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Training of pharmacy students: a practice orientated approach

O.B.W. Greeff

The training of pharmacists in South Africa has come to the cross-road.
The young pharmacist lacks job satisfaction and finds it difficult to find an application of his academic training in the day to day practice of his profession. New roles are being suggested for the Pharmacist and there is a suggestion for specialization in different areas. In most instances the Pharmacist is inadequately trained for these new additions to his professional field of activity.
A critical analysis of the curriculum of the Pharmacist shows the possible shortcomings and a new curriculum is suggested with a totally different emphasis. The Pharmacy College of Pretoria will in 1986 take the first steps towards this practice orientated approach and hopes to have it established in 1987. The initial action is the rationalization of the subject PHARMACY PRACTICE and the compilation of a syllabus that will equip the pharmacist as a community pharmacist that can play an important role in health care. Then the subject CLINICAL PHARMACY will be given a specific content and will, together with PHARMACY PRACTICE and PHARMACY MANAGEMENT, be major subjects in the final year.
There is an urgent need for all parties interested and involved in the training of the pharmacist and practice of pharmacy to reach consensus on this important matter in the near future.

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A Clinical Pharmacy (training) Programme for a group of (private) community hospitals

R.S. Summers, B. Summers and S. Rawnsley

Education for and the practice of Clinical Pharmacy in South Africa have as a general rule largely been neglected. This situation is in marked contrast to that in many countries in Europe and America where a recognised discipline has been taught and practised for up to 25 years. This paper describes one attempt to improve matters.
In November, 1983, a survey of pharmacies, pharmacists and other staff in a small group of private hospitals was performed to determine its level of Clinical Pharmacy organisation and services. Eight hospitals, through nursing and administrative staff, 15 pharmacies and 25 pharmacists responded to the questionnaire, which was presented at the group's annual congress. The results showed both positive and negative aspects and were applied to the design of a Clinical Pharmacy (training) Programme for selected pharmacists in the group. The programme consists of 6 units:

1. Organisation and Control
2. Drug Information Services
3. Medication Monitoring
4. I V Additives
5. Parenteral Nutrition
6. Therapeutic Drug Monitoring

Each unit is presented in at least a full-day session which makes extensive use of audiovisual support, small group discussion and rigorous exercises. Application of the techniques and methods taught to the situation in the various hospitals has led to a marked improvement in Clinical Pharmacy services, in medical and nursing staff and patient perceptions about pharmacists, and in job satisfaction and motivation among many of the group's pharmacists.

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Development of a residency programme in drug information

D. Gerber

The history of development in clinical pharmacy in the USA has proved that drug information is the backbone of clinical pharmacy. In view of this and experience of pharmacy development in SA it was decided to develop a training program for pharmacists in drug information. After careful considerations of hospital staffing conditions, it was decided that the course should at present be restricted to a 3 month period. The course content really demands a 12 month period and this is what is planned for the future. The course is coordinated by a pharmacist from Groote Schuur Hospital, and the Dept. of Pharmacology as well as physicians have input to the program. The aims of the program are to give the pharmacist an intensive introduction to Drug Information, to promote leadership qualities and to introduce the pharmacist to critical reading, writing and provide the pharmacist with an insight into pharmacy development. During their training they take part in all Drug Information activities of the Centre, subject to peer review, and in the Dept. of Pharmacology activities, including journal club, research meetings and ward rounds. They have the opportunity to learn, as well as to teach pharmacy students. It is hoped that this program will help develop clinical pharmacy by providing the impetus and background necessary for further development.

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Pharmacovigilance: post-marketing monitoring of adverse drug reactions

S.M. Scott

Pharmacovigilance is the term used for the overall process of monitoring of adverse drug reactions (A.D.R.'s) and adverse drug events. By monitoring these adverse reactions to drugs it is hoped to achieve the following: to identify the problem as early on as possible, to investigate the problem, to establish the incidence, to evaluate the risk/ benefit ratio and finally to inform all parties concerned of the result. The process of drug monitoring involves three distinct phases, namely: alerting, verfication and reaction. Numerous systems are currently in use for obtaining such information. The systems include: voluntary reporting systems, valid case studies and cohort studies. Once the information concerning the A.D.R. has been collected this has to be verified and a cause-effect relationship established. The appropriate reaction should then be taken. No single system can be relied on as a sole method as many factors influence the identification and reaction to A.D.R's. The requirements of an ideal system can be speculated, but no single method at present is ideal and thus a number of complementary methods are employed. Pharmacovigilance can play a very important role in the process of sharing drug information. It is a system that should be operational on a national basis with co-operation between the regulatory authorities, academics, the industry, the medical and paramedical professions and the media.

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An antimicrobial drug policy for a major teaching hospital

R.S. Summers

Antimicrobial drug prescribing at Ga-Rankuwa Hospital was previously subject to a system of informal controls based on the seniority of the prescriber. The system was not effective in controlling drug use or the development of microbial resistance. In May 1984 the hospital's Pharmaceutical Control Committee (**i e** Pharmacy and Therapeutics Committee) resolved to introduce an Antimicrobial Drugs Policy for this purpose.
A draft policy was formulated on the basis of clinical practice, considerations of microbial resistance and cost. The draft was circulated to Clinical Departments for examination and comment in June 1984. Suggestions were incorporated into a second draft where appropriate. This draft was circulated for review in September 1984 and then finalised and approved.
The policy provided for 4 prescribing categories with gradually increasing constraints, as well as for special exclusions and emergency arrangements. Full details are given in each case.
The policy was introduced to the hospital staff during March 1985 and was implemented on April 1 of that year. Reponse to the policy, which allows for new drugs, has been generally positive. The results of the introduction of this policy are presented and discussed.

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Aspekte van medisyneverbruik in 'n hospitaal

J.H.P. Serfontein

Moontlike faktore wat 'n invloed kan hê op medisyneverbruik en -koste deur blanke buitepasiënte by 'n provinsiale hospitaal is ondersoek. Data is verkry deur steekproefopnames te maak in 'n hospitaal wat deur ongeveer 1 000 blanke buitepasiënte maandeliks besoek word. Met die hulp van hospitaalaptekers is opnames gemaak vir Junie 1981, 1982 en 1985. Die ouderdom van die pasiënte, as 'n moontlike faktor wat invloed kan hê op medisyneverbruik en -koste, word bespreek in samehang met ander faktore soos geslag, apteekbesoek, hospitaalindeling van die pasiënt, en geneesheerkonsultasies. Waar moontlik word dit vergelyk met soortgelyke patrone in die privaatsektor. Ten slotte word die invloed wat 'n hospitaalapteker kan hê op medisynekoste bespreek. Dit is aangetoon dat inligting van medisynekostes aan geneeshere 'n daling van die kostes kan teweegbring (tot soveel as 55% by sekere siektetoestande). Geen gevolgtrekking kan gemaak word of die laer medisynekoste die behandeling nadelig beïnvloed het nie.

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POSTERS — PLAKKATE

cipients on the coating integrity of c coated theophylline granules

C.J.A. Carter

rity of acrylic coated (Eudragit RSPM) nules after compaction into tablets talc at levels of 20% m/m in each ssed in terms of cross-sectional views g scanning electron microscopy, and their respective drug release profiles. high level of starch resulted in rapid h near total drug release within 20 the inclusion of talc was found to 0% = 120 mins). Scanning electron starch-containing and control tablets s matrix, while those containing talc nsely impregnated with the latter. In arch-containing tablets, the lacquer to be intact, but may have been ne extent because of severe strain at fragmentation of the coating in the as evident, and the formation of a natrix, resulted in an intermediate 50% = 75 mins). The ability of talc to tion may have conserved the integrity und the granules, besides impeding of the dissolution medium into the

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disintegration behaviour of disintempression systems

integration previously reported lead that no simple theory satisfactorily tegrant systems. These mechanisms by a plot of compression force *vs* . Tablets of Emdex containing Avicel, OL or starch as disintegrants were ified pressures, and disintegration *vs* applied punch pressures. When ese curves are compared to the sms, it is apparent that compression e disintegration mechanism more significantly than the physio-chemical properties of disintegrants. Therefore, it can be deduced that observed differences in disintegration actions at low compression values are due to swelling and wicking as predicted by the Washburn equation, whilst at higher compaction forces wetting and relaxation of the stressed particles gives rise to an exothermic process causing expansion and breakage of bonds. The compressional characterization of each disintegrant is evaluated by determining the pressure required to produce a compact having a tensile strength of 100N. The results suggest that the compactibility of Avicel and Primojel is superior to that of AC-DI-SOL and starch. These findings may have implications for powders having a low plasticity index, and in overcoming tablets defects such as capping and lamination.

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Application of differential scanning calorimetry to the study of drug/excipient interactions

A.R. Fassihi and I. Kanfer

Differential scanning calorimetry (DSC) has been shown to be extremely valuable method for rapid evaluation of the compatibility of drug substances with excipients in preformulation studies. Thermograms of several drugs alone and in combination with various excipients were obtained. DSC scans of various mixtures of amitriptyline hydrochloride with either lactose or magnesium stearate indicated that the drug was incompatible with both these excipients. Whilst endothermic peaks for the excipients were readily observed, the relevant endothermic peak for amitriptyline was absent. However, a distinct exothermic decomposition peak beyond the melting range of amitriptyline was observed. Imcompatibilities were also observed when isoniazid was mixed with lactose. Mixture of lorazepam with a range of excipients were also evaluated and no significant interactions were observed under the given experimental conditions. A further compound, chlordiazepoxide was also investigated. However, since this compound is highly heat sensitive and undergoes an exothermic decomposition as the melting transition is about to occur, a very slow rate of heating is necessary to obtain a well-characterized endothermic peak. Because of the above problem DSC studies for possible interactions with excipients are not feasible with chlordiazepoxide.

The synthesis and hydrolysis of caboxylic acid esters of N-methylephedrine: implications for the design of N-methylephedrine type prodrugs

J.A. Myburgh and J.A. Syce

Various carboxylic acid esters of N-methylephedrine were synthesised by refluxing the acid chlorides of the respective carboxylic acids with N-methylephedrine. Thus esters having an increasing length in the carbon chain, branched carbon chains, phenyl ring substitution, hetero atom substitution and a carbon chain with a double bond were synthesised. Various physical and chemical tests were performed to validate the existence of the proposed compounds.
These esters were then subjected to hydrolysis and the rate of hydrolysis monitored by using the pH stat system. As controls, the hydrolysis rates in normal saline of both the esters and the enzyme medium were determined. The hydrolysis rates of the esters in lung tissue medium were then determined. From this the structural effect of the ester on the rate of enzyme hydrolysis was ascertained.

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Comparative study of the activity of aryl and caboxyl esterases in primate lung

H.M.J. Leng and J.A. Syce

The lung plays an important role in the metabolism of certain drugs. Esterase enzymes are known to be present in pulmonary tissue, but the activity of these esterases have not been fully characterized. Since several drugs are aryl and carboxyl esters, it is likely that the lung may play an important role in their biotransformation. We therefore investigated the lung's ability to hydrolyse specific aryl and carboxyl ester drugs.
The lyophilized lung of the vervet monkey (spp **Cercopithecus-pygerythrus)**, reconstituted in isotonic saline (0,5mg/ml) served as enzyme source. The hydrolysis of selected aryl and carboxyl ester compounds were monitored with a pH stat system at 37°C and pH 7,4. The lung esterases hydrolysed the following aryl esters Phenylacetate ($7{,}52 \times 10^{-2}$ μMole/ml/sec/mg); phenylpropionate ($13{,}5 \times 10^{-2}$ μMole/ml/sec/mg) and phenylbutyrate ($16{,}1 \times 10^{-2}$ μMole/ml/sec/mg) faster than carboxyl esters: ethyl acetate (3×10^{-5} μMole/ml/sec/mg); ethylpropionate ($2{,}6 \times 10^{-4}$ μMole/ml/sec/mg) and ethyl butyrate (5×10^{-4} μMole/ml/sec/mg). The primate lung thus has substantially more arylesterase than carboxylesterase activity (658%) and such activities are sensitive to small changes in the structure of the ester compound.

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The effect of pKa and lipid solubility on chlorphentermine binding in the rat lung

J.A. Syce and A.E. Tredoux

Chorphentermine (CP) apparently enters the cell and reaches select intracellular sites by passive diffusion of the unionized form and becomes trapped at these intracellular sites, where pH is low, as the ionized form. Thus the lung binding of CP should be sensitive to changes in the pH at the binding site and the lipid-solubility and pKa of the drug. We investigated the effect of these parameters by determining the effect of select compounds as inhibitors of CP binding to rat lung homogenate at two pH's. The binding of CP and the inhibition of this binding by 10 compounds were determined in the 9000g supernate fraction of rat lung at 37°C and pH 5,5 and 7,5 by ultrafiltration. The % CP bound remained constant at both pH 5,5 (43,67 ± 3,27%) and pH 7,5 (41,50 ± 2,61%, n=3) over the range 2,73 to 545 μM. Above 545 μM it decreased indicating specific binding. The % inhibition of CP binding by the compounds ranged from 0 to 87%. All the basic compounds produced less inhibition at pH 5,5 than pH 7,45 (Av.diff. 25,31± 7,91%). The more lipid soluble ones produced the greatest inhibition at both pH's. The results suggest that increases in both basicity and lipid solubility enhance CP binding to lung tissue and the presence of both properties is necessary for minimal binding.

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The inhibition of chlorphentermine binding by structurally related drugs in the rat lung microsomal fraction

A.E. Tredoux and J.A. Syce

Chlorphentermine (CP), an anorectic drug, is known to accumulate in the rat lung. Cellular binding has been shown to be a major component of this process. In the present study we have investigated the ability of other

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Knolle en blare van **H. rooperi** en **H. rigidula** is gedurende die herfs versamel. Die blare en knolle van beide spesies toon positiewe reaksies vir steroïede, fenoliese hidroksielgroepe, flavonoïede en aminosure, terwyl reduserende suiker ook aangetoon is in beide blare maar nie-reduserende suiker, saponiene, antosianidiene en tanniene in beide die knolle aangetoon is. Antimikrobe- en fototoksiese aktiwiteit is by geen plant materiaal gevind nie. Hippokratiese evaluering volgens die metode van Malone, dui op die teenwoordigheid van 'n verbinding(s) met parasimpatiese aktiwitiet in die blare en knolle van **H. rooperi** en die knolle van **H. rigidula**. Die blare van **H. rooperi** toon aktiwiteit by 'n minimum dosis van 316 mg/kg en die knolle van beide plante by 'n minimum dosis van 1 778,4 mg/kg liggaamsmassa.

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Primêre chemiese en biologiese evaluering van *Solanum coccineum* **(Solanaceae)**

P.J. Milne en L.M. Gerritsma

Plante met groen en ryp vrugte is gedurende Maart versamel. Die toets vir saponiene en nie-reduserende suiker was positief vir alle morfologiese dele. Aminosure is in groen sowel as ryp vrugte aangetoon. Wortel en vrugte toon 'n swak antibakteriële aktiwiteit teen *Staphylococcus aureus* en *Bacillus licheniformis*. Stingel en vrugte toon fototoksiese aktiwiteit. Met intra-peritoneale toediening van die stingels aan witrotte is gevind dat 562,4 mg/kg die minimum toksiese dosis is. Algemene simptome wat voorgekom het, is verlaagde motoriek, enoftalmos, ptose, pilomotoriese ereksie en lakrimasie. Dit lyk dus of die stingels 'n verbinding(s) bevat wat parasimpatomimetiese stimulasie by witrotte veroorsaak.

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Amienderivate van pentasikloundekaan — 'n nuwe reeks kalsiumkanaalblokkeerders

W. Liebenberg, C.J. van der Schyf en J.J. van der Walt

'n Nuwe sintetiese verbinding, NGP 1-01 is gesintetiseer en elektrofisiologies geëvalueer. Daar is gevind dat die verbinding optree as 'n kalsiumkanaalblokkeerder. Die werking van hierdie verbinding is analoog aan die reeds bestaande verbindings soos Nifedipien, Verapamil en Diltiasem. Met hierdie verbinding as model is 'n reeks nouverwante polisikliese amienverbindings gesintetiseer deur sykettingsubstitusie met die doel om die aktiwiteit van die moederverbinding te optimaliseer. Elektrofisiologiese studies is op marmotpapillêrspier uitgevoer. Verbindings met 'n aromatiese syketting is in staat om die kalsium gemedieerde aksiepotensiaal volkome te onderdruk terwyl die aktiwiteit en spesifisiteit van verbindings met die alifatiese syketting wissel na gelang van die kettinglengte.

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Conformation and bioactivity

D.W. Oliver, D.P. Venter and G.J. Squier

Stereochemical specificity as a key factor in biological action of natural compounds and synthetic drugs has been recognized and studied for more than a century. The differences in the biological activities exhibited by optical isomers are well established. The role of conformational specificity in the biological activity of drugs has however, been neglected and received only recently attention. A detailed knowledge of the different conformations of a flexible molecule and the controlling of the conformational possibilities would not only elucidate the conformational requirements for biological acitivity but also give information about the geometry of the interaction site of the drug molecule.
Conformational analysis of compounds e.g. catecholamines and the biological studies performed on conformationally restricted rigid, semi-rigid and flexible analogues thus far indicate that conformational isomerism plays a role in the bioactivity of drugs.

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Stress relaxation ability of various powder materials in tabletting

A.R. Fassihi and N.T. Naidoo

The tensile strength, shear strength, elastic modulus and hardness of compacts of powders are of major concern in tablet manufacture. Stress distribution in microregions of a porous compact during uniaxial compression are complex, and usually localized plastic deformation occurs during elastic recovery. Upon uniaxial decompression, the resultant imbalance of stresses (the shear stress) exceeds the strength of local regions in the compact, and either plastic deformation or fracture occurs. Therefore it is important to determine the magnitude of these forces which indicates the ability or inability of powders to relieve stress by plastic deformation. To evaluate this behaviour, single compacts were prepared by compressing each material under constant strain in an instrumented single-punch tabletting machine, and measuring the decrease in applied force with respect to time. Unlike previous investigations, flat bevel-edged punches and an intermediate compression force were chosen to comply with normal manufacturing conditions. The following results were concluded; a) Sulphathiazole, Lactose and Sta-Rx produced little plastic flow; b) Sodium Chloride and Palmitic Acid relaxed rapidly and produced hard compacts with a high degree of binding; c) Aspirin and Avicel both showed intermediate properties. These findings provide an interesting means of measuring the behaviour of materials which could be used as an index of compact formation in order to interpret or predict the variety of tabletting properties that may be incurred.

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A comparison of the blanching activities of commercial fluocinolone acetonide lotions from three different countries

E. Meyer, E.W. Smith, J.M. Haigh and I. Kanfer

The human skin blanching assay was used to determine the blanching profiles of three commercially available lotion formulations of fluocinolone acetonide purchased in South Africa, Australia and the United Kingdom. Statistically significant differences were observed between the United Kingdom preparation which showed the highest degree of blanching, and the South African and Australian preparations which were similar to each other but produced a lower degree of blanching than the United Kingdom preparation.

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The pharmacokinetics of phenylpropanolamine in humans after a single dose study

R. Dowse, J.M. Haigh and I. Kanfer

The pharmacokinetics of phenylpropanolamine have been studied in healthy human volunteers following the oral administration of an aqueous solution of the drug (50 mg/200 ml). Blood and urine samples collected throughout the trial were assayed using HPLC with UV detection. The drug was shown to be rapidly absorbed with a mean t_{max} of 1.47 ± 0.49 hours and a mean elimination half-life of 3.96 ± 0.53 hours. Phenylpropanolamine is predominantly excreted via the kidney with a mean renal clearance of 44.3 ± 7.5 l/h and 90.2 ± 1.7% excreted unchanged in the urine. The data were not well described using conventional one or two body compartment models. However, the incorporation of a discontinuous absorption phase into the models resulted in an improved overall fit with better characterisation of the absorption phase.

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Application of a programmable wavelength fluorimetric detector for HPLC: optimisation of sensitivity and selectivity

N.A. Sparrow and I. Kanfer

Fluorescence detection in high-performance liquid chromatography (HPLC) is an extremely valuable

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orption of digoxin in vivo

ermann and B. Boneschans

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to the filter being transferred to nutrient broth. Reduction of TTC to (red) formazan is brought about by the surviving organisms and this colour can be transferred to methylethylketone and read spectrophotometrically. Using *E.coli* as a model this method has been shown to compare very favourably with viable plate counts utilising a number of well-known preservatives.

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Determination of uniformity of powder flow by means of a light-emitting diode flowmeter

A.R. Fassihi, O.I.D. Campbell, I. Kanfer and P.H.R. Persicaner

During the development of a formulation for a solid dosage form a primary objective is to produce a powder system which flows freely and uniformly into either the dies of the tabletting machine or into hard gelatin capsules from a dosator nozzle system. However, non-uniform distribution of powder bulk density or porosity can influence the process of powder flow which often results in a significant weight variation within the dosage forms. A powder flowmeter has been designed to monitor both the uniformity and rate of flow and is therefore highly applicable to the study of pharmaceutical powders. Three directly compressible powders, Emdex, Emcompress and magnesium oxide as well as various three component powder mixtures were assessed for flowability, angle of repose and compressibility. The powder properties were evaluated and the data obtained were compared to those obtained using a commercially available powder flowmeter (Pharma Test). Although the angle of repose and flow rate data were similar, information on the unformity of flow was directly obtained from the designed flowmeter. This parameter is shown to be of paramount importance in predicting uniformity or weight. The interrelationships between flow rate, angle of repose, compressibility index and coefficient of tablet weight variation were established using both a single punch and a high-speed rotary tabletting machine. It is suggested that as an aid to the pharmaceutical formulator a simple predictive measure of the unformity of flow could be of value.

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Termogravimetriese analise (TGA) as 'n hulpmiddel by die identifisering van urapidil pseudopolimorfisme

S.A. Botha, J.K. Guillory, M.R. Caira en A.P. Lötter

Die verskynsel van pseudopolimorfisme by geneesmiddels word gewoonlik geïdentifiseer deur gebruik te maak van termomikroskopie. Pseudopolimorfe vorme kan verder gekarakteriseer word deur differensiële skanderingskalorimetrie (DSC) infrarooi spektrometrie (IR) en X-straaldiffraksie.
In die geval van pseudopolimorfe vorme van urapidil, is gevind dat termogravimetriese analise (TGA) die aangewese metode is vir beide die identifisering van 'n metanol solvaat en drie hidrate, en die stoichiometriese opklaring van die solvaat en hidrate. Die resultate, soos met TGA verkry, is met behulp van enkelkristal X-straalkristallografie bevestig.

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Die vergelyking van kompartement- en nie-kompartementbenaderings vir die bepaling van bio-ekwivalensie

H.A. Koeleman, H.S. Steyn, B. Boneschans en S.H. du Preez

Die tradisionele wyse waarmee die biologiese ekwivalensie van medisyne vergelyk word, is deur wiskundige kompartementmodelle op die geneesmiddelkonsentrasie in die bloed te pas, waarna die drie betrokke biobeskikbaarheidsparameters statisties vir die toetsdoseervorm met dié van 'n standaard doseervorm vergelyk word. Die metode kan egter baie tydrowend wees indien dit met metodes wat op statistiese momente gebaseer word, vergelyk word. Parameters wat van die nie-kompartementele metodes verkry word, is vergelykbaar met die parameters verkry van kompartementele metodes. Die vergelyking van die twee benaderinge

die resultate die uitspraak

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2520

bare geneesmiddels deur
eganistiese ondersoek

plosbare antikonvulsiewe
µg/ml), op een of ander
die teenwoordigheid van
geneesmiddel, die 3-hidrok-
er van N,N-dimetielglisien-
(>150 mg/ml). Die
om die meganisme van die
baal. Faktore wat 'n rol kan
rversadiging as ook self-
esmiddel met insluiting van
is vasgestel dat solubilisasie
ae konsentrasies van die
m. Verder is vasgestel dat
oord bied vir die toename
onsentrasies van die abba-
oging om vas te stel of
neesmiddels voorkom is 'n
soek sowel as 'n ligstrooiings-
esultate toon selfassosiasie
etal.
van die abbageneesmiddel
of hulle dieselfde mate van
toon. Dit is gevind dat solu-
et toename in kettinglengte.

c. Hons. (Chemie), B.Sc.
nior Lektor, Departement
. vir C.H.O.
, 2520

orne enzymes to determine
39 antigen

, G.G.S. Dutton and D.M.

ccharide (K-antigen) from
gated (DML) and found to
e repeating unit for which
ure was proposed.

$$\rightarrow 4)\text{-GA-}(1\rightarrow \overset{\beta}{2})\text{-M-}(1\rightarrow \overset{\alpha}{4})\text{-GA-}(1\rightarrow \overset{\beta}{2})\text{-M-}(1\rightarrow \overset{\alpha}{3})\text{-G-}(1\rightarrow \overset{\beta}{}$$

$$\begin{matrix} 3 & & 3 \\ & & GA = GlcAp \\ 1 & & 1 \quad G = Glcp \\ G & & G \end{matrix}$$

$$M = Manp$$

The site of the glucopyranosyl sidechain could not be unequivocally determined using standard chemical techniques due to the labile nature of the glycosidic bond. A bateriophage-borne enzyme-mediated depolymerization was thus undertaken (ANA) which afforded the complete structure. The structure is unique in being the first repeating unit within the *Klebsiella* capsular polysaccharides reported to contain two uronic acid residues.

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Primêre chemiese en biologiese evaluering van *Gladiolus dalenii* **(Iridaceae)**

S. Botha en L.M. Gerritsma

Knolle en blare van **Gladiolus dalenii** is gedurende Junie 1985 versamel. Met die Hippokratiese toetsing van Malone is gevind dat die knolle hoogs toksies is indien intraperitoneaal toegedien aan rotte. Die aantoning van bloed in die uriene dui op die teenwoordigheid van 'n hemoliserende bestandeel. Die blare lewer simptome in rotte na intra-peritoneale toediening wat ooreenkom met tulpvergiftiging. Geen antimikrobe of fototoksiese aktiwiteit is aangetoon nie. Chemiese voortoetse dui op die teenwoordigheid van saponiene, steroïede, fenoliese verbindings, suikers en aminosure in beide blare en knolle.

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Chemiese en biologiese evaluering van *Hypoxis rigidula* **en** *Hypoxis rooperi* **(Hypoxidaceae)**

L.M. Gerritsma en S. Botha

PAPERS — REFERATE

A study of (1) particulate contamination in some locally available reconstituted antibiotic parenteral solutions and (2) the particle size distribution of some reconstituted antibiotic parenteral suspensions.

D.M. Alexander and A.M. Veltman

Particulate contamination in the solutions was analysed using a HIAC PC 320 Particle Size Analyser linked to a CMB 60 Sensor; a CMB 300 sensor was used for the study of the suspensions. The particles in the solution were also examined by Scanning Electron Microscopy. These micrographs were compared with those prepared from the orginial powder.
The levels of contamination of the solutions were found to meet the specifications set by the USP XXI but two preparations contained particles larger than 50 μm. The contaminating particles, with one exception, were probably not undissolved powder.
Only a very small percentage of the particles in the suspensions were greater than 50 μm.

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Die invloed van komponente van parenterale voedingsmengsels op die stabiliteit van intraveneuse emulsies

J. du Plessis, C.J. van Wyk en C. Ackermann

Die doel van hierdie ondersoek was om die invloed van komponente van parenterale voedingsmengsels soos dekstrose, aminosure en elektroliete op die stabiliteit van intraveneuse emulsies te bepaal. Die volgende parameters is in stabiliteitstoetsings gebruik: Druppelgrootte-verspreiding, pH en viskositeit. Dekstrose veroorsaak 'n verlaging in pH en 'n toename in viskositeit en druppelgrootte. Die aminosure het eerder 'n stabiliserende as destabiliserende effek op emulsiestabiliteit. Elektroliet byvoeging het 'n verhoging in viskositeit en koagulasie in die intraveneuse emulsie tot gevolg gehad. Toevoegings tot intraveneuse emulsies moet dus versigtig oorweeg word aangesien dit onstabiliteite, wat nie met die blote oog waarneembaar is nie, in die intraveneuse emulsie veroorsaak.

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The biocidal effects of some metal ions on a selection of micro-organisms

J.J. Zeelie and T.J. McCarthy

The minimum lethal concentrations of copper (Cu^{++}), zinc (Zn^{++}), magnesium (Mg^{++}), calcium (Ca^{++}), and aluminium ($A1^{+++}$) were determined against Staphylococcus aureus, Escherichia coli, Bacillus polymyxa, Pseudomonas aeruginosa and Candida albicans. Copper and zinc were found to be biocidal against all the micro-organisms whereas aluminium was shown to be antimicrobial against Staphylococcus aureus, Escherichia coli and Pseudomonas aeruginosa. Magnesium and calcium showed no significant antimicrobial effects against any of the micro-organisms. The various ions were tested as copper sulphate, zinc sulphate, magnesium sulphate, calcium chloride and aluminium sulphate.

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Estimation of bacterial death rates using TTC

T.J. McCarthy and S.J. Hurwitz

In the estimation of death rates of bacteria the method commonly used is that of viable counts of surviving organisms on nutrient media. This entails neutralising the adverse effects of the preservative or disinfectant on the organism before growth of the injured bacterium can occur. The use of triphenyltetrazolium chloride (TTC) has been shown to improve this procedure inasmuch as the filtered bacteria are well-washed prior

without the toxic effects. **In vitro** studies using mouse and human skin with diffusion cells were done and the results indicated that digoxin penetrated skin at least to the same degree as scopolamine which is used in a transdermal dosage form.
After **in vivo** experiments on one volunteer, the concentration of digoxin which was to be applied to give therapeutic bloodlevels was determined as 65 mg. This was applied once to the ventral forearms of 8 experimental volunteers and blood drawn twice a day. The plasma digoxin concentration (PDC) was determined by radioimmunoassay. After a single application of digoxin a mean PDC peak of 3,0 ng/ml was obtained at 28 hours.
Although individual PDC's were higher, none of the volunteers complained of any side effects whereas after oral dosing, side effects are usually experienced at concentrations of 2,0 ng/ml and higher. The results indicate that digoxin, when applied in an ointment base to the ventral forearm, does penetrate human skin to give therapeutic bloodlevels of digoxin with less experience of toxic effects.

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Insolering van die steroïedmetaboliete van die wortels van Kanahia laniflora (Asclepiadaceae)

A.M.C. van Schalkwyk en L.M. Gerritsma

Die Asclepiadaceae is bekend vir die biosintese van steroïedderivate, waarby twee hoofgroepe nl. kardenoliede en esterglikosiede onderskei kan word. In opvolging van resultate wat ons verkry het met die primêre chemiese en biologiese evaluering van *Kanahia laniflora* (vgl. voordrag gehou by die 6de kongres te Pretoria, 1985) is die wortels m.b.t. die steroïedbestanddele ondersoek. Met chloroform is 'n komplekse mengsel steroïedderivate geëkstraheer wat deur gefraksioneerde presipitasie en chromatografie vereenvoudig is.

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Chemiese ondersoek van Berula erecta

W.C. Durand en J.C. Breytenbach

Chemiese voortoetse op gedroogde materiaal van *Berula erecta* toon die moontlike teenwoordigheid van kumariene, karotenoïede,terpene, fenole, deoksisuikers en flavonoïede. Geringe antimikrobiese aktiwiteit is gevind. Intraperitoneale toediening van ruplantmateriaal aan proefdiere (witrotte) veroorsaak atonie, asemnood, sianose van snoet en ledemate en die dood. Ekstraksie van plantmateriaal is uitgevoer deur masserasie met benseen, etielasetaat en metanol as oplosmiddels. Skeiding van benseenekstrak deur KC en preparatiewe HDVC lewer vyf verbindings waaronder heptakosaan asook swael. KMR gegewens dui daarop dat die ander verbindings terpene is. Die etielasetaatekstrak bestaan hoofsaaklik uit chlorofil terwyl die metanolekstrak 'n hoë persentasie kaliumchloried bevat.

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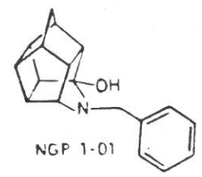
Konformasievereistes by verbindings met kalsiumantagonistiese werking

C.J. van der Schyf, W. Liebenberg en G.J. Squier

Die onlangse ontdekking van NGP 1-01, 'n polisikliese aromatiese amienverbinding, verteenwoordig 'n geheel nuwe strukturele tipe onder bekende kalsiumantagoniste en kan 'n bydrae lewer tot die opklaring van konformasievereistes in molekules met stadige kanaal blokkerende aktiwiteit. 'n Vergelykende studie van ruimtelike konformasie tussen die rigiede NGP 1-01 en dihidropiridienverbindings en die buigbare verapamilagtige verbindings toon sommige ooreenkomste aan. Die konformasie van beide die NGP 1-01 verwante verbindings en die dihidropiridiene, is star, met die N-atoom gerig binne die struktuur. Verbindings in die verapamil-reeks is hoogs buigbaar en kan analoog gestel word aan die syketting van hoër gesubstitueerde NGP 1-01-agtige verbindings.



NGP 1-01

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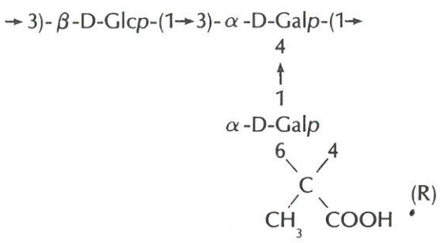
Structural investigation of the capsular antigen from Escherichia coli 09: K37 (A84a)

A.N. Anderson, H. Parolis and L.A.S. Parolis

The structure of the acidic capsular polysaccharide (K-antigen) isolated from *E.coli* K37 has been established. The polysaccharide was found to contain glucose and galactose in a molar ratio of 1:2. ^{1}H- and ^{13}C-n.m.r. spectroscopy showed the presence of one (1-carboxyethylidene) group to three anomeric protons. Analysis of the products obtained from a partial hydrolysis study and Smith degradation enabled the following structure for the antigen to be proposed:-



The trisaccharide repeating unit is unique within the **E. coli** K-antigen series established thus far in having the (1-carboxyethylidene) group as the sole acidic function.

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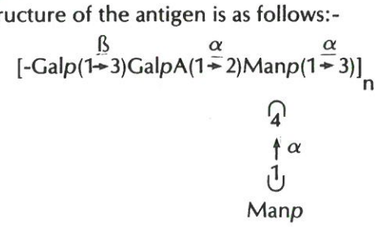
The capsular antigen of Escherichia coli K36

H. Parolis, L.A.S. Parolis and S.M.R. Stanley

The structure of the capsular antigen of *E. coli* K36 was examined by high resolution ^{1}H and ^{13}C-n.m.r. spectroscopy, mass spectrometry and gel permeation chromatography.
A large part of the structural information was derived from a study of an oligosaccharide corresponding to a single repeat unit of the capsular polymer. This oligosaccharide was obtained with a bacteriophage-borne endogalactosidase.
The structure of the antigen is as follows:-



and is identical to that of the K-antigen of *Klebsiella* K57.

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A novel and efficient route to 3,9-dihydroxyaporphines

J. Grundy, W.B. Whalley, F.C. Copp and K.W. Franzmann

The scope and mechanism of a novel, acid-catalysed cyclisation leading to 3,9-dihydroxyaporphines, was investigated. A series of 1-(3-alkoxy/phenoxy-benzyl)-5,8-dimethoxy-1,2,3,4-tetrahydroisoquinolines were subjected to treatment with constant boiling hydrobromic acid at reflux. The precipitated phenolic products were isolated and analysed by physical and spectroscopic methods. It was shown that only the 3'-alkoxybenzylisoquinolines had undergone cyclisation (with concomitant cleavage of the alkyl ether) to yield 3,9-dihydroxyaporphines; the phenoxy analogues, on the other hand, had failed to cyclise (the phenyl ether having resisted cleavage), merely producing the 5,8-didemethylated isoquinolines. These results support a proposed mechanism for the cyclisation reaction in which cleavage of the 3'-ether function forms a necessary and integral part of the cyclisation process. (This work was supported by an SRC C.A.S.E. award in conjuction with the Wellcome Research Laboratories).

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The effect on paediatric epilepsy cases of a specialist clinic with pharmacist involvement

B. Summers and R.S. Summers

At the request of the consultant, a pharmacist attended the paediatric outpatient neurology clinic held at Ga-Rankuwa Hospital, from June 1984. Specific responsibilities of the pharmacist are:

a) patient counselling
b) issuing of medication to patients at the clinic

09h30 — 09h50	The inhibition of chlorphentermine binding by structurally related drugs in the rat lung microsomal fraction — A.E. TREDOUX
09h50 — 10h10	The effect of fenfluramine and chlorphentermine on the pulmonary disposition of 5-hydroxytryptamine in the isolated perfused rat lung — P. VALODIA
10h10 — 10h50	REFRESHMENTS & POSTER SESSION : VERVERSINGS EN PLAKKAATSESSIE
	SESSION 5 : SESSIE 5 **SESSION CHAIRMAN : SESSIEVOORSITTER** **Mr. P.F.K. Eagles**
10h50 — 11h20	GUEST SPEAKER : GASSPREKER PROF. H.B. KOSTENBAUDER
11h20 — 11h40	Electron microscopy of foam cell formation after chronic administration of chlorphentermine and fenfluramine in the rat — S. HASSAN
11h40 — 12h00	Potentiation of noradrenaline induced pulmonary vascular response by serotonin in the isolated perfused rat lung — G.J. LE ROUX
12h00 — 12h20	Wound healing immune stimulation — A.L. HEYNS
12h20 — 12h40	Die effek van domperidoon op die opname van parasetamol — J.H.D. v.d. MERWE
12h40 — 13h00	Pharmacy dispensaries: a future challenge met today — N. v.d. MERWE
13h00 — 14h00	L U N C H : M I D D A G E T E
	SESSION 6 : SESSIE 6 **SESSION CHAIRMAN : SESSIEVOORSITTER** **Miss N.C. Butler**
14h00 — 14h20	Training of pharmacy students: a practice orientated approach — O.B.W. GREEFF
14h20 — 14h40	A Clinical Pharmacy (training) Programme for a group of (private) community hospitals — R.S. SUMMERS
14h40 — 15h00	Development of a residency programme in drug information — D. GERBER
15h00 — 15h20	Pharmacovigilance: post-marketing monitoring of adverse drug reactions — S.M. SCOTT
15h20 — 16h00	REFRESHMENTS & POSTER SESSION : VERVERSINGS EN PLAKKAATSESSIE
	SESSION 7 : SESSIE 7 **SESSION CHAIRMAN : SESSIEVOORSITTER** **Prof. T.J. McCarthy**
16h00 — 16h20	An antimicrobial drug policy for a major teaching hospital — R.S. SUMMERS
16h20 — 16h40	Aspekte van medisyneverbruik in 'n hospitaal — J.H.P. SERFONTEIN
16h40 — 17h00	'n Opname onder aptekers en aptekerstudente om die moeilikheidsgraad en doelmatigheid van die huidige opleiding te bepaal — A.C. DREYER
18h45	TRANSPORT TO UNIVERSITY OF THE WESTERN CAPE FROM THE HEERENGRACHT HOTEL : VERVOER NA UNIVERSITEIT WES-KAAPLAND VANAF DIE HEERENGRACHT HOTEL
19h30	D I N N E R : D I N E E (Senate Building, U.W.C. Campus)

SESSION 3 : SESSIE 3 (HEERENGRACHT HOTEL)
SESSION CHAIRMAN : SESSIEVOORSITTER
DR. N. Finkelstein

14h00 — 14h20	The use of bacteriophage-borne enzymes to determine the structure of the **Klebsiella** K39 antigen — A.N. ANDERSON
14h20 — 14h40	Chemiese en biologiese evaluering van **Hypoxis rigidula** en **Hypoxis rooperi** (Hypoxidaceae) — L.M. GERRITSMA
14h40 — 15h00	Primêre chemiese en biologiese evaluering van **Gladiolus dalenii** (Iridaceae) — S. BOTHA
15h00 — 15h20	Primêre chemiese en biologiese evaluering van **Solanum coccineum** (Solanaceae) — P.J. MILNE
15h20 — 15h40	Amienderivate van pentasikloundekaan — 'n nuwe reeks kalsium-kanaalblokkeerders — W. LIEBENBERG
15h40 — 16h00	Conformation and bioactivity — D.W. OLIVER
16h00 — 16h40	REFRESHMENTS & POSTER SESSION: VERVERSINGS EN PLAKKAATSESSIE (B.P. CINEMA COMPLEX).
17h30 — 19h00	CIVIC RECEPTION : BURGEMEESTERSONTHAAL (CAPE TOWN CIVIC CENTRE) Hosted by the Mayor of Cape Town : Aangebied deur die Burgemeester van Kaapstad
19h30 — 20h30	ANNUAL GENERAL MEETING OF THE ACADEMY OF PHARMACEUTICAL SCIENCES : ALGEMENE JAARVERGADERING VAN DIE AKADEMIE VIR FARMASEUTIESE WETENSKAPPE (HEERENGRACHT HOTEL) Opening : Opening — Mr. Don Sutherland President of the PSSA : President van die AVSA Welcome : Verwelkoming — Prof. B. Esterhuizen, Dean of the Faculty of Science, U.W.C.: Dekaan van die Fakulteit van Natuurwetenskap, U.W.K.
20h30 — 21h15	GUEST SPEAKER : GASSPREKER PROF. H.B. KOSTENBAUDER Associate Dean for Research, College of Pharmacy, University of Kentucky, Lexington, USA.
1986-05-10	**Saturday/Saterdag**
08h00 — 08h30	REGISTRATION : REGISTRASIE (B.P. CINEMA COMPLEX)

ORAL PRESENTATIONS : VOORDRAGTE
SESSION 4 : SESSIE 4
SESSION CHAIRMAN : SESSIEVOORSITTER
Dr. D. W. Oliver

08h30 — 08h50	The synthesis and hydrolysis of carboxylic acid esters of N-methylephedrine: implications for the design of N-methylephedrine type prodrugs — J.A. MYBURGH
08h50 — 09h10	Comparative study of the activity of aryl and carboxyl esterases in primate lung — H.M.J. LENG
09h10 — 09h30	The effect of pKa and lipid solubility on chlorphentermine binding in the rat lung — J..A. SYCE

c) assisting with the interpretation of drug plasma levels. Levels were measured for patients who were poorly controlled or exhibited possible toxicity

After six months of this "team" approach, its effect on patient care was evaluated. The study consisted of a retrospective survey of approximately 100 patient visits before and after the establishment of the specialist clinic. Patient medication details and frequency of fitting were entered into and analysed by a micro-computer. There was an increase in the number of patients seen per session. The results also showed that poly-pharmacy, dosing frequency and average dose per day were reduced under the new arrangement, whilst disease control, **i.e.** fitting frequency, was no worse. The overall result has been to rationalise and improve anticonvulsant drug therapy at this clinic.

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A study of the paediatric asthma clinic at Ga-Rankuwa Hospital

S. Rawnsley, R.S. Summers and I.T. Hay

A specialist clinic was etablished at Ga-Rankuwa hospital several years ago, in response to a perceived need to treat asthmatic children as a group distinct from general paediatric out-patients. The major problems likely to occur in the assessment and treatment of child asthmatics are:

1. Determination of the serverity of the condition
2. Establishment of therapeutic regimes and dosage schedules
3. Assessment of effectiveness of treatment
4. Identification of factors adversely affecting treatment, **e g** poor aerosol technique, non-compliance

From January 1985 a pharmacist has attended the clinic to assist with the resolution of the above problems. A baseline study was needed to determine patient characteristics and prescribing patterns. Records of patients attending the clinic were used to compile patient and perscription details for the period 1 June 1983 to 31 May 1984. Eighty patient records were studied, and the results analysed by a micro-computer. Data are presented to show the age and sex distribution of patients, frequency of patient visits, and prescription details. There was no significant difference between numbers of male and female patients, despite the general trend elsewhere to a majority of males. 68% of patients studied were no more than 10 years old. 78% of patients were on only one or 2 drugs. The most commonly-prescribed drugs were salbutamol and theophylline liquid. 39% of the patient visits studied recorded the date specified for the follow-up visit. 62% of these visits occurred on, or within one week of the specified date. Implications for continuity of treatment and medication compliance are considered.

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Drug prescribing for TPN patients at a teaching hospital serving a developing community

T.H. Bertram and R.S. Summers

Drug prescribing for TPN patients at Ga-Rankuwa Hospital was investigated as part of a larger retrospective survey of TPN products and practices. The medical records of 45 patients who received parenteral nutrition over the period April to August 1985 were examined. Relevant information was transcribed onto survey forms, classified and analysed.
The major defined complaints were gastrointestinal (50,0%) and perinatal (34,5%). Twelve patients had more than one major complaint. Seventy three percent of the patients were admitted to Paediatric wards and over 24% to (adult) Surgical wards.
There was one medical patient in the group. Blood chemistry was monitored as usual. The only drug categories that were prescribed in more than 10% of cases were antimicrobial agents (64,9%) and analgesics (10,4%). The most frequently-used individual drugs were gentamicin (14,3%), penicillin G (12,3%), piperacillin (10,4%) and aminophylline (5,8%). The implications of this pattern of drug use for TPN patient monitoring are discussed.

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Kliniese implikasies van ensieminduksie en ensieminhibisie

B.P.U. Taljaard

Die farmakologiese effek van 'n geneesmiddel is gedeeltelik afhanklik van die geneesmiddelkonsentrasie by die plek van werking, en dit is weer deels afhanklik van die uitskeidingsnelheid. Die uitskeiding (eliminasie) van 'n hele aantal lipofiele geneesmiddels word deur die aktiwiteit van die lewer mikrosomale oksidases,

beheer. 'n Gevolglike verandering in die aktiwiteit van hierdie ensieme mag 'n verandering in geneesmiddelwerking tot gevolg hê.
Pasiënte waarvan die epileptiese aanvalle nie gekontroleer was nie, se bloedvlakke is gemonitor en by sekere pasiënte is die polifarmasie (meer as een geneesmiddel) verminder en die bloedvlakke weer bepaal.
Duidelike geneesmiddelinteraksies het hierdeur na vore bekom. By baie pasiënte is die epilepsie nou deur slegs een middel beter gekontroleer en daar is ook minder gedragsprobleme by sekere pasiënte.
By 'n sekere pasiënt is die difenielhidantoïen onttrek en die karbamasepien dosis is konstant gehou. Die plasmavlakke van karbamasepien styg nou van 'n subterapeutiese 5,8 μg/ml na 'n terapeutiese vlak van 9,8 μg/ml.
By nog 'n pasiënt op 'n konstante dosering difenielhidantoïen styg die plasmavlakke van difenielhidantoïen van 12,2 μg/ml na 23,7 μg/ml nadat die pasiënt van fenobartitoon gespeen is.

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The effect of temperature on the structure of the skin and percutaneous absorption of urea and water in vitro

E. van der Merwe, C. Ackermann and L.R. Tiedt

From percutaneous absorption studies with water, urea and other hydrophilic compounds, an increasing permeation phenomenon was observed. The physical changes in skin during percutaneous absorption of urea and water were therefore studied under various conditions. These conditions were temperature (10°C-50°C), time (0-48 hours), concentration of urea (OM-1,67M) and the stirring of the donor- and receptor phases in the diffusion cell system. All the permeation studies were done by determining the permeation profiles of the radio-labelled urea and water through full thickness hairless mouse skin in a closed diffusion cell system. The physical changes were observed by means of the light microscope and the transmission electron microscope. Although no significant effect of concentration of urea or the stirring of the donor- and receptor phases in the diffusion cell could be found, the results indicated that there is a significant increase in the percutaneous absorption of urea and water at higher temperatures. The micrographs illustrate the deterioration of the skin as a function of time and increasing temperature. It can be concluded that the skin undergoes significant structural changes during percutaneous absorption studies using the closed diffusion cell system. These changes are in relation to the time and temperature at which the skin is kept in the system and are reflected in the increasing permeability of urea and water.

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PROGRAMME FOR THE CONGRESS PROGRAM VIR DIE KONGRES

1986-05-09	**Friday/Vrydag**
10h00 — 10h55	REGISTRATION AND REFRESHMENTS : REGISTRASIE EN VERVERSINGS (B.P. CINEMA COMPLEX)
10h55 — 11h00	OFFICIAL OPENING : AMPTELIKE OPENING Prof. R.H. Lombard — Chairman of the Academy of Pharmaceutical Sciences: Voorsitter van die Akademie vir Farmaseutiese Wetenskappe.
	ORAL PRESENTATIONS : VOORDRAGTE **SESSION 1 : SESSIE 1** **SESSION CHAIRMAN : SESSIEVOORSITTER** **Prof. J.M. Haigh**
11h00 — 11h20	A study of (1) particulate contamination in some locally available reconstituted antibiotic parenteral solutions and (2) the particle size distribution of some reconstituted antibiotic parenteral suspensions — D.M. ALEXANDER
11h20 — 11h40	Die invloed van komponente van parenterale voedingsmengsels op die stabiliteit van intraveneuse emulsies — J. DU PLESSIS
11h40 — 12h00	The biocidal effects of some metal ions on a selection of micro-organisms — J.J. ZEELIE
12h00 — 12h20	Estimation of bacterial death rates using TTC — T. J. McCARTHY
12h20 — 12h40	Determination of uniformity of powder flow by means of a light-emitting diode flowmeter — A.R. FASSIHI
12h40 — 14h00	LUNCH : MIDDAGETE
	SESSION 2 : SESSIE 2 (B.P. CINEMA COMPLEX) **SESSION CHAIRMAN : SESSIEVOORSITTER** **Prof. J.G. Van der Watt**
14h00 — 14h20	Termogravimetriese analise (TGA) as 'n hulpmiddel by die identifisering van urapidil pseudopolimorfisme — S.A. BOTHA
14h20 — 14h40	Die vergelyking van kompartement- en nie-kompartementbenaderings vir die bepaling van bio-ekwivalensie — H.A. KOELEMAN
14h40 — 15h00	Die invloed van die tipe maaltyd op die biologiese beskikbaarheid van metieltestosteroon vanuit tablette — S.H. DU PREEZ
15h00 — 15h20	Die verband tussen die gemoedstoestand en die imipramien-konsentrasie in die bloed van proefpersone — B. BONESCHANS
15h20 — 15h40	Die vergelyking van verskillende statistiese metodes vir die toetsing van bio-ekwivalensie van medisynes met 'n nou terapeutiese indeks — H.S. STEYN
15h40 — 16h00	Solubilisasie van swak oplosbare geneesmiddels deur Abbageneesmiddels — 'n meganistiese ondersoek — D.G. MÜLLER