Medical Inspector of Factories, Sir Thomas Legge, endeavoured to control occupational lead poisoning. Due to his influence it became a reportable disease in Britain in 1899, and the number of reported cases dropped from 1058 with 38 deaths in 1900, to 505 cases in 1910, and 59 in 1973. (Landrigan, 1989).

World over, lead poisoning remains a serious problem and for this reason an alternative means to alleviating the effect of lead poisoning on factory workers is necessary.

2.3 Aetiology of lead poisoning.

Most industrial lead poisoning is due to the inhaling of lead dust and fumes in the workplace. In other instances the handling or processing of lead may lead to absorbtion or ingestion. Lead poisoning in children is mainly associated with the children nibbling lead-painted windowsills, frames and toys. (The Merck Manual, 1987). For this reason The American Standards Association specified in 1955 that paints for toys, furniture and the interior of dwellings should not contain more than 1% of lead in the final dried solids of fresh paint.

The main absorption routes of lead are the gastrointestinal tract and the respiratory system. For every 40 μg of lead inhaled, 15 μg is retained by the lung and absorbed.(Turner, 1967, p.56).

Despite aetiology, if Homoeopathy can alleviate or cure the raised lead levels, a major battle will have been won. It must be stressed that this research has the delimitation that it will not attempt to evaluate the effectiveness of any protective clothing worn by any employee. This study deals with determining the effectiveness of Homoeopathy on the present raised levels.

2.4 Biochemistry and pathophysiology of lead toxicity.

The human body has great difficulty in excreting lead, therefore lead accumulates in the human body. Following absorption, inorganic lead becomes distributed in soft tissues, especially those of the kidney and liver, with small quantities accumulating in the grey matter of the brain. Later, the lead is redistributed and deposited in bone, teeth and hair. Approximately 90% -95% of inorganic lead kept by the body becomes stored in bone, the concentrations being higher in the long bones.

Tetraethyl lead is converted to tri-ethyl lead in the liver which then releases its toxicity on the central nervous system. Lead has affinity for adenosine. In cellular respiration, a molecule of adenosine monophosphate reacts to one molecule of adenosine triphosphate to form two molecules of adenosine diphosphate. In this process a high energy phosphate bond is released. Adenosine also forms part of RNA. Due to lead attaching to RNA, lead interferes with RNA and in this process interferes with protein synthesis. Lead also has a strong affinity for sulphhydryl groups, thus making enzymes concerned with porphyrin metabolism to be vulnerable. This phenomenon causes the "lead-line" at the dental margin where the lead forms a precipitant with the sulphur-containing compounds produced by the bacteria near the teeth. (Fisher,1981).

The porphyrin pathway is used in haemoglobin production, thus explaining the weakness and tiredness due to the aneamia of those affected. The factory, that this study will be conducted through, measures urine porphyrin levels as an indication of lead levels.

Lead causes degradation of erythrocytes and thus porphyrin is released from the cells. As blood lead levels decrease, decreased destruction of erythrocytes results in decreased porphyrin levels. However, with an initial increase in blood lead levels during mobilization and excretion of the lead from the body, the porphyrin levels will initially increase. This is what this study intends to show , as well as the return to normal of both blood lead levels and urine porphyrin levels as both become stabilized after treatment.

2.5 Clinical presentation of lead poisoning.

Symptoms of chronic lead poisoning develop insidiously and include general fatigue and lassitude, aches and pains in muscles and joints, colicky abdominal pains, change of bowel habits such as constipation or diarrhoea, metallic taste, headache, lack of appetite, hypertension, peripheral limb weakness, wrist drop, and personality changes. According to the severity of the lead levels a person, may be asymptomatic, may complain of general weakness and aches, or may display the full clinical presentation. In severe cases, renal damage, paralysis or convulsions are present. The fact that even in the same condition different people present differently makes this study fit well with Homoeopathy where individual treatment is a rule.

A problem with lead toxicity is that it can be present in apparently healthy workers that are exposed to lead inhalation below the safety limit set by factories. (Landrigan, 1990).

By administering Homoeopathic Simillimum one does not need the classical lead poisoning symptoms to present themselves. The Homoeopath prescribes according to the symptom picture the patient presents with, on an emotional, mental and physical level. Here, the patient can be alleviated from his personal sufferings despite his ability to, or inability to present with the clinical presentation defining lead poisoning.

2.6 Special Investigations.

The diagnosis of lead poisoning requires measuring blood lead levels. Other tests include the "free" erythrocyte protoporphyrin (FEP) test. This is a measurement of the toxic effects of lead on haemoglobin. Measurement of lead excretion in the urine is useful.(The Merck Manual, 1987).

Consequently this study will use blood lead levels and urine porphyrin levels as a measurement of Simillimum effectiveness and at the same time fit in with the factory by using the same tests as used in the company policy monitoring of employees.

2.7 Medical management of lead poisoning.

The medical profession faces a serious problem with lead poisoning. This is due to the fact that lead causes toxicity in workers at exposure levels that were previously "safety" levels. Medically the prevention of lead poisoning is emphasized, with the use of supportive measures. At mines and factories pre-employment medical examinations, discussions on dangers , and methods to control risks using safety measures are routine. Education is the principal rule. Employees are instructed on the use of respirators and other protective wear.

In the United Kingdom the ' Control of-lead at work ' (revised June 1985, Health and Safety Commission) advises continual medical surveillence and testing for all workers exposed to lead on a significant level. (Van Heerden and Mets, 1990).
Landrigan recommends that the blood lead level requiring removal of a worker from his lead-contaminated workplace be greatly reduced to 20μg/dL. He suggests a blood lead level of 10μg/dL before the worker can return to his workplace. (Landrigan, 1990).

This shows how medically the emphasis is on prevention, and that there is a lack of research on how to reduce the lead toxicity in those workers where prevention did not help. The preventative actions needed would require new regulations and laws - a slow process considering an immediate problem.

By providing greater safety for the workers, the number of affected workers would reduce. It is those that however still have raised lead levels and perhaps present with symptoms that is the emphasis of this study.

Treatment involves removal from the exposure of lead and Chelation therapy is given in symptomatic patients. Edetate calcium sodium (up to 40 mg/kg twice daily i.v. in 0.9% NaCl infusion), and dimercaprol (2.5-3 mg/kg every four hours for two days and then reduce the dose.) are used parentally, and d - penicillamine is given orally. Abdominal colic may be relieved by administration of calcium salts by mouth or intravenous injection. (Edwards and Bouchier, 1991).
In the case of acute encephalopathy, mainly if the blood lead level is greater than 100 μg/dl, the convulsions are treated with the

intravenous injection of diazepam and barbiturates. (The Merck Manual, 1987).

This medical treatment is not totally effective and the above-mentioned drugs do cause side-effects which are known to cause complications. Medical research has not yet presented with a profound solution to occupational lead poisoning. It is therefore imperative that Homoeopathy, through research, finds its place in the treatment of lead poisoning.

2.8 Homoeopathy and lead poisoning.

Although prevention is most important, this study deals with the treatment of lead poisoning.

Homoepathic medicine was formulated by Samuel Hahnemann using "similia similibus curentur " - let like be cured with like. This implies that an undiluted substance in a healthy individual causes certain complaints, these complaints can be cured by the diluted " potentised " substance. This includes potentizing drugs, e.g. penicillin, as will be discussed later. This potentization is the method by which homoeopathic medicine is manufactured. It is a combination of dilution and vigorous shaking/ succussion. As an example, one part of a mother tincture (plant material macerated and dissolved in alcohol) is mixed with nine parts (D1 potency) or ninety-nine parts (C1 potency) of 70% alcohol and vigorously shaken. This process is repeated (1 in 10 or 1 in 100) according to the potency required. (Kleijen, Knipschild and ter Riet, 1992).

The Homoeopath takes a case-history of the patient, which is the conventional case-history with extra questions added to obtain more individual symptoms. Then follows a physical examination and the findings are reported. The case-history is then repertorized- as is required in this study where the simillimum will be found. This involves selecting the homoeopathic medicine whose symptom

picture matches that of the patient. The remedy and its potency best suited to the patient's physical, mental and emotional needs will be selected (treating the patient as a whole).

Different people present differently even if suffering from the same complaint. Similillmum also encompasses the potency of the remedy, therefore a patient with a predominance of mental or emotional symptoms will require a high potency, physical symptoms require a lower potency. By treating the general complaints and aiding in general well-being, the lead excretion is stimulated and the body is encouraged to restore balance.

In an experiment by Fisher, twenty-four adult rats were experimentally poisoned with lead acetate. The rats were randomly divided into four groups. Group A was treated with Homoeopathic Plumbum metallicum (potentized lead, thus substantiating " like cures like "); Group B was given Penicillamine (as used in medicine but greatly diluted); Group C was given 10% ethanol; Group D was given distilled water.

The urinary lead excretion was monitored for fourteen days. The result was that the Group C and D showed negligible lead excretion, but Group A and B showed highly significant excretion of lead, especially Group A.

This experiment proved the action of homoeopathic medicine on lead poisoning. It also demonstrated the effectiveness of changing a poison into a remedy by maintaining the diluted dose of penicillamine. As mentioned, medical chelating agents, e.g. penicillamine are used in lead poisoning but its side effects are dangerous. (anaemia, renal damage, rheumatoid like reactions , also depleting the body of elements, especially copper and zinc.) With the dilution of homoeopathic medicine there are no side effects. Homoeopathic medicine can therefore find a place in treating lead poisoning.

2.9 Cookson Chemicals (Pty) Limited.

Formed in 1948 as Associated Lead Manufacturers, Cookson Chemicals took on a new identity in 1986 to acknowledge the technical expertise provided by its UK-based founding company, Cookson Group plc.

Cookson Chemicals (Pty) Limited is situated at Jacobs which is 16 kilometres from the Durban city centre. Initially supplying red and white lead and lead oxides to the paint, battery and gold mining industries, their range of products has broadened. They now supply stabilisers and lubricants for the PVC industry.

Some of their lead based chemicals are used in explosives in mines (Pb_3O_4 is used in the detonation process), and curing agents in rubber.

Cookson Chemicals in Durban buys approximately 500 tons of 'virgin lead' per month. The virgin lead is either 99.9% or 99.99% pure once the ore has been refined. Cookson Chemicals then uses electrical heating to melt the virgin lead. Here, Pb_3O_4 is formed in an exothermic reaction which yields the characteristic bright red colour of the oxide. The oxide formed is furnaced and sold to the battery industry to be used in the lead accumulated battery or sold to the paint industry as 'red lead'.

The oxide can also be roasted in a furnace at a much higher temperature to yield a bright yellow product, mustard lead, which reacts with stearic acid to form lead stearate. This in turn is a lubricant in the plastic industry.

It is the factory workers dealing with the virgin lead and the processes it undergoes that are the concern in this study. Through the handling of the lead and its products the workers are exposed to the lead dust and possible self-contamination for example putting fingers in their mouth after brushing their fingers through their hair.

With a genuine concern for their employees' health and safety, stringent regulations are adhered to. Dust collectors are present in the factory, factory floors are constantly washed to get rid of any dust(wet method), vacuum units are available in case of spillages, and personnel monitors ensure employees wear their protective clothing.

Cookson Chemicals (Pty) Limited, strictly abides by the lead regulations set down by the Department of Manpower. These regulations cover all aspects such as:

- exposure to airborne lead
- education and training
- duties of employees
- assessment of exposure to lead
- air monitoring
- biological monitoring and medical surveillance
- records
- control of airborne lead
- cleanliness of premises and plant
- personal protective equipment
- prohibitions
- processing of lead
- packaging, transport and storage
- disposal of lead waste
- offences and penalties

As mentioned in the regulations, an employee with a blood lead concentration greater than 80 μg/100ml must be certified unfit for work in an area which exposes him to lead. The employee is fit to return to work when the blood lead concentration is less than 70 μg/100ml. (Machinery and Occupational Safety Act, 1983(act no. 6 of 1983) , No. R. 586).

Cookson Chemicals (Pty) Limited do not employ women in their factories. This is due to the strenuous physical work required from the employees and the danger of high lead levels which may result in abortion in pregnant women due to the abdominal colic which may initiate uterine contractions.

With Cookson Chemicals doing everything in her power to combat raised lead levels amongst employees, it is time to turn to an alternative method which can alleviate, if not obliterate, the remaining problem.

2.10 Conclusion.

Occupational lead poisoning is a problem that has been recognized for thousands of years. Most industrial lead poisoning is due to inhalation of lead dust or fumes and due to limited excretion of lead by the body, it accumulates and becomes fixed in body tissues. The worker, besides raised blood lead levels, may be asymptomatic or may progress to display a wide variety of symptoms; such as fatique, aches and pains, constipation, headaches, metallic taste. Medically, the emphasis has been on prevention, with removal from exposure if necessary. The possible side-effects and complications caused by drugs does cause a dilemma and therefore an alternative treatment is necessary. Treating patients individually by prescribing Homoeopathic Simillimum endeavours to determine the effectiveness of Homoeopathy on raised lead levels. Homoeopathy has its chance to intervene into a world-wide problem - lead poisoning.

CHAPTER THREE

3. MATERIALS AND METHOD/ GENERAL PROCEDURE.

3.1 Introduction

This chapter serves to describe the full procedure carried out in order for the results of this research to be collected and analyzed. It also describes the key components used in the research such as the data and the sample.

3.2 The data : primary and secondary.

This study involved the use of both primary(1°) and secondary(2°) data.

Primary data is data obtained through a) communication: in this study the information given by the employees during the case history.

b) observation: in this study the information received by the researcher during each employee's basic physical examination.

c) experimentation: in this study the results of the blood lead tests and urine porphyrin tests.

Secondary data, (data already in existence) took the form of the employees' previous blood lead test results and urine porphyrin test results, as recorded in the Cookson Chemicals (Pty) Limited medical files.

Cookson Chemicals (Pty) Limited past records were used to obtain the five most recent results, prior to research treatment commencing, in blood lead and urine porphyrin tests for each member of the sample group. These were used as readings numbered 1-5, for both blood lead and urine porphyrin in the results of each

sample member, reading number 5 being the most recent/initial result obtainable in each of blood lead and urine porphyrin prior to treatment.

The readings numbered 6-8 are those results from the three month treatment period for blood lead levels and then urine porphyrin levels.

Readings 9 and 10 are the results from the two month post-treatment, monitoring period.

3.3 The criteria governing the admissibility of the data.

As company policy, Cookson Chemicals (Pty) Limited tests each factory employee every three months for blood lead levels and every month for urine porphyrin levels.

- the company's medical records were inspected, and only those employees that volunteered to be part of this study and whose most recent blood lead level(reading number 5) was equal to or greater than 18 µg/100ml, were admissible.
- all data obtained during each case history and physical examination was admissible.
- to make readings numbered 6-10 admissible to be included in this study, the identical method of analysis was used to determine the blood lead and urine porphyrin levels as was used in readings 1-5.
- all results of any employee unable to participate in all five months of testing, for whatever reason, were forfeited.

3.4 The sample.

3.4.1 Location :

The sample was obtained from factory employees of Cookson Chemicals (Pty) Limited, Jacobs.

3.4.2 Size :

A sample of size twenty was obtained.

3.4.3 Technique :

Convenience sampling was used. Employees with blood lead reading number 5 equal to or above 18 μg/100ml, and who volunteered to become part of this study constituted the sample group. The sample thus consisted of twenty employees.

3.5 Means of obtaining the data.

3.5.1 The case history.

The case history as set out in Appendix A, was followed as a general guideline for each employee of the sample group in order to obtain substantial information enabling a Similiimum to be found.
If warranted, additional questions were asked. If an employee complained of severe headaches, more detail was based on this compared to an employee who did not suffer from headaches.

3.5.2 The physical examination.

Each employee of the sample group, once his case history was taken, had a basic physical examination as set out in Appendix B. This again was a guideline where alterations were at the researcher's discretion.
The case history and physical examination of each employee was carried out in the company surgery during working factory time.

3.5.3 Obtaining the homoeopathic simillimum.

Each case history was repertorized using the MacRepertory computerized repertorizing programme.

After each case had been repertorized, three print-outs were done for each case so that the information was readily available. For an example see Appendix C. The Simillimum for that employee was then determined using Boericke's Materia Medica with Repertory (1990) as a reference, as well as the print-outs.

Due to the precautions and safety methods followed by the company, despite raised lead levels, no employee had the text-book picture of lead toxicity. Only three sample members' Simillimum came up as Plumbum Metallicum (lead). That is to say only three employees gave symptoms and/or displayed signs that were of those recorded in Homoeopathic Materia Medica's from people with lead toxicity/overdose.

To give each Simillimum a potency, the case history was re-analyzed. If the case history was dominated by mental or emotional problems then a high potency was prescribed.(e.g. 15CH). If acute symptoms or mainly physical symptoms dominated then a medium or lower potency was prescribed.(e.g. 9CH or 7CH). The employee as a totality was considered and the prescription was uniquely devised. In this research four sample members had the same Simillimum and matching potency. Their cases were totally different but on repertorizing, the Simillimum and its potency best suited to each employee was the same : Sulphur 9CH.

3.5.4 Dispensing the medication.

The prescriptions were handed in to a registered pharmacist qualified in homoeopathic methodology.

The medicine was prescribed in tablet form, were one tablet would be chewed daily. These tablets that were dispensed were hard lactose tablets of 0,8 cm diameter each. They were impregnated at a rate of 2% with the chosen Simillimum which was in alcohol form. Each sample member thus had 90 tablets impregnated with his Simillimum.

3.5.5 Storage of the medicine.

The medication for the twenty sample members for the three month treatment period was taken to the company surgery. The first batch of medication was given to each employee with instructions to chew one tablet every day, starting that day.

The remaining two months medication, (each employee had two glass phials of his Simillimum left with 30 tablets in each phial), was stored in a dark, cool, dry cupboard. No other medication was stored in this same cupboard.

3.5.6 The blood and urine tests.

After 30 days of treatment, each employee was called to the company surgery and handed in a urine sample and had his blood taken by the company Sister. He consequently collected his medication for month two of treatment with clear instructions to chew one tablet every day.

The blood lead test results once received by Cookson Chemicals (Pty) Limited, were read by the company Sister and Technical Director and then made available to the researcher.

The results for the first month of treatment were recorded as reading number 6.

At the end of another 30 days, the identical procedure was followed and the results for the second month of treatment were recorded as reading number 7.

The procedure was followed again to obtain the results for the third and final month of treatment which were recorded as reading number 8.

With the sample group now off Similiimum treatment, the same procedure was followed for the final two months to obtain the results which were recorded as reading number 9, followed by reading number 10.

With regard to each urine sample handed in to the company Sister, as mentioned above, the following steps were taken to obtain the urine porpyrin test result for each urine sample.

The method used to analyze the urine is called the Corproporphyrin Test. This was performed in the company surgery by the company Sister.

a) 5ml of the urine sample was pipetted into a glass test-tube.

b) 5ml commercial ether was added.

c) 2ml 1% acetic acid was added.

d) 3 drops of 10% hydrogen pyroxide was added.

The stoppered test-tube was inverted three times and left to stand for 12 hours. The test-tube was held under ultra-violet light from a Corproporphyrin colour coded U.V meter, and the colour coded value was read off. The values are from 0-8 where, 0-1: normal

2-3: acceptable

4-6: excessive

7-8: dangerous.

For each blood sample as mentioned earlier, the following steps were performed.

To obtain the blood sample, each employee was required to shower and then the Sister cleaned the required area on the arm with Savlon, followed by 1% acetic acid and then commercial ether.

A 3-5 ml blood sample by venopuncture was then taken.

The twenty blood samples each month were sent to be analyzed in Johannesburg by registered pathologists: Drs. Mauff, Zail, Skudowitz & Partners.

The Lancet Lead Test was used which is a rapid automated method that reduces the potential for contamination by reducing the number of manipulations.

The instrumentation used in this testing is the GBC System 2000 graphite furnace and the 902 atomic absorption spectrophotometer. The 283.3nm lead line was used and due to the volatility of lead a total pyrolytic graphite platform was used during the analysis. Blood samples were diluted (1 + 5) with a solution of Triton X100 (0.5 mL/L) and diammonium hydrogen phosphate (5 g/L). To reduce potential contamination from dust, atmospheric lead, reagents and containers; dilution of the sample was carried out in the sample container. The diammonium hydrogen phosphate ensures that all the lead stays as a single compound and does not split.(Sinclair and Chapple, 1988).

3.6 Treatment of the data.

The results, once collected, were analysed using the computer program , SGPLUS
(Statgraphics Plus Version 6, supplied by Manugistics, Inc.).
Here, the blood lead results were subjected to The Wilcoxon Signed Rank test(Nonparametric). This test was selected because of its less restrictive assumptions. However, due to the sample size(n) being only 20 and consisting of only one group, The Wilcoxon Signed Rank test could only be utilized to determine the number of increases and decreases in blood lead levels over the months, and nothing more.
The computer program was also used to measure standard deviations, means, and other summary statistics for the blood lead results.

All remaining results were obtained from visual observation and the following were compiled:
a) Tables of actual findings for blood lead results and urine porphyrin results.
b) Tables showing the number of changes(increases and/or decreases) in blood lead and urine porphyrin levels.
c) Tables of summary statistics(including the means and standard deviations for blood lead results)
d) Graphical representation of blood lead level results.

3.7 Conclusion

The above mentioned steps were followed in the execution of this study in order to produce the results as set out in the following chapter.

CHAPTER FOUR

4. RESULTS.

4.1 TABLE ONE

Sample no.	R one	R two	R three	R four	R five	R six	R seven	R eight	R nine	R ten	Years employed
1	38	47	43	46	36	38	49	53	51	48	16
2	42	50	55	50	40	58	67	48	45	46	14
3	58	60	46	63	52	56	56	56	56	53	6
4	34	42	53	42	35	37	43	40	39	38	12
5	18	65	64	25	45	58	85	60	55	60	2
6	58	50	51	47	53	47	53	43	45	32	8
7	53	59	59	57	51	50	47	47	41	49	5
8	63	61	68	53	57	45	70	45	42	43	10
9	24	30	33	41	37	27	32	31	32	32	12
10	79	64	67	67	69	66	75	58	57	76	5
11	9	12	20	24	22	23	29	25	21	18	3
12	53	77	65	63	64	75	74	67	71	55	17
13	31	30	38	31	31	36	40	39	30	32	8
14	36	42	38	53	36	45	49	38	45	45	30
15	20	18	19	18	18	16	21	22	16	14	4
16	51	58	62	61	55	57	50	56	64	55	12
17	50	58	65	57	49	59	58	53	66	54	8
18	55	57	71	66	47	60	55	53	41	43	5
19	64	62	69	54	52	52	54	50	52	58	10
20	53	53	57	59	59	54	54	53	53	56	12

R = Reading/Result

TABLE OF BLOOD LEAD LEVEL RESULTS IN ug/dl

4.2 TABLE TWO

Sample no.	R one	R two	R three	R four	R five	R six	R seven	R eight	R nine	R ten	Years employed
1	0	0	0	0	0	0	0	0	0	0	16
2	0	0	0	0	0	0	0	0	0	0	14
3	0	0	0	0	0	0	0	0	0	0	6
4	0	0	0	0	0	0	0	0	0	0	12
5	0	0	0	0	0	0	0	0	0	0	2
6	0	0	1	0	0	0	0	0	0	0	8
7	0	0	0	0	0	0	0	0	0	0	5
8	0	0	0	0	0	0	0	0	0	0	10
9	0	0	0	2	0	0	0	0	0	0	12
10	0	0	0	0	0	0	0	3	2	2	5
11	0	0	0	0	0	0	0	0	0	0	3
12	0	0	0	0	0	3	0	0	0	0	17
13	0	0	0	0	0	0	0	0	2	0	8
14	0	0	0	0	0	0	0	0	0	0	30
15	0	0	0	0	0	0	0	0	0	0	4
16	0	0	0	0	0	0	0	0	0	0	12
17	0	0	0	0	0	0	0	0	0	0	8
18	0	0	0	0	0	0	0	0	0	0	5
19	0	0	0	0	0	0	0	0	0	0	10
20	0	0	0	0	0	0	0	0	0	0	12

R = Reading/Result

TABLE OF URINE PORPHYRIN LEVEL RESULTS

4.3 TABLE THREE

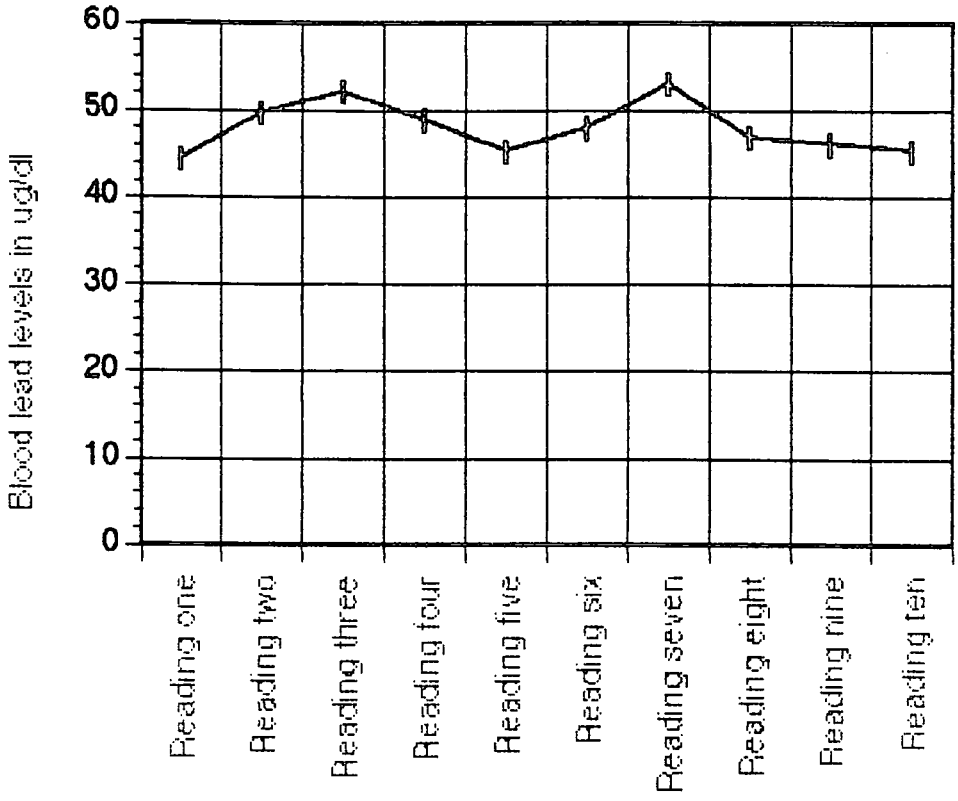
Readings	Increased (-ve difference)	Decreased (+ve difference)	Unchanged	Total
R5 - R6	12	7	1	20
R6 - R7	13	5	2	20
R7 - R8	3	15	2	20
R8 - R9	7	11	2	20
R9 - R10	9	9	2	20
R5 - R8	13	7	0	20
R5 - R10	10	9	1	20

R = the Readings/Results that are being compared

TABLE SHOWING NUMBER OF CHANGES IN BLOOD LEAD LEVELS

This table shows the number of changes over the five month period of monitoring in the blood lead levels. The number of increases and decreases for each month is shown as well as the number of levels that remained unchanged.

4.4 GRAPH ONE



GRAPH OF SAMPLE MEAN BLOOD LEAD LEVELS IN ug/dl

This graph illustrates how the mean blood lead level for the sample increased from the initial reading 5 to a peak at reading 7, then decreased at reading 8 which was the final month of treatment. The mean continued to decrease in the post-treatment period until the mean measured the same as the initial reading 5.

4.5 TABLE FOUR

Reading number	Porphyrin value 0	Porphyrin value 1	Porphyrin value 2	Porphyrin value 3
Five(before treatment)	20	0	0	0
Eight(after treatment)	19	0	0	1
Ten(after final monitoring)	19	0	1	0

TABLE SHOWING NUMBER OF CHANGES IN URINE PORPHYRIN LEVELS

This table illustrates how many porphyrin values of 0, 1, 2 and 3 resulted from reading number five, eight and ten, showing that with the majority of values being zero how insignificant these results are.

4.6 TABLE FIVE

Variable	Sample size	Mean	Median	Standard deviation	Minimum	Maximum	Range
R5	20	45.4	48	13.37	18	69	51
R6	20	48	51	14.86	16	75	59
R7	20	53.1	53	15.99	21	85	64
R8	20	46.9	49	11.66	22	67	45
R9	20	46.1	45	14.25	16	71	55
R10	20	45.4	47	14.69	14	76	62

R = Reading/Result

TABLE OF SUMMARY STATISTICS FOR BLOOD LEAD LEVELS

The summary statistics of mean, median, standard deviation, minimum, maximum and range shows an increase in blood levels initially when on treatment with a decrease towards the end of treatment.

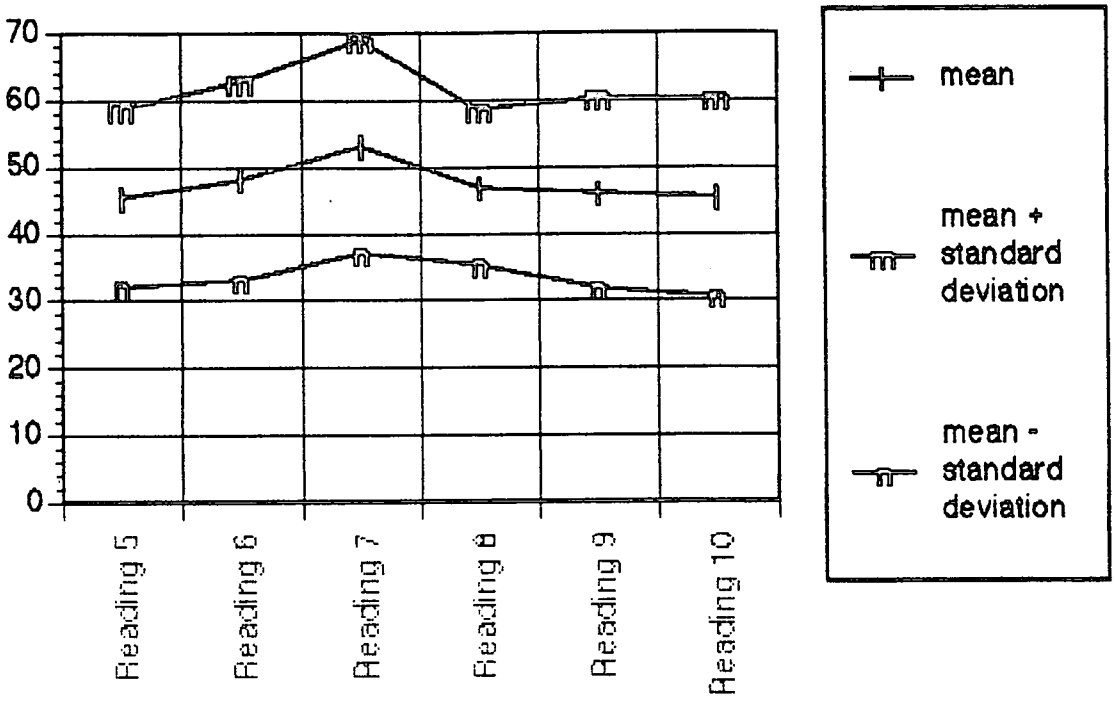
4.7 TABLE SIX

Variable	Mean	Standard deviation	Mean +/- standard deviation	Mean + standard deviation	Mean - standard deviation
Reading 5	45.4	13.37	45.4 +/- 13.37	58.77	32.03
Reading 6	48	14.86	48 +/- 14.86	62.86	33.14
Reading 7	53.1	15.99	53.1 +/- 15.99	69.09	37.11
Reading 8	46.9	11.66	46.9 +/- 11.66	58.56	35.24
Reading 9	46.1	14.25	46.1 +/- 14.25	60.35	31.85
Reading 10	45.4	14.69	45.4 +/- 14.69	60.09	30.71

TABLE OF MEAN +/- STANDARD DEVIATION FOR BLOOD LEAD LEVELS

This table expresses numerically the dispersion of the remainder of the sample to the mean with regard to blood lead levels.

4.8 GRAPH TWO



GRAPH OF THE MEAN +/- STANDARD DEVIATION FOR BLOOD LEAD RESULTS, SHOWING THE DISPERSION OF THE SAMPLE TO THE MEAN

This graph displays the mean blood lead level for the sample for each reading, from reading 5 to reading 10. With each mean is the reading's mean plus standard deviation and the reading's mean minus standard deviation. This provides a picture of the sample mean for each reading and the dispersion of the remainder of the sample to the mean. The graph shows that the sample was always closely positioned to the mean despite minor fluctuations.

4.9 TABLE SEVEN

Reading no.	Sample mean blood lead level
1	44.45
2	49.8
3	52
4	48.9
5	45.4
6	48
7	53.1
8	46.9
9	46.1
10	45.4

TABLE OF SAMPLE MEAN BLOOD LEAD LEVELS IN ug/dl

CHAPTER FIVE

5. DISCUSSION

5.1 Introduction

This chapter serves to discuss the results displayed in the previous chapter and compare them to other investigations dealing with raised lead levels. Substantiation of the results will be attempted

5.2 The blood lead level results

In reference to Table Six, the mean blood lead level for the sample just prior to treatment was 45.4 µg/dl and after the five month monitoring period the mean level was maintained at 45.4 µg/dl.

In reference to Table Seven, in the entire year prior to the research the general trend in the mean blood lead level of the sample was an increase. The mean started at 44.45 µg/dl (Feb. 1992) and increased to 49.8 µg/dl (May 1992), to 52 µg/dl (Aug. 1992), to 48.9 µg/dl(Nov. 1992), to 45.4 µg/dl(Feb. 1993). The previous year's results could have been higher but monitoring commenced after the majority of the men had been on leave over the festive season and thus were removed from their usual exposure.

An entire year passed with the trend being on the increase, and the sample mean blood lead level at the end of treatment (R8 = 46.9 µg/dl) was lower than the test results one year previous (Aug.1992 = 52 µg/dl).

The sample mean blood lead level at the end of the five month monitoring period was, equal to the level before treatment (45.4 µg/dl), and lower than the corresponding test for the previous year.

In reference to Graph one, it illustrates how the mean blood lead level for the sample from R5 through to R7 increased, with a peak at R7, and then declined at R8. Unfortunately the treatment ceased but

the mean did continue to decline through to R10. According to Homoeopathic Methodology the stimulus of the medicine does still present itself in the body despite cessation of tablet administration, which could explain the continued decline in levels despite no treatment being administered during the follow-up period.

90-95 % of inorganic lead is stored in bone, thus being difficult to excrete. (Fisher, 1981.)
Administration of the Homoeopathic Similiimum saw the mean blood lead levels increase in comparison to R5. It is assumed this is due to the medicine initiating mobilization of the stored lead in the bone and once it entered the blood stream it resulted in the raised readings for R6 and R7. In the final month of treatment there is a decrease in the mean blood lead level as elimination has commenced. This research failed to establish the lead excretion following mobilization because it was noted too late that the urine porphyrin tests were not a good indicator for lead excretion.
It would have taken further tests to provide proof but this research assumes the initial increase in the mean blood lead level was due to mobilization of the lead from the bone into the blood in order for it to be excreted, and that the decrease in the mean blood lead level at R8 was due to the excretion of the lead occurring. This continued in the two month post treatment monitoring period.

The standard deviation is a measurement of dispersion and utilizes all the data values. It illustrates how the values deviate from the mean or shows how congregated about the mean the sample test results are.
Table Five illustrates that the standard deviation for R5 was 13.37 and at R6 it was 14.86, then at R7 it was 15.99. As the mean blood

lead level was increasing, the values of the twenty sample members' test results were deviating further from the mean - becoming more widespread - and then when the mean blood lead level decreased at R8 the standard deviation decreased to 11.66.

However, despite the mean blood lead level continuing to decline as seen at R9 and R10, the standard deviation increased. This was influenced by the range for R9 being 55 which itself was affected by the maximum reading for the month being as high as 71 μg/dl.

By looking at the range in Table Five, one can see it is not an excellent statistical method of evaluation because it can be affected by one single value. The range starts off low, as does the mean for R5 and then the range increases with the first two readings and consequently decreases at the final treatment result of R8. However when the mean which utilizes all data values decreases further at R9 and R10, the range which only utilizes two values (minimum and maximum) continues to increase. This only implies that in comparison to R8, R9 and R10 have a higher maximum and a lower minimum blood lead level.

This does affect the standard deviation because this expresses how the data values of the sample are closely congregated or widely spread about the mean.

The standard deviation increases for the first two months then declines and then increases again to become more widely spread about the mean.

This can be visually portrayed by noting Graph Two.

Here the mean is plotted for each of R5 to R10 and with each mean is the mean plus standard deviation and the mean minus standard deviation. This clearly shows that the sample's blood lead levels did have minor changes in the standard deviation but generally the sample was always closely positioned about the mean. The mean, mean plus standard deviation, and mean minus standard deviation all

follow the same pattern. Both the mean plus standard deviation and the mean minus standard deviation follow the mean.

Table Three illustrates how many individual blood lead levels increased or decreased throughout the months.
This was the only reason to perform the Wilcoxon Signed Rank Test. Due to sample size and the existence of only one group, all other results except the standard deviation could have been compiled visually from Table One and Table Two.
Comparing R5 with R8 shows only 7 out of the 20 sample member's blood lead levels decrease, and comparing R5 with R10 shows 9 levels decreased and 1 remained unchanged thus causing the mean for R5 and R10 to remain identical.
Comparing R7 and R8 sees the decrease of 15 blood lead levels once the assumed excretion had commenced in the final month of treatment. From R7 to R8 the greatest change in blood lead levels occurred.

The results of the mean blood lead levels do show that the Homoeopathic Simillimum made a significant change to the levels, this change being the influence of Homoeopathic Simillimum on raised lead levels.

5.3 Urine porphyrin test results

Inspection of Table Two reveals that the urine porphyrin test is not a good indicator of lead excretion. Through continued reviewing of literature it was substantiated that the measurement of actual blood lead is the most meaningful way of monitoring workers exposed to lead, but that the toxic effect of lead did not appear to be associated with its action on the porphyrin metabolic pathway (Irwig, 1978).

As porphyrin is a byproduct of lead metabolism, it is not as good an indicator as the product lead itself. Further research would benefit by doing urine lead tests to measure the body's excretion of lead.
Table Two reveals two porphyrin values were produced by sample members the entire year prior to research treatment. One worker excreted porphyrin at a level of 1, the other at a level of 2.
During the three month treatment, two workers had a reading of 3 and in the post treatment monitoring period, three workers had a reading of 2 for their urine tests.
During treatment and post treatment, more of the lead byproduct porphyrin was excreted. In the five months of research the values added up to twelve, whereas the entire year previous the porphyrin test result values only added up to three. The treatment time therefore did see more porphyrin being excreted but the reliability and validity of these urine porphyrin results is questionable.

Table Four shows that just prior to treatment (R5) all porphyrin values were 0; that at the end of treatment (R8), nineteen were 0 and one value was 3; and that at the end of the five month monitoring period, nineteen were 0 and one had a value of 2.
Again the significance for such few results is questionable.

5.4 Comparison against literature

Cookson Chemicals continues to try new methods to deal with their factory workers' raised lead levels. With the length of exposure by some workers (20-30 years employment), despite removal from immediate exposure when their levels reach a certain value, it is no wonder their levels fail to decrease drastically when so much deposition and storage has occurred for so long.
The factory has never seen a diagnosed case of lead poisoning, which includes the classic blue lead line on the gum. This is due to the

excellent precautions taken by the company, as described in the literature review.

Cookson Chemicals removes workers from the exposure to lead if their blood lead level is above 80 μg/dl. The worker must remain out of exposed areas for two weeks. Laboratory work is encouraged until their level goes down to below 70 μg/dl again.

If one refers to Table One, the individual blood lead levels rose from 18 μg/dl to 85 μg/dl and despite these high levels no worker complained of anything serious with regard to lead toxicity. Fatigue, lack of concentration and insomnia were the main complaints. No clear symptoms of lead toxicity were noted with levels of 80μg/dl or above, contrary to literature.

However, " I recommend further that the trigger blood lead level for removal of a worker from a lead-contaminated workplace be set no higher than 20 μg/dl and that a worker not be allowed to return to a lead-contaminated workplace until his or her blood lead level has fallen to 10 μg/dl ". (Landrigan, 1990, p. 907-908).

These levels being enforced are sure to prevent lead toxicity but would also result in factory shutdown. To allow the worker to return only when his level is down to 10 μg/dl would require Cooksons to come to a halt as no-one in the sample had a level this low despite following all the precautions and legislations.

Landrigan's proposed levels are idealistic but certainly not realistic.

In a study by Van Heerden and Mets in a lead mine, the cut-off level for removal from work was set at 60 μg/dl. (Van Heerden and Mets, 1991, p. 388).

This level is more realistic but would still result in many apparently healthy workers at Cookson Chemicals being removed from exposure, with no complaints except fatigue which could be as

a result from the physical labor required in doing their work or other social and emotional reasons.

The ' trigger ' blood lead level for removal of workers from exposure is a topic that is debatable worldwide.

In Fisher's experiment in 1981 on rats, as described in the literature review, the four different groups were poisoned with lead acetate and their urinary lead excretion was monitored for 14 days. The group on Homoeopathic medication showed a significant excretion of lead.

However, if only seven days of exposure took fourteen days to show a significant excretion, in proportion it would take years to excrete stored lead in workers where exposure has been for up to thirty years. This shows how the urine porphyrin results are neither valid nor reliable in this research.

5.5 Lifestyle trends in the sample group

It was noted that the workers in the sample who were presenting with the highest blood lead levels all resided in hostels and were heavy alcohol consumers. The nutrition in hostels is usually deficient and these workers live many to a single room. This encourages passive smoking in those that do not actively smoke.

The insufficient nutrition combined with drinking and smoking all presented themselves in those workers whose levels were the highest and who needed constant removal from exposure.
If a company could provide each factory employee with on-site private accommodation with decent nutrition, further research could be undertaken to see if this improves the situation.

It is recommended that the company administers to their factory workers, that are exposed to lead, a calcium supplement on a regular basis. This will possibly decrease the deposition of lead in the body tissues because lead and calcium compete for a carrier, and factors that affect the distribution of calcium similarly affect that of lead. A high phosphate intake favors skeletal storage of lead and a low phosphate intake mobilizes lead in bone and elevates its content in soft tissues. A high intake of calcium in the absence of elevated phosphate intake thus enables lead mobilization and prevents further deposition. (Bronner, 1987, p. 1347).

5.6 Conclusion

The administration of Homoeopathic Simillimum did cause a change in the sample mean blood lead levels. An initial increase occurred due to the suspected mobilization of stored lead but a drop did occur at the final month of treatment. However, due to the complaint of the raised lead levels being a chronic one, the hypothesis that the three month treatment period would bring the blood lead levels to normal was not fulfilled. According to Cooksons a raised blood lead level is one above 18 μg/dl but to bring the constantly exposed workers to, or below, this level would require a much longer treatment time.

The urine porphyrin test results in this research were not significant and only showed a slight excretion in some workers during or after treatment. The hypothesis was not fulfilled.

All the changes that did occur in the blood lead levels were the influence of the Homoeopathic Simillimum. The influence by the Homoeopathic Simillimum on the urine porphyrin levels is negligible.

In addition to the changes that did occur, it was noted that while on Simillimum treatment, the majority of the sample admitted to feeling better, " on the whole ". Workers admitted that a variety of personal complaints were relieved by the medication, those mainly being backache, headache, insomnia, the common cold and fatigue. Many said, " I feel better on the whole " - one of the greatest accomplishments when treating individually with Homoeopathic Simillimum.

CHAPTER SIX

6. RECOMMENDATIONS AND CONCLUSION

6.1 Introduction

Recommendations for further research on factory workers with raised lead levels will be discussed in this chapter, as well as the final conclusion on the findings of this study.

6.2 Recommendations for further research

Due to the fact that some of the factory workers in this study have been exposed to a lead contaminated environment for up to twenty to thirty years and thus have a large quantity of stored lead in their bodies, it will require a much longer treatment time to mobilize most of the lead and encourage excretion.

According to Homoeopathic Methodology, it takes one-eighth the time of the duration one has had a condition for Homoeopathy to alleviate it. A suggestion is not to treat for only three months but to continue treatment for up to two years to stimulate the body to mobilize and excrete the lead from the bones. This longer time would allow a pattern in the blood lead levels to be seen during treatment.

Instead of measuring the lead byproduct porphyrin to test for the excretion of lead, it is recommended to do actual urine lead tests to discover if lead is being excreted from the body, and if so, in what quantity. This is more beneficial measuring the actual product than measuring a byproduct which appears, in this study, to have no association with lead toxicity.

To confirm the lead excretion the best method would be to perform a bone biopsy in every sample member, prior to treatment and again

after treatment. This would give a measurement of stored lead before treatment and after treatment. One could then determine how much, if at all, has been mobilized into the bloodstream due to the medication.

This recommendation is however highly impractical and workers will be unwilling to co-operate.

Due to this sample consisting of volunteers from a relatively small Company branch, it's size was only twenty.

Further research would have greater significance to the results and the trends would be better seen if a larger sample were to be utilized (one hundred or more as a sample group).

6.3 Conclusion

Future research on treating raised lead levels in factory workers with Homoeopathic Simillimum will have greater impact if the aforementioned recommendations are followed.

Despite the hypothesis for this research not being totally fulfilled, the treatment did cause a change in the blood lead levels. The sample mean blood lead level was maintained and did not increase to above the mean level for the sample for the previous year despite one full years further exposure.

The urine porphyrin test results were not significant and the hypothesis was not fulfilled.

Cookson Chemicals (Pty) Limited, Durban, has agreed to keep some factory workers of concern on long term Homoeopathic treatment because they recognize the potential of Homoeopathy in treating raised blood lead levels.

THE END

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APPENDICES

Appendix A : Case-history format.

This is the standard case-history. It shows the aspects that were investigated first, before individual symptoms/problems, if present, were questioned.

Name:

Date of birth:

Allergies/Smoker:

Family history:

Past medical history:

Past surgical history:

Present medication:

Mind:

Memory

Anxiety

Fatigue

Quality of sleep

Head:

Headaches

Dizziness

Face:

Eye pain

Ear pain

Nasal discharge

Taste in mouth, status of gums

Copious saliva

Throat:

Sore throat

Phlegm

Difficulty in swallowing

Respiration:

Cough

Expectoration

Shortness of breath

Cardiovascular:

Palpitations

Chest pains

Gastrointestinal:

Abdominal pains/colic

Nausea

Vomiting

Appetite

Bowel movements(constipation and/or diarrhoea)

Frequency of urination and any associated pain

Musculoskeletal:

Pains or weakness in joints

Cramps

Modalities: Aggravations or ameliorations of all symptoms

Mood of patient:

Fears:

Any further complaints:

Appendix B : Physical examination format.

1) Vital signs:

Blood pressure

Pulse

Temperature

Respiration rate

2) General inspection:

Inspection of the skin

Neck stiffness, range of motion

Palpation of lymph nodes

Heart auscultation

Lung auscultation

Palpation of liver, spleen

Abdominal palpation

Examination of eyes, ears, mouth and throat.

Reflexes: patella and brachioradialis

3) Specific inspection:

If deemed necessary, the relevant area was inspected in detail.

1. Generalities; HYPERTENSION
2. Generalities; WEARINESS
3. Generalities; COLD; amel.
4. Head Pain; LOCALIZATION; Occiput
5. Vertigo; HEADACHE; during
6. Mouth; TASTE; metallic
7. Mouth; ULCERS; painful; stinging stitches
8. Mouth; ULCERS; white
9. Stomach; AVERSION to; milk; yogurt, sour milk
10. Abdomen; DISTENSION; flatus, passing; amel.
11. Sleep; WAKING; midnight; after; 1.30 a.m. - 2.30 a.m.
12. Sleep; WAKING; anxiety, as from
13. Perspiration; SLEEP; during
14. Rectum; CONSTIPATION; difficult stool
15. Extremities; SENSITIVE; Upper limbs, to cold
16. Mind; ABSENT-MINDED; afternoon
17. Mind; ABSENT-MINDED; conversing, when

1. Generalities; HYPERTENSION: acon., adon., *adren.*, agar., aml-n., anh., ant-a., aran., aran-ix., arg-n., arn., ars., asar., aster., *aur.*, aur-br., aur-i., aur-m., aur-m-n., *bar-c.*, bar-m., cal-ren., calc., calc-f., calc-p., caust., chin-s., chloram., chlorpr., coff., con., convo-s., cortico., cortiso., crat., cupr., cupr-ac., cupr-ar., cyna., cyt-l., dig., ergot., esp-g., fl-ac., glon., *grat.*, ign., iod., iris, kali-c., kali-m., kali-p., kali-sal., kres., lach., lat-m., lyc., lycps., mag-c., man., methys., naja, nit-ac., nux-v., onop., ph-ac., phos., pic-ac., pituin., *plb.*, plb-i., psor., pulm-a., puls., rad-br., reser., *rauw.*, rhus-t., sang., scop., *sec.*, sep., sil., squil., *stront-c.*, *stront-i.*, stroph., sulph., *sumb.*, tab., thal., thlaspi, thuj., valer., vanad., **Verat.**, verat-v., visc.
2. Generalities; WEARINESS: acon., adlu., aesc., agar., **Alum.**, *alum-p.*, *am-c.*, ambr., *anac.*, ang., *anh.*, *ant-c.*, *ant-t.*, aphis., aran., aran-ix., arg-m., *arg-n.*, arist-cl., *arn.*, *ars.*, *ars-i.*, asaf., asar., aur., aur-a., aur-m., aur-s., *bapt.*, bar-c., bar-m., bell., bell-p., **Benz-ac.**, berb., beryl., bism., bor., bov., brucin., *bry.*, cadm-met., calad., *calc.*, calc-f., **Calc-p.**, *calc-sil.*, camph., **Cann-s.**, canth., caps., *carb-ac.*, carb-an., *carb-v.*, **Carb-s.**, carc., *caust.*, cecr., cench., cham., **Chel.**, chin., cic., cimic., cimx., cina, cist., clem., cob-n., *coc-c.*, cocc., coff., colch., coloc., *con.*, cortico., cortiso., **Croc.**, *crot-c.*, *cupr.*, cycl., dam., dicha., dig., dros., dulc., erig., esp-g., euph., euphr., **Ferr.**, ferr-ma., ferr-p., **Gels.**, gran., **Graph.**, grat., guai., guat., *ham.*, harp., hecla., hed., hell., helon., *hep.*, hist., *hyos.*, ign., iod., *ip.*, kali-bi., kali-c., kali-chl., *kali-m.*, kali-n., **Kali-p.**, kali-s., kali-sil., kalm., *kreos.*, lac-ac., **Lach.**, lact., *laur.*, **Lec.**, led., luf-op., **Lyc.**, mag-arct., mag-aust., *mag-c.*, mag-f., mag-m., man., mang., med., meny., meph., **Merc.**, mez., mosch., *mur-ac.* murx., naja, *nat-c.*, **Nat-m.**, *nat-s.*, nat-sil., nep., nit-ac., *nux-m.*, **Nux-v.**, ol-an., olnd., op., *par.*, ped., *petr.*, **Ph-ac.**, phenob., **Phos.**, phyt., **Pic-ac.**, *plat.*, plb., prun., psil., *psor.*, **Puls.**, ran-b., rauw., *rheum*, *rhod.*, *rhus-t.*, rib-ac., **Ruta**, sabad., sabin., samb., saroth., sars., sec., senec., seneg., **Sep.**, sieg., **Sil.**, spig., spong., squil., *stann.*, **Staph.**, *stram.*, stront-c., *sul-ac.*, sulfa., **Sulph.**, sumb., *tab.*, teucr., ther., thiop., thuj., **Tub.**, v-a-b., valer., *verat.*, verb., viol-o., visc., x-ray, **Zinc.**, zinc-p.

3. Generalities; COLD; amel.: *acon.*, aesc., all-c., aloe, alumn., am-m., *ambr.*, *anac.*, *ant-c.*, *ant-t.*, *apis*, *arg-n.*, arn., *asar.*, *aur.*, aur-i., bar-c., bell., bell-p., beryl., bor., *bry.*, *calad.*, calc., camph., *cann-i.*, carb-v., caust., *cham.*, chin., *cina*, coc-c., cocc., *colch.*, coloc., *croc.*, cycl., *dros.*, dulc., *euph.*, fago., ferr., fl-ac., *glon.*, guai., hist., **Iod.**, kali-i., kali-m., kali-s., *lac-c.*, *led.*, lil-t., *lyc.*, mag-m., mag-s., med., merc., moly-met., mur-ac., *nat-s.*, onos., *op.*, psor., **Puls.**, rhus-t., sabin., *sang.*, *sec.*, spig., **Sulph.**, syph., tab., thuj., trio.
4. Head Pain; LOCALIZATION; Occiput: *acon.*, *aesc.*, *aeth.*, *agar.*, ail., alf., *all-s.*, aloe, alum., alumn., *ambr.*, *am-c.*, ammc., am-m., *anac.*, ant-t., **Apis**, *arg-n.*, **Arn.**, *ars.*, *ars-i.*, arund., asaf., asar., aur., aur-m-n., aven., bapt., bar-c., bar-m., **Bell.**, *benz-ac.*, berb., bism., bor., bov., *brom.*, **Bry.**, cact., calad., *calc.*, *calc-p.*, calc-s., camph., cann-i., cann-s., canth., caps., *carb-ac.*, *carb-an.*, **Carb-s.**, **Carb-v.**, card-m., **Caust.**, cedr., cham., *chel.*, **Chin.**, *chin-a.*, chin-s., *cic.*, **Cimic.**, *cinnb.*, clem., cob., coca, **Cocc.**, coc-c., *colch.*, coloc., con., conv., *cop.*, corn., croc., *crot-c.*, *crot-h.*, crot-t., cupr-ar., cycl., daph., dig., dios., *dulc.*, *echi.*, *elaps*, euon., euph., *eup-per.*, ferr., ferr-ar., ferr-i., ferr-p., **Fl-ac.**, form., gall-ac., **Gels.**, gins., **Glon.**, gnaph., *graph.*, grat., guai., ham., *hell.*, *helon.*, hep., hydr., hydr-ac., hyos., *hyper.*, hura, *ign.*, indg., ind., *iod.*, *ip.*, *iris*, jatr., **Jug-c.**, kali-ar., *kali-bi.*, *kali-br.*, *kali-c.*, *kali-chl.*, *kali-i.*, *kali-n.*, kali-p., *kali-s.*, *kreos.*, **Lac-c.**, *lach.*, lachn., lac-ac., lact., laur., *lec.*, led., *lil-t.*, lith., lob., *lyc.*, *lycps.*, lyss., mag-c., *mag-m.*, mag-s., manc., mang., *med.*, meph., merc., merc-i-f., *merc-i-r.*, *mez.*, mill., *morph.*, *mosch.*, murx., *mur-ac.*, myric., *naja*, *nat-a.*, *nat-c.*, nat-m., *nat-p.*, *nat-s.*, nicc., nicc-s., *nit-ac.*, nux-m., **Nux-v.**, ol-j., **Onos.**, *op.*, oreo., ox-ac., osm., pall., paeon., par., **Petr.**, **Ph-ac.**, *phos.*, phys., *phyt.*, **Pic-ac.**, pip-m., plan., plat., plat-m., *plb.*, prun., psor., ptel., *puls.*, *pyrog.*, rad., ran-b., ran-s., raph., rhod., *rhus-g.*, *rhus-r.*, *rhus-t.*, rumx., sabad., *sabin.*, sang., sanic., *sars.*, sec., *seneg.*, **Sep.**, **Sil.**, *spig.*, *spong.*, squil., stann., *staph.*, stram., stront-c., *stry.*, *sulph.*, sul-ac., syph., *tab.*, tarax., *tarent.*, teucr., *thuj.*, til., torula., trom., urt-u., valer., vario., verat., *verat-v.*, verb., xan., *zinc.*, zinc-ar., zinc-m., zing.

5. Vertigo; HEADACHE; during: acet-ac., *acon.*, aeth., agar., agro., ail., alumn., anac., anthr., ant-t., **Apis**, *arg-n.*, *arn.*, *ars.*, asaf., *aur.*, *bar-c.*, **Bell.**, brom., bry., *bov.*, **Calc.**, calc-ar., *calc-p.*, calc-s., carb-s., carb-v., card-m., *caust.*, *chel.*, *chin.*, chin-s., cimic., coca, *cocc.*, *coff.*, croc., *cupr.*, **Con.**, crot-h., cycl., dulc., eug., *eup-pur.*, ferr., ferr-ar., ferr-p., fl-ac., form., *gels.*, *glon.*, grat., *hep.*, ign., kali-ar., *kali-bi.*, *kali-br.*, *kali-c.*, kali-chl., kali-n., kali-p., kali-s., *kalm.*, lac-c., *lach.*, laur., lept., lil-t., lob., lob-p., lyc., mag-c., mag-m., *merc.*, nat-c., *nat-m.*, *nat-s.*, *nux-m.*, **Nux-v.**, onos., ox-ac., *phos.*, pic-ac., *plb.*, podo., *psor.*, *puls.*, rhus-t., *sang.*, sec., sep., **Sil.**, *spig.*, stram., *stront-c.*, sulph., *tab.*, tub., urt-u., verat., *verat-v.*, xan., *zinc.*
6. Mouth; TASTE; metallic: *aesc.*, aeth., agar., *agn.*, aloe, alum., *am-c.*, *arg-n.*, *ars.*, arum-d., aspar., aur., aur-m., bism., bol., bufo, cadm-s., *calc.*, calc-s., cann-i., *canth.*, carb-ac., carb-s., card-m., cedr., cham., chel., chin-a., chr-ac., cimic., cimx., *cinnb.*, **Cocc.**, *coc-c.*, coch., *coloc.*, conv., **Cupr.**, *cupr-ar.*, *cupr-s.*, echi., ferr-i., ham., hep., hyos., indg., iodof., jatr., kali-bi., kali-chl., kali-i., kali-n., lac-ac., *lach.*, *lob.*, *lyc.*, manc., med., meph., **Merc.**, *merc-c.*, merc-i-r., merc-p-r., merc-sul., naja, *nat-a.*, **Nat-c.**, nat-h., nat-m., nat-p., *nit-ac.*, nit-m-ac., *nux-v.*, phos., *phyt.*, *plb.*, psor., puls., ran-b., **Rhus-t.**, sars., **Seneg.**, *sep.*, sil., *sulph.*, tell., *tub.*, yohim, *zinc.*
7. Mouth; ULCERS; painful; stinging stitches: *nit-ac.*
8. Mouth; ULCERS; white: cic., *sul-ac.*
9. Stomach; AVERSION to; milk; yogurt, sour milk: *nat-s.*
10. Abdomen; DISTENSION; flatus, passing; amel.: all-c., am-m., ant-t., bov., bry., calc., *carb-v.*, *kali-i.*, **Lyc.**, *mag-c.*, mag-m., mang., mur-ac., nat-c., nat-m., ol-an., *ph-ac.*, *sulph.*
11. Sleep; WAKING; midnight; after; 1.30 a.m. - 2.30 a.m.: sel.
12. Sleep; WAKING; anxiety, as from: agar., con., dig., zinc.
13. Perspiration; SLEEP; during: *acet-ac.*, aeth., agar., am-c., anac., *ant-c.*, *ant-t.*, aral., *ars.*, *ars-i.*, bar-c., **Bell.**, bol., bor., bry., bufo, calc., camph., *carb-an.*, carb-s., carb-v., *caust.*, **Cham.**, **Chel.**, **Chin.**, *chin-a.*, *chin-s.*, cic., cina, clem., **Con.**, corn-f., cycl., dig., dros., dulc., euphr., eup-per., *ferr.*, *ferr-ar.*, *ferr-p.*, hep., **Hyos.**,

ign., *iod.*, ip., *piloc.*, kali-ar., kali-c., kali-i., *kali-p.*, *lac-c.*, lachn., lyc., *merc.*, **Mez.**, mur-ac., *myos.*, nat-c., *nat-m.*, nit-ac., nux-v., *op.*, petr., *ph-ac.*, *phos.*, phyt., picro., piloc., **Plat.**, **Podo.**, psor., **Puls.**, **Rhus-t.**, *sabad.*, *salv.*, sang., sanic., **Sel.**, *sep.*, **Sil.**, stann., staph., stram., stront., *sulph.*, syc-co., *tarax.*, thal., **Thuj.**, til., **Tub.**, verat., zinc., zinc-m.

14. Rectum; CONSTIPATION; difficult stool: *aesc.*, agar., *all-c.*, aloe, **Alum.**, **Alumn.**, *am-c.*, **Am-m.**, *anac.*, ang., **Ant-c.**, *apis*, *aur.*, *aur-m.*, bapt., *bar-c.*, **Bar-m.**, *berb.*, bov., **Bry.**, *cact.*, *calc.*, calc-p., *calc-s.*, *camph.*, canth., carb-an., **Carb-s.**, *carb-v.*, **Caust.**, cham., chel., chin., cimx., *clem.*, *cocc.*, colch., coll., coloc., **Con.**, cop., crot-t., dulc., *ferr.*, ferr-i., ferr-p., gels., **Graph.**, grat., *hell.*, **Hep.**, *ign.*, *ind.*, iod., *kali-bi.*, *kali-c.*, kali-n., *kali-p.*, **Kali-s.**, kalm., kreos., **Lach.**, *lac-c.*, **Lac-d.**, lact., laur., *lyc.*, lyss., mag-c., **Mag-m.**, mag-s., mang., meli., *merc.*, merc-c., *mez.*, *mur-ac.*, naja, *nat-c.*, **Nat-m.**, nat-p., nat-s., **Nit-ac.**, **Nux-m.**, **Nux-v.**, *oena.*, ol-an., olnd., **Op.**, ph-ac., *phos.*, **Plat.**, **Plb.**, *podo.*, *psor.*, *puls.*, *rat.*, *rhod.*, **Ruta**, *sabin.*, **Sanic.**, *sars.*, **Sel.**, senec., **Sep.**, **Sil.**, *stann.*, staph., *stram.*, stront-c., sul-ac., **Sulph.**, sumb., *tarent.*, **Thuj.**, valer., *verb.*, *vib.*, **Zinc.**
15. Extremities; SENSITIVE; Upper limbs, to cold: kali-bi.
16. Mind; ABSENT-MINDED; afternoon: ang.
17. Mind; ABSENT-MINDED; conversing, when: bol., chin., chin-b., psil.

Analysis Options: Totality, All Remedies

	Sulph.	Lyc.	Puls.	Sil.	Nux-v.	Calc.	Sep.	Caust.	Con.	Merc.	Zinc.	Bry.	Lach.	Nat-m.	Phos.	Rhus-t.	Carb-s.	Carb-v.	Chel.	Chin.
Total	19	17	17	17	16	15	15	14	14	14	14	13	13	13	13	13	12	12	12	12
Rubrics	9	9	8	7	7	9	7	7	7	7	7	7	6	7	7	7	6	7	6	7
1. Generalities; HYPERTENSION	1	1	1	1	1	1	1	1	1				1		1	1				
2. Generalities; WEARINESS	3	3	3	3	3	2	3	2	2	3	3	2	3	3	3	2	3	2	3	1
3. Generalities; COLD; amel.	3	2	3			1		1		1		2				1		1		1
4. Head Pain; LOCALIZATION; Occiput	2	2	2	3	3	2	3	3	1	1	2	3	2	1	2	2	3	3	2	3
5. Vertigo; HEADACHE; during	1	1	2	3	3	3	1	2	3	2	2	1	2	2	2	1	1	1	2	2
6. Mouth; TASTE; metallic	2	2	1	1	2	2	2			3	2		2	1	1	3	1		1	
7. Mouth; ULCERS; painful; stinging...																				
8. Mouth; ULCERS; white																				
9. Stomach; AVERSION to; milk;...																				
10. Abdomen; DISTENSION; flatus,...	2	3				1						1		1				2		
11. Sleep; WAKING; midnight; after;...																				
12. Sleep; WAKING; anxiety, as from									1		1									
13. Perspiration; SLEEP; during	2	1	3	3	1	1	2	2	3	2	1	1		2	2	3	1	1	3	3
14. Rectum; CONSTIPATION; difficult...	3	2	2	3	3	2	3	3	3	2	3	3	3	3	2		3	2	1	1
15. Extremities; SENSITIVE; Upper...																				
16. Mind; ABSENT-MINDED; afternoon																				
17. Mind; ABSENT-MINDED;...																				1