July 1983

SA Sports Medicine
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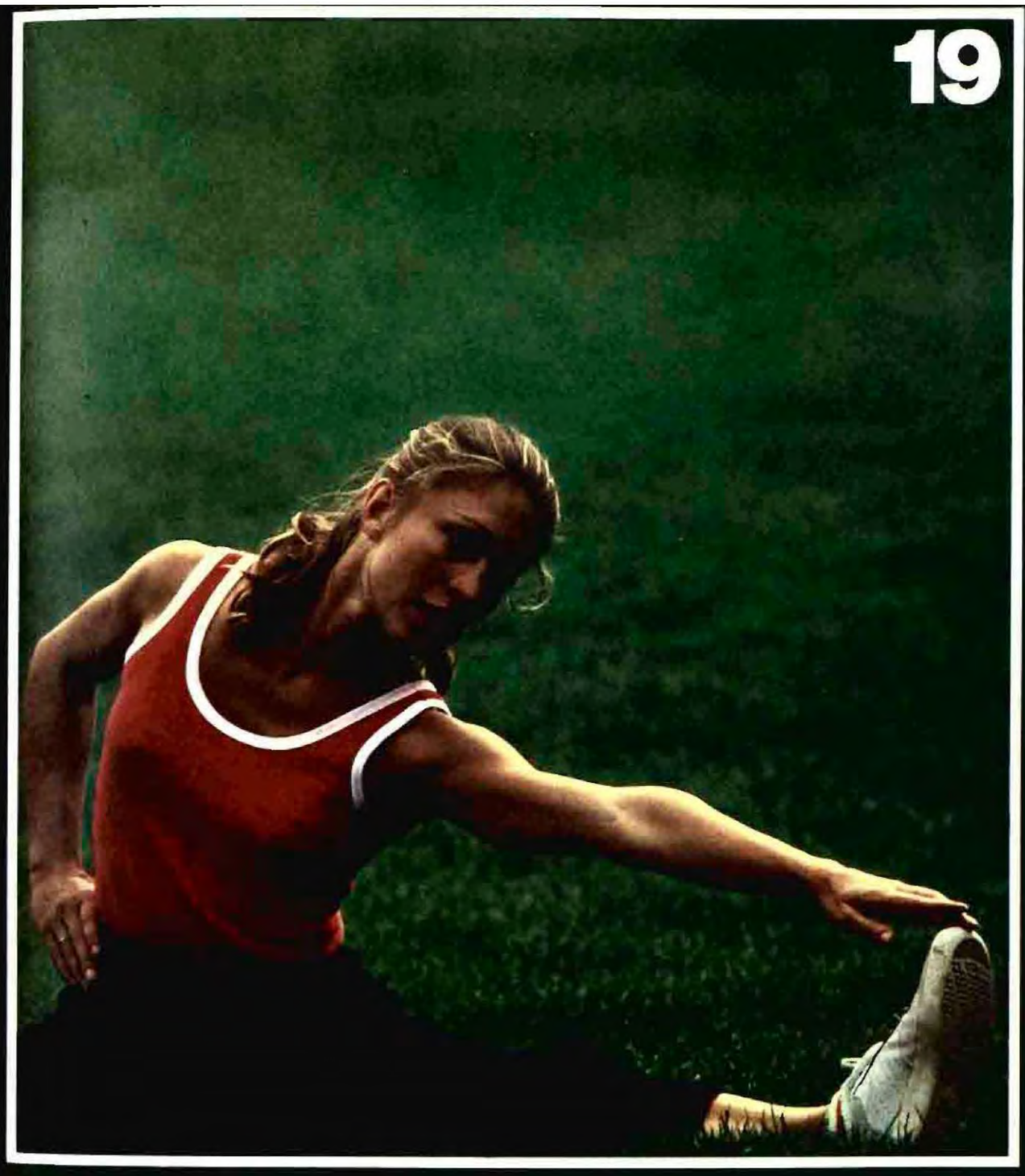

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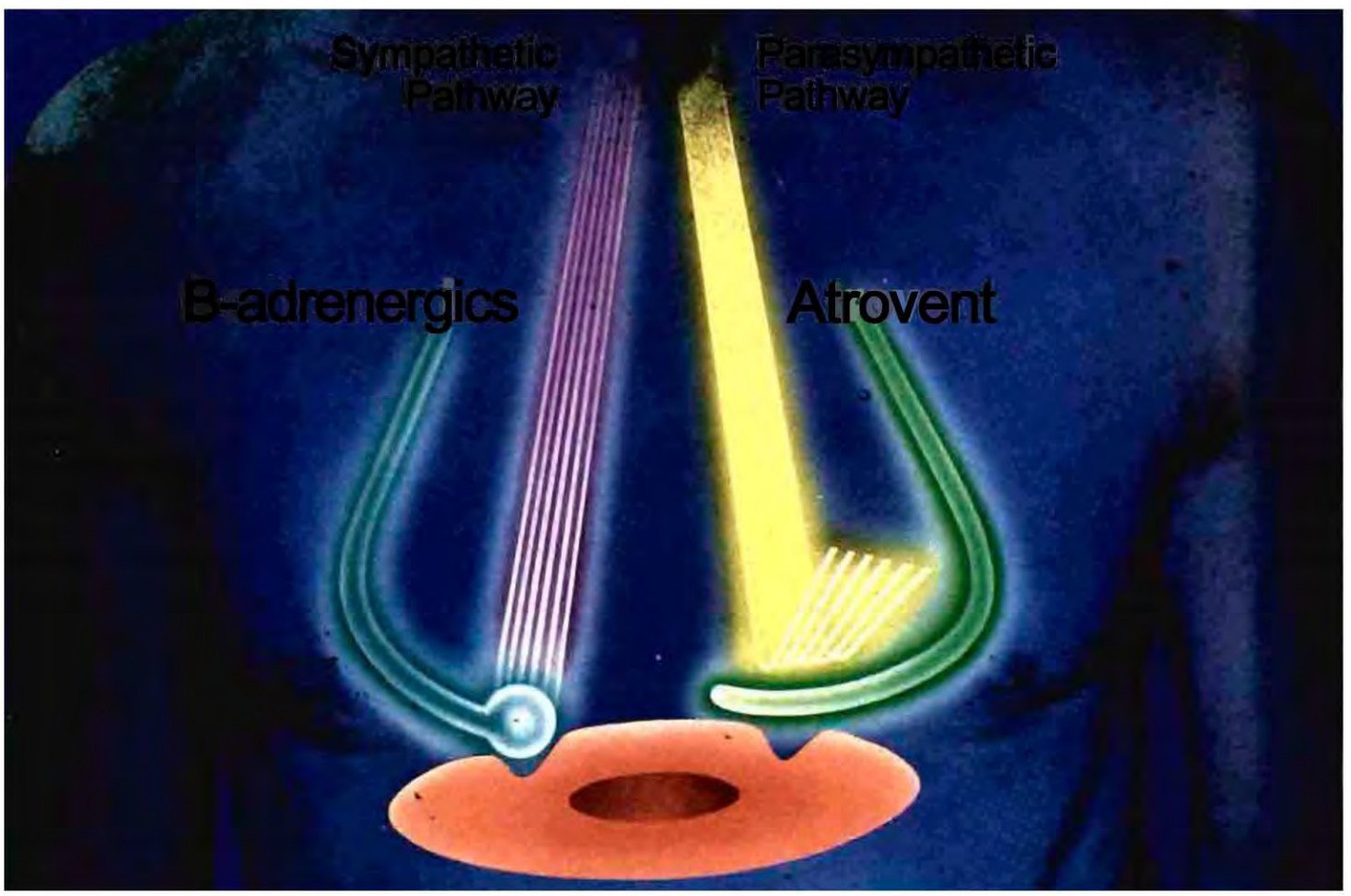

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Editorial Content

July 1983

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Training Routines

Flexibility in Sport

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One of the most neglected aspects of sports training is flexibility or suppleness. Considerable time is devoted to improving strength, stamina, style and speed, but little or no attention is paid to flexibility training. Almost all sportsmen commence a training session with what they term a "warm-up". Too often this warm-up is based on archaic, traditional methods which do not include appropriate or scientific flexibility exercises. A jog around a field, vigorous arm-swinging, sit-ups, toe-touching, press-ups and "bunny-hops" frequently constitute the average warm-up.

Few training instructors seem to appreciate that any rapid movements activate the muscle stretch-reflex which initiates contraction, or stiffening, of the muscle. Moreover, any strenuous initial activities cause a detrimental accumulation of fatigue by-products in the muscle, as well as irregularities of heart beat in many people. Rapid movements during the early phase of a workout can also lead to muscle, tendon or ligament damage particularly if the warm-up session has not been structured to focus the sportsman's attention on correctness of style. On several counts, therefore, the traditional fast-movement, endurance-type warm-up is potentially harmful, and at best, little more than useless.

For years, virtually the only persons to integrate flexibility exercises into their training were gymnasts and ballet dancers. Fortunately, scientific evidence and feedback from sports doctors and physiotherapists is now convincing increasing numbers of sportsmen that flexibility is vital in all sport.

Among the many benefits of proper flexibility training are the following [1 2 3]:

- reduction in the incidence of injury
- decrease in the severity of injury
- delay in the onset of fatigue
- increase in the range of useful movement
- increase in level of skill and efficiency
- improved mental outlook
- prolongation of sporting life
- prevention and alleviation of muscle soreness[4 5]

It is important to note that, even when no injury occurs, lack of flexibility has adverse effects on the efficiency of movement. If a muscle is required to lengthen to its limit or somewhat further, it will require extra energy to execute the movement, since there are two forces opposing it:

1. the muscle tension caused when the stretch-reflex is activated near the limit of joint movement
2. the tension created by the extension of the muscles and other soft tissues such as tendons and ligaments.

Short, tight muscles will elicit the stretch-reflex sooner and operate against the intrinsic tension over a greater range, so greater flexibility will contribute to enhanced efficiency of movement.

Fortunately normal muscle is able to be stretched to between 150 and 160 percent of its relaxed length before breaking and hence provides another safeguard to injury, in addition to the stretch-reflex which limits the range of rapid extension [6]. It should be appreciated that an increase in relaxed length of muscle will contribute to diminishing the possibility of injury.

Prolonged muscular soreness or stiffness after exercise may be caused by ischaemia (temporary lack of blood supply) and fatigue, with its concomitant accumulation of fatigue by-products which maintain nervous activity, elicit muscle spasm and prevent complete relaxation. De Vries has shown that strained, sore muscles display an increase in electrical acitivity. Static stretching movements are able to reduce the electrical activity significantly and simultaneously diminish muscle soreness [5]. Furthermore, it was found that stretching exercises are particularly effective in preventing muscular soreness if used to terminate a workout.

The relative contributions of the various body tissues to joint stiffness are as follows [7]:

- muscles and their fascial sheaths 41%
- structures of the joint capsule 35%
- skin 11 %
- tendons 10%

Since little or nothing can be done to modify the physical characteristics of the joint capsule and the inherent degree of inextensibility of tendons and ligaments, the more elastic muscles and fascia comprise the tissues which can contribute the most to increase of flexibility by appropriate exercises. Despite the relative inextensibility of ligaments and tendons, controlled strain on these tissues may increase the formulation of fibres in them, thereby contributing to enhanced elasticity and strength in the connective tissue of the joint[3].

A remark has to be made about the popular concept of one becoming "muscle-bound" due to weight training. Many studies have revealed that weight training does not reduce flexibility and that Olympic weightlifters are amongst the most supple of all sportsmen [8 9 10]. Whenever flexibility is adversely affected by weight training, it is due to technique which limits the range of movement. According to Morehouse and Rasch [11]:

> "It is now generally accepted that an individual becomes muscle bound when he consistently exercises one muscle or group of muscles in a fixed position which does not permit a complete range of motion, with the result that connective tissue in the muscles become adapted

to this position and become shortened".

This fact is true of all exercises, including those which do not involve weights or heavy resistance. Limited flexibility may be caused by regular repetition of any limited range movement or by neglect of any movement associated with operation of a specific joint.

It is interesting to note that a combination of stretching exercises and weight training used as a supplement to a sprint-training programme for athletics actually produced significantly greater increases in speed over an unsupplemented sprint-training routine [12].

Flexibility is influenced by the following factors.

1 **Exercise**

Regular exercise, particularly that which involves a wide range of movement, generally enhances flexibility. It should be noted, however, that sportsmen tend to develop patterns of flexibility which are characteristic of their particular sport.

2 **Age**

Stiffness generally tends to increase with age, and hence susceptibility to muscle injuries increases. Regular exercise combined with flexibility training can minimise the effect of these physiological changes. Flexibility is not at a peak in the youngest children. There are differences between males and females, but maximum flexibility seems to be reached between the ages of 10 and 12 years [6]

3 Temperature

An increase in muscle temperature, for instance, due to a warm-up or massage increases flexibility. An appropriate gentle warm-up session is therefore recommended prior to flexibility training.

4. **Sex**

Females generally tend to be more flexible than males in equivalent joints.

5 Type of joint

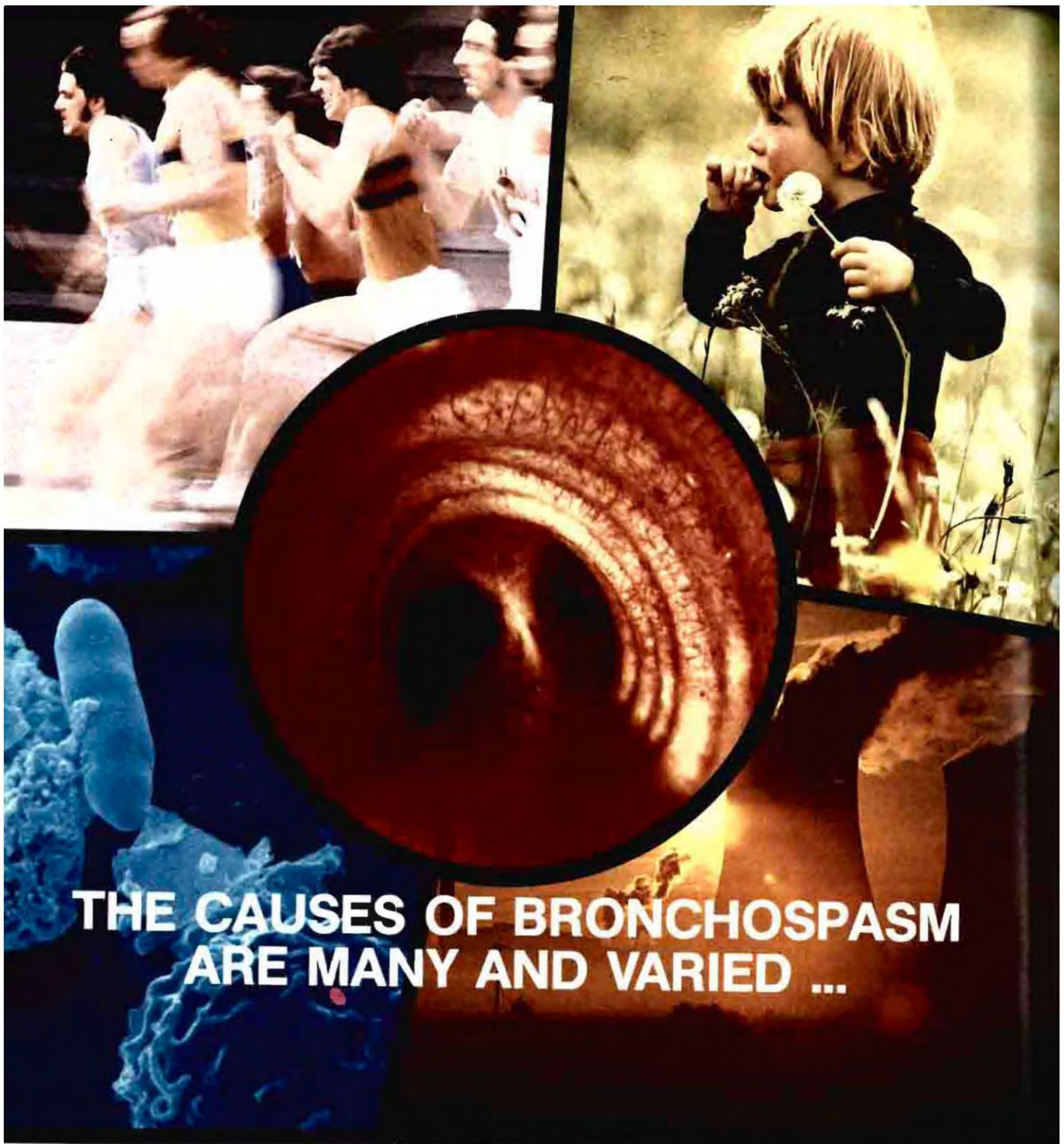
Flexibility is specific to each joint. It may be somewhat misleading to categorise one person as being more flexible or supple than another. One person may have very flexible hips, but stiff shoulders, while another may display the reverse situation. Overall flexibility may be determined by averaging the flexibility of a large number of joints, but what is more valuable is establishing the flexibility of the most important joints used by a participant in a particular sport.

6 Type of movement

Movement of a joint may involve one or more of the following types of displacement:

- flexion — extension
- adduction — abduction
- rotation
- impaction — distraction
- antero — posterior gliding
- medio — lateral gliding

Photo: Rapport



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The degree of flexibility is different for each one of these modes of displacement in order to maintain static and dynamic stability under a wide range of loading. It is important to avoid increasing flexibility in any mode which may adversely affect the stability of a joint vital to the execution of a specific sporting manoeuvre. The indiscriminate use of too many yoga positions may be detrimental in this respect. It is extremely important to remember that optimum, and not maximum, flexibility is required for a specific joint and a specific movement. In fact, sportsmen who are already hyper-mobile in certain joints should avoid exercises which increase flexibility

There are at least four different types of stretching exercise which may be used to improve flexibility [6]:

1 Static exercises

These exercises, similar to yoga asanas or positions, are used to stretch muscles slowly as far as possible without causing pain, and to hold them in the required pose for up to a minute.

2 Ballistic exercises

These bouncing exercises use the momentum of a particular part of the body to stretch a muscle beyond its normal statically stretched limit.

3 Passive exercises

These exercises rely on externally applied force or momentum to stretch a muscle. A training partner may exert additional force on a sportsman to extend the range of a static stretch or he may add momentum in form of extra bounce to achieve a similar effect with a ballistic stretch

4. Contract-relax exercises

These exercises are drawn from the physiotherapy rehabilitation system known as PNF (proprioceptive neuromuscular facilitation), which also requires a partner to constrain a sportsman to follow a specific pattern of movement PNF manoeuvres are designed to make optimal use of the stretch reflex and its inverse, the stress (or tendon) reflex, which is involved with the relaxation of contracted muscle. By contracting a muscle before it is stretched, the stress reflex signals the muscle to relax. To utilize this mechanism, the sportsman stretches the relevant muscle, then an assistant helps him hold this position while he isometrically contracts that muscle for 5 to 10 seconds. He then relaxes and returns to static stretching, either on his own or with the aid of his assistant.

All the above methods are effective in increasing flexibility, although the ballistic method is not advisable for use by amateurs because of its high injury risk. Ballistic stretching may recruit the stretch reflex and contract a muscle while the sportsman is forcing it to lengthen, a situation which not only requires more force to achieve stretching, but also increases the possibility of injury. Moreover, the ballistic method requires greater expenditure of energy, leading to inefficiency and unsuitability for warming up routines.

In both the partner assisted methods (passive and contract-relax stretching), the practical problem is that two people are necessary for every manoeuvre, which doubles the time required for sufficient flexibility training. In addition, correct execution of the stretching manoeuvres is usually learned formally by physiotherapists alone, and an unskilled partner can apply an inappropriate or excessive load which can injure the muscles. Amateurish therapy of this nature may not cause pain or acute injury, but it can still promote the formation of micro-tears in muscles, tendons or ligaments which can eventually lead to structural instability and injury.

Static exercises are simple to learn, easy to execute, safe and most suitable for the average sportsman who does not always have a coach or training partner available. Several passive or contract-relax exercises may be used by sportsmen who have been carefully taught the correct techniques of application. These may be of particular benefit to the sportsman with certain muscles whose flexibility does not seem to improve significantly with static stretching.

Studies have revealed that stretching exercises, when properly executed, have a prolonged effect on flexibility. For instance Hansen found that initial gains in flexibility measured directly after a flexibility routine for the lower back and hamstrings lasted for 3 hours, declined slightly after 6 hours and still remained significant after 24 hours. Jacobson showed that the increase in flexibility due to a 3 week stretching programme was still significant 7 days after its cessation, while McCue found measurable gain in flexibility even 8 weeks after a 3 week stretching programme [6]

Beaulieu provides a useful summary of points to be observed by any sportsman or trainer when establishing a flexibility programme.

1. One should concentrate on stretching the major muscle groups used in that particular sport and include some exercises stretching the body generally.
2. An individual routine is most effective, although a general programme produces good results. A screening programme to measure each sportsman's capabilities is valuable in the design of individual routines.
3. Each flexibility session should last from 10 to 20 minutes.
4. Daily stretching is important for optimum

gains in flexibility, except for persons who are inherently excessively supple.

5. A light, non-stamina type warm-up should always precede the flexibility exercises. A tracksuit may be useful in keeping the muscles warm when the air temperature is low.
6. Stretching before and after a workout is desirable, though the pre-workout session is most important.
7. Hyper-flexible sportsmen should not aim to increase their flexibility any further.
8. Significant increases in flexibility are gradual; the sportsman should be mentally prepared for this situation.
9. A static stretching routine is generally the safest and most advisable.
10. Exercises should be executed slowly with no jerking or bouncing. One should never stretch to the point of pain.
11. Exercises should progress gradually from the simple, mild and brief (15 seconds) to the complicated, more demanding and prolonged (45-60 seconds).
12. Both sides of the body should be stretched.
13. The body should be released slowly from any stretched position, particularly when passive exercises are used.
14. One should concentrate on relaxing the muscles as much as possible while they are being stretched, if necessary by using visualisation techniques.
15. Stretching exercises are not meant to be competitive.
16. Successful programmes are based on educating and motivating participants as to the importance of flexibility training.
17. The flexibility programme should continue during the off-season.

Flexibility training should be integrated carefully into every workout so that the body is gradually prepared and progressively stressed.

The activity phase of the training session should, in the interests of safety and efficiency, follow the sequence recommended by the Russians [13]

Technical and Tactical Skills	Speed and 'Agility	Strength	Endurance

After strenuous exercise, blood tends to pool in the extremities of the body and the cessation of physical movement deprives the heart of the supplementary pumping action of the muscles which contribute to venous return of blood to the heart. The continuation of light activity during the recovery period not only diminishes this extra loading on the heart but also assists in the removal of toxic exercise by-products which accumulate in the neuromuscular system. Should exhaustion render light activity impossible it is preferable to lie flat with legs raised rather than to remain in an upright stationary position. This will at least minimise the tendency for blood to pool in the lower extremities and lead to faintness or more serious cardiovascular consequences.

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Anaboliese Steroiede in Sport

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Inleiding

Die steroi'edhormone is 'n groep hormone wat oor dieselfde basiese struktuur beskik en wat "n gemeenskaplike voorloper naamlik cholesterol besit.

Sintese van bg hormone vind in die adrenale korteks, testes, ovaria en plasenta plaas[7]

Met betrekking tot die bespreking is ons geintereseerd in die androgene.

Kort Geskiedenis van Androgene en Anaboliese SteroYede:

Androgene word gesintetiseer in die testes, adrenale korteks en die ovaria.

i) John Hunter het reeds in 1771 daarin geslaag om manlike geslagskenmerke in henne te induseer deur middel van testes oorplantings.

ii) Berthold het in 1849 gedokumenteer dat oorplanting van testes in gekastreerde hane die tipiese tekens van kastrasie voorkom.

iii) Die eerste kliniese proef, hoewel baie subjektief, wat met androgene uitgevoer is, deur Brown-Sequard in 1889 gedoen. Hy het testikulere ekstrak ingeneem en was oortuig daarvan dat sy lewenslus en kapasiteit vir werk toegeneem het. Die proef dien egter as goeie voorbeeld van 'n plasebo effek omdat dit nou bekend is dat sy ekstrak in werklikheid geen hormone bevat het nie.[7]

iv) Begrov het 1891 gevind dat stikstof uitskeiding afneem as ekstrakte van konyntestes vir n persoon ingespuit word.

v) Eers in 1935 is daarin geslaag om die hormone te kristalliseer en sintetiseer met testikulere materiaal as uitgangspunt. Die deurbraak is in Duitsland gedoen.

vi) Gedurende die tydperk is daar ook begin met studies oor die verhouding tussen androgene en spiermassa deur ene Drs. Kochakian en Murlin.

vii) 'n Baie belangrike deurbraak in die soeke na androgene het in 1950 plaasgevind. Daar is waargeneem dat die verbindings 'n toename in grootte en gewig veroorsaak van die levator ani spier in rotte. Die toename in grootte en gewig is ongeveer direk eweredig aan algemene massa toename en stikstof retensie. Die tegniek word nog soms gebruik om naastenby die anaboliese indeks van 'n steroied te bepaal.[9]

Reeds op hierdie stadium is steroiede deur liggaamsbouers en gewigoptellers op 'n ongereelde basis gebruik.

viii) In 1968 het Ciba Pharmaceuticals 'n produk genaamd Dianabol wat metandrostenoloon bevat, begin bemark. In die opeenvolgende jare het chemiese atlete al hoe meer hulle

verskyning gemaak. In Munich in 1972, is gevind dat 68% van die deelnemers aan die Olimpiese spele anaboliese steroiede gebruik om hulle sportprestasie te verbeter; 80% van die gewigoptellers het gereeld anaboliese steroiede gebruik[8] Die misbruik van anaboliese steroiede is ook aan die toeneem in sportsoorte soos Boks, stoei, roei, atletiek ens.

Testosteroon:

Testosteroon is die ware testikulere hormoon en ook die basis waaruit anaboliese steroiede ontwikkel is.

Testosteroon is onaktief wanneer dit oraal ingeneem word omdat dit feitlik volledig geinaktiveer word met eerste deurgang deur die lewer Struktuuraktiwiteitsverwantskappe van Androgene:

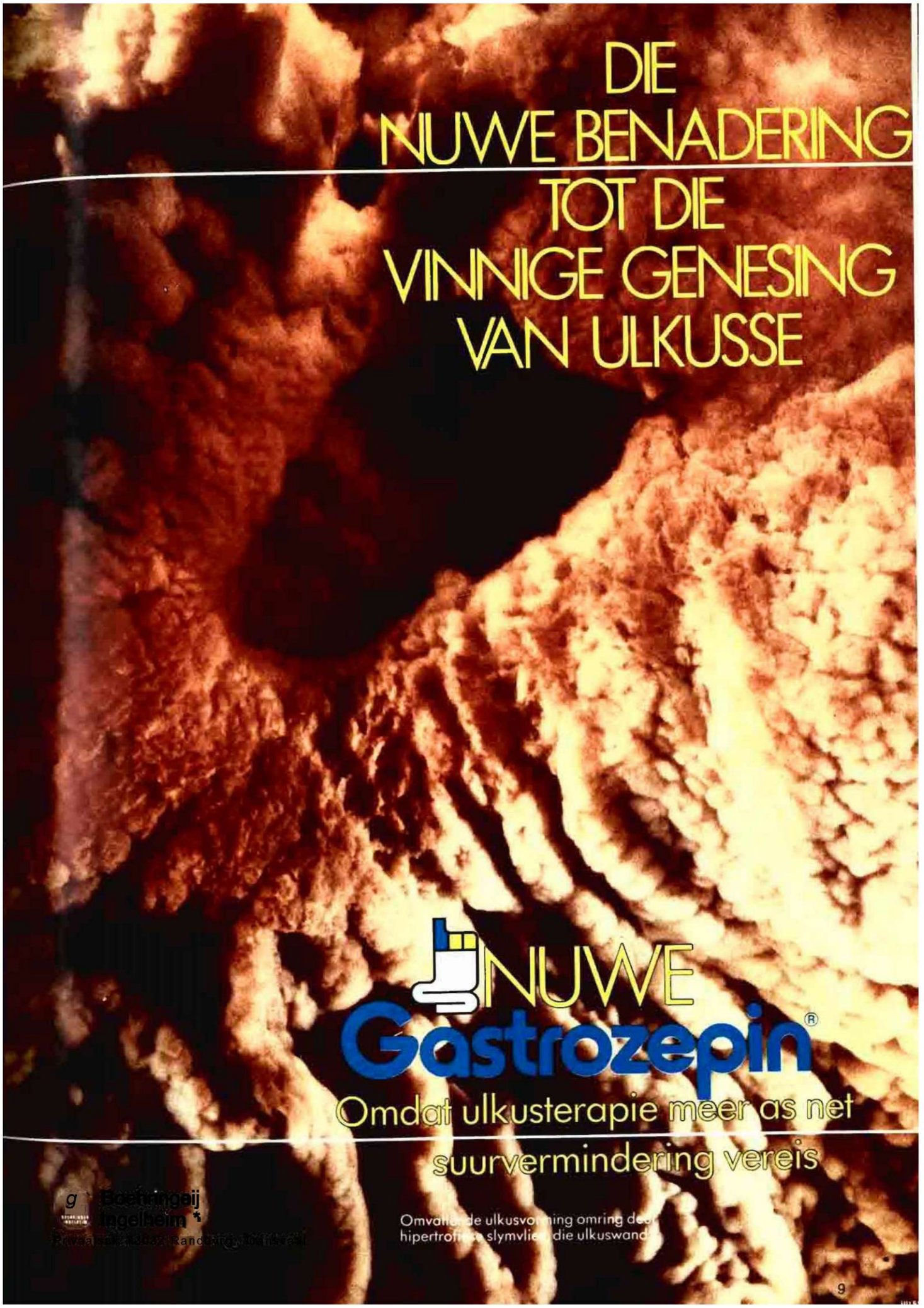
i) 'n Suurstof atoom gekoppel aan C3 en 'n hidroksiedgroep aan C17 is noodsaaklik vir androgene aktiwiteit.

ii) Metielgroepe gebind aan C1 C7 en C17 verhoog die aktiwiteit. Deur middel van manipulasie van die basiese testosteroonstruktuur is 'n reeks verbindings gesintetiseer met 'n verhoogde ol verlaagde androgeniese of anaboliese aktiwiteit.

Androgene is hoogs plasmaproteien gebond bv. 98% van testosteroon in die plasma is gebonde aan albumien. Die vrye androgeen kan gekorreleer word met die mate van androgeniese aktiwiteit.

Testosteroon konsentrasies in manlike kinders voor puberteit is in die orde van 0-20 ng/dl. By die aanvang van puberteit kry ons siklies verhoogde afskeidings van gonadotropiene en veral luteieniseringshormoon (LH) en follikelstimulerende hormoon (FSH). Die sikliese afskeidings is aanvanklik gesinkroniseerd met slaapsiklusse. Later in puberteit kom die sinkronisasie met slaapsiklusse nie meer voor nie, en die hipotalamus en pituitere klier se sensitiwiteit vir die negatiewe terugkoppelingsreaksie neem ook af. (fig. 4 bl 9). Testosteroon konsentrasies styg uiteindelik na vlakke van 0,2-1 Ug/dl in volwasse mans.[1]

LH en FSH is verantwoordelik vir testikulere groei, spermatogenese en steroiedogenese. LH stimuleer steroiedogenese deur interaksie met die Leydig selle in die testes. FSH stimuleer hoofsaaklike spermatogenese in die seminifereuse buise.



Fisiologiese en Farmakologiese Werking van Androgene en Anaboliese Steroiede:

Veranderinge wat teweeg gebring word deur natuurlike androgene voor en tydens puberteit kan soos volg uiteengesit word:

i) Tydens aanvang van puberteit kry ons 'n vergroting van die testes en kort daarna volg 'n vergroting van die penis, skrotum en pubiese hare verskyn.

ii) Gelyktydig veroorsaak 'n verhoogde androgeenafskeiding vinnige toename in lengte en spiermassa.

iii) Veldikte neem toe en 'n prolifirasie van vetkliere en daarmee saam kom 'n verhoogde afskeiding van velolies voor. Die vetkliere raak redelik maklik geinfekteerd wat aanleiding gee tot die ontstaan van aknee.

iv) Tipiese manlike haargroei op die bors en bene verskyn.

v) Vergroting van die larinks, verlenging van die stembande en 'n verdieping van stemtoon kom voor. Aan die einde van puberteit vind sluiting van die epifeses van lang bene plaas.

vi) Androgene is moontlik verantwoordelik vir agressiewe en seksuele gedrag by mans.[5]

Farmakologiese effekte van anaboliese steroiede:

i) Die belangrikste effek van anaboliese steroiede is die bevordering van proteien sintese. Daar is gewoonlik 'n tydelike toename in liggaamsgewig gepaardgaande met 'n afname in stikstof-, fosfaat-, kalium- en kalsiumuitskeiding in die uriene. Die anaboliese effek is opmerklik verlaag in gesonde individue in vergelyking met persone wat ondervoed is.[9] Sportmanne is gewoonlik superfiks en gesond wat die effek van die middel dus verlaag. Omdat laasgenoemde feit nie in ag geneem word nie, word buitengewoon hoe dosisse geneem in 'n poging om sportprestasies te verbeter. Wat egter nie besef word nie, is dat die anaboliese effek logaritmies toeneem met 'n verhoogde dosis, m a w as 'n dosis van 10mg per dag 'n massa toename van 2 kilogram veroorsaak, sal 'n dosis van 100 mg per dag 'n massa toename van 3 kilogram veroorsaak. 'n Praktiese voorbeeld hiervan is: Tydens die onlangse Wereld Kampioenskappe vir Gewigoptellers was anaboliese steroiede vryelik beskikbaar. 'n Russiese gewigopteller het erken dat hy 175mg Dianabol per dag gebruik. (Persoonlik kommunikasie).

ii) Stikstof retensie begin gewoonlik 2 tot 3 dae na die aanvang van androgeen terapie. Presiese aanvangstyd word bepaal deur die preparaat wat gebruik word.

Iii) Die effek van anaboliese steroiede op verskillende spiergroepe varieer. Die respons van 'n individu tydens behandeling word ook beinvloed deur ouderdom, seks, fiksheid en voedingstatus. Steroiedbehandeling kan 'n opmerklike toename in die deursnee van spierselle veroorsaak asook 'n verhoogde digtheid van die proteiene verantwoordelik vir spierkontraksie. Sellulere organelle soos die mitochondria, die sarkoplastiese retikulum ens, vermeerder ook dikwels.

iv) Hoewel daar geen bewyse bestaan dat die metaboliese tempo verander word nie, lyk dit asof vet katabolisme verhoog. Steroiede verlaag die totale vet inhoud van die liggaam en veroorsaak 'n toename in proteiene gepaardgaande met water retensie. Die effek van hierdie middels op vetmetabolisme is egter nog onbekend.

v) Staking van anaboliese terapie veroorsaak 'n tydelike toename in stikstof uitskeiding en 'n hoeveelheid gewig word weer verloor.

vi) Abnormale groot dosisse steroiede kan egter 'n verlies aan proteien sowel as vet veroorsaak en aanleiding gee tot gewigsverlies. 'n Verhoogde proteien en kalorie inname tesame met hoe dosisse anaboliese steroiede veroorsaak nie meer stikstof retensie as tydens normale proteien en kalorie inname nie.[9]

vii) Die gebruik van anaboliese steroiede voor puberteit het premature sluiting van die been epifeses tot gevolg, alhoewel die beengroei gestimuleer word. Die klassieke tekens van puberteit tree ook na vore. As gevolg van die filosofie wat al hoe meer posvat nl dat 'n sportman ten alle koste moet wen, kry ons dat steroied gebruik voor puberteit aan die toeneem is. Sogenaamde outoriteite moedig jeugdiges aan tot steroied gebruik met die motivering dat hulle die top gouer sal bereik. Steroied gebruik kom dus in sekere krag sportsoorte voor die ouderdom van 13 jaar voor.[8]

viii) Alhoewel baie navorsing op die gebied gedoen is, is nog nie daarin geslaag om 'n suiwer anaboliese steroied te sintetiseer nie.[12] Alle preparate op die mark besit dus in 'n mindere of meerdere mate androgeniese aktiwiteite. Die konsekwensie hiervan word eers ten voile besef as in ag geneem word dat steroied gebruik deur dames aan die toeneem is. Newe effekte van anaboliese steroiede by dames is onder andere herdistribusie van liggaamshare, verhoogde insidensie van mammakarsinoom, alopecia,

verlaging van stemtoon, vergroting van die klitoris vermanliking van vroulike fetis. Wat baie beiangrik is om te onthou, is dat die veranderings wat voorkom tydens stero'ied gebruik by dames dikwels onomkeerbaar is, as word die stero'ied terapie afgewissel met estrogeen terapie. Groot dosisse steroiede onderdruk menstruasie en ovulasie en veroorsaak uiteindelik algehele steriliteit.[4]

Newe-effekte tydens die gebruik van steroiede:

i) Soos reeds genoem veroorsaak dit vermanliking by dames.
ii) Stero'iedgebruik by kinders veroorsaak premature epifisiale sluiting en onreelmatighede in groei en seksuele ontwikkeling
iii) Water retensie, wat bydra tot gewigstoename, kom voor tydens stero'ied gebruik en kan edeem vorming veroorsaak.
iv) 17 -metielgroepe gekoppel aan die basiese stero'ied struktuur verhoog die voorkoms van cholestatiese geelsig tydens stero'ied gebruik. Middels wat veral van belang is in hierdie groep is — metieltestosteroon methandroil, Metandrostenoloon (Dianabol), Oksandroloon (Anavar), Oksimetoloon (Anadril) en Stanazolol (Winstrol).
v) Die gebruik van groot dosisse steroiede vir lang periodes kan die ontstaan van hepatiese adeno-karsenoom veroorsaak.
vi) Anaboliese steroiede verlaag die produksie van endogene testosteroon en gonadotropin vrystelling en onderdruk dus spermatogenese. Na staking van stero'ied gebruik kan steriliteit voorkom.
vii) Prapisme kan voorkom by die aanvang van terapie.
viii) Stomatitis en lokale inflammasie kom soms voor[5]

Alle vroue wat by Innsbruck aan die Olimpiese Winterspele deelgeneem het, moes toetse ondergaan om vas te stel ofhulle enige middels soos o.a. anaboliese steroiede geneem het om hulle prestasies te verbeter

Photo Rapport

Sienings van atlete en owerhede:

As ons die misbruik van anaboliese steroiede in sport wil verstaan, moet ons 'n idee he van die atleet se siening. Die klem in sport het verskuif vanaf deelname na die van wen teen alle koste m a w 'n atleet sal sy gesondheid in die weegskaal plaas om roem of rykdom te verwerf.[10]

Sportowerhede sien die gebruik van chemiese stowwe om prestasie te verbeter as 'n verlaging van morele waardes en as die verkryging van onverdiende voordeel. Die owerhede wil dus kompetisie tussen chemiese stowwe i p v atlete vermy. 'n Nuwe gedagterigting wat egter agter die ystergordyn voorkom is dat atlete gelei moet word tot die korrekte gebruik van anaboliese steroiede om die maksimum voordeel daaruit te verkry in plaas van die gebruik van massiewe dosisse deur atlete sonder mediese toesig Anaboliese steroiedgebruik word dus as 'n integrale deel van kompetisie voorbereiding beskou. Om 'n agterstand te voorkom gebruik westerse atlete die middels in 'n vergelykende mate.

Daar word dus aanbeveel dat atlete die middels op die volgende wyse moet gebruik.

i) Atlete moet besef dat psigologiese afhanklikheid maklik kan ontstaan, d w s 'n atleet kan dink hy maak nie vooruitgang nie slegs omdat hy nie steroied gebruik nie.
ii) Steroiedgebruik moet in siklusse plaasvind m a w die middel te gebruik vir 'n periode van 4 weke en dan vir 4 weke te staak reg deur die jaar.
iii) Geen atleet behoort steroiede te gebruik behalwe in top kompetisie nie. Steroiede is definitief nie 'n kortpad boontoe nie.
iv) Atlete moet onthou dat die effek van steroiede logaritmies toeneem met 'n toename in dosis en as 10 mg effektief is, is 20 mg dikwels nie meer effektief nie.
v) Hoe hoer die dosis hoe meer newe effekte word ondervind.
vi) Oormatige groot dosisse en verlengde gebruik verlaag stikstof retensie, aptyt en liggaamsgewig."
vii) Wat atlete in gedagte moet hou is dat urien analises om die gebruik van steroiedes te bepaal al hoe meer gebruik word by top kompetisies en dat positiewe resultate tot diskwalifikasie kan lei. Verrassingstoetse word ook al hoe meer gebruik deur die owerheid om steroied misbruik aan bande te le.[6]

Na oorweging van die voordele en nadele van steroiedgebruik berus die besluit nog by die atleet.

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Children Running Long-distance - Another perspective

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At a recent sports' clinic, two 13-year-olds were brought in by an enthusiastic sport coach "They,re doing a lot of mileage for their age, _±. 50 km a week," he proudly explained

As a physical educationalist, I feel pity for these two young girls and so many others, who, during this, the "golden age of perceptual-motor skill", are being encouraged to spend much of their time and energy in the quest for training mileage and age-group provincial titles

We now know that the early teens provide the last opportunity to substantially improve perceptual-motor skills such as gross and fine muscle co-ordination, hand-eye co-ordination, balance, proprioception, body control, special orientation and temporal projection.' As these form the basis on which the majority of sports (including some athletic events) are founded, physical educationalists advocate that the young child is provided with as comprehensive a range of movement experiences as possible.[2] The acquisition of motor skills most readily takes place at an early age and once this has been achieved and sufficiently reinforced by means of practise, (i.e. the motor pathways have been established and the nerves have been myelinated), the ability to perform these skills will remain with them for the rest of their lives. Indeed, once able to swim, one is always able to swim! Compare this to the temporary nature of physical fitness (two weeks of bed rest. . .??)!

However, once a child has reached his/her late teens, it becomes difficult to acquire new motor skills ... to learn to swim, to learn to hit a ball with an implement, not to speak of the ability to co-ordinate and control body weight. It is, however, not too late to start middle or long-distance running at the age of 16-17 years (adults reach the peak of their performance between the ages of 25 — 35 years). In fact, one can, by encouraging the youngster to participate in a wide variety of motor skills, also indirectly promote the development of physical fitness.

How often do we not hear unhappy, frustrated ex-athletes complaining that they were pushed into formal athletic training at too young an age, to the detriment of their development in other movement areas, and as adults, feel embarrassed to join a social game of tennis, soccer or squash, not to speak of the ladies shy to join the local modern dance classes due to their awkwardness and inability to control and co-ordinate their body weight. "All we can do is run . ." they complain.

Running is a natural, functional activity which no child needs to be "taught". With 50-60 years of running ahead if they might so choose, there is no need to rush youngsters into premature heavy training for which they are neither physically nor emotionally ready, and thereby deprive them of the opportunity of enjoying participation in so many other physical activities for which there is a limited learning period.

Instead by providing the basis for a wide spectrum of sports during the first _±. 15 years of their lives and then encouraging specialisation in running if this be their choice, children can have their cake today and eat it in the future[1]

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Pholo flappo"

Noakes Notes

Education: The Importance of Sport

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Few working days in my life pass by without me being reminded that, to many of the so-called "academics" who run and administer Universities, sport is not considered to be a really important function of the University. Certainly it runs a very poor last when compared with the importance of socalled "academic" excellence. Why do I say so-called "academic"? Because the term academic means someone who agrees with the teaching of Plato. The academy was a garden in which Plato taught. And Plato was an arch exponent of the Ancient Greek concept that the body and mind existed in unison and could not be separated. So when the Greeks talked about education, they talked about educating the whole person, mind and body. And theirgoalwas "arete" —excellenceof the total man. Plato in fact said — "Avoid exercising either mind or body without the other; and so preserve an equal and healthy balance between the two".

So I would conclude that, an academic who opposed the importance of sport in education, is by definition, not an academic, because he does not follow the teachings of Plato. It would seem that another name should be found for teachers who restrict their activities only to the mind.

Now unfortunately most of the teaching profession, be it in University or other institutions, seem to be run by people who do not have a very deep understanding of, or committment to, sport. I have yet to meet a University principal who would be as prepared to be burned at the stake over the sporting rights of his students or his society, as he would be for the protection of their civil rights. It disturbs me to hear, for example, that when Bruce Fordyce was rightly awarded one of the few commemorative medallions granted by the University of the Witwatersrand to its most select graduants, unnecessary comment had to be made to justify giving such an award to a man whose outstanding contribution has been in the field of sport, not academics. Who really is to judge whether Bruce's sporting contribution to the University or the South African community is of any lesser magnitude than are those of graduates whose contributions have been purely intellectual?

But, you must appreciate that the anti-sport mafia do have some justifiable complaints about sport abuses that they would not like to see at their University. And they would be correct. There are unquestionably abuses in which students are accepted to University on the sole basis of their sporting ability without their having the academic qualifications to really be at University. To me, this is unacceptable. At its worst this is epitomised by the spectre of American College football, which appears, at least from the outside, to be a business that provides funds for all the other, less wealthy university sports programmes. Under those circumstances, the need to high quality athletes regardless of their academic qualifications and the consequences of a losing team go far beyond the football field, far beyond sport and they invite abuses. Whether or not such abuses occur in American College football, I can't say, but the potential is there, and that is not what we need in our Universities.

Then these people probably feel, with some justification, that it is much easier to achieve national recognition for sporting excellence than it is for academic excellence.

Then this attitude is naturally compounded by the practise that some academic institutions seem to have adopted, of appointing sportsmen or important sports administrators to top academic posts because they believe that this will improve the prestige of the University. This is totally and utterly unacceptable.

And finally, there is the justifiable criticism that it is clearly impossible to do one's academic best if one spends inordinate amounts of time training for or travelling to, sports events for large portions of the academic year.

Now these criticisms may seem trivial, but they are not. University authorities are simply not going to support or put money into something they, at best, don't understand and which they give a low priority rating and, at worst, distrust or feel threatened by. Already Universities in the United States are cutting back on their financial grants for University sports and the same could conceivably happen here. So it seems to me that, as athletes of Universities that are free of the abuses I have mentioned, we have a very special responsibility to show why sport is important, indeed vital to academic life.

So I think that the first component necessary for success in life, as in sport, is to look after your body. This concept that the body is important is something that, I believe, receives too little attention. The body definitely is important and, the way we look after it can play a decisive role in how we live, and what we will achieve. Let me give you an example: Quite frequently I will go to run a marathon and will be ac-

costed by a runner who looks lean and athletic He tells me that 12 months before he was 80 pounds heavier, drinking and smoking heavily. Then he started running and now he no longer smokes or drinks. Now, if at 250 pounds he had visited a psychologist or psychiatrist, he would have undergone extensive analysis, and some Freudian explanation for his problem would probably have been forthcoming. With luck, he might have been helped to stop smoking and drinking. But what would we have been left with? A 250 pound wreck. For he needed those cigarettes and that alcohol to keep him going. Until he learned that he was a 170 pound runner inside a 250 pound frame, no amount of bodyless psyschotherapy would have helped.

Now it may be of interest that I am told that Freud himself underwent some 30 surgical operations for cancer of the mouth, a cancer directly related to his smoking. Yet he, the great mind, was unable to stop his smoking. If he had consulted me I would have told him about the Comrades Marathon and got him into training. Once he was running one hour a day, and he had re-discovered his body, he would have stopped smoking. By treating his body, not by dream analysis, we would have helped him. In psychology, as in education, there is no room for this bodyless concept of human behaviour I contend that our physical appearance is more important than we believe and that our self-image is critically related to the way we look. A tight firm athletic body tells me more about that person's approach to life, than does his curriculum vitae.

And the only way to learn about the body and to train and refine it, is through sport. You the elite athletes, teach us how to hone down our bodies to the correct proportions for our par-

ticular sports. You teach us how we must have knowledge of our bodies to succeed; how we must be aware of the way in which diet, altitude, sleep and work stress interact and affect our performance. You have learned as the invincible hurdler Edwin Moses, said, "Everything I do affects my running". And that knowledge goes beyond science. There is no scientist in the world who can tell you how and why these factors affect us, as they do.

The next benefit that exercise brings, and which should be of importance to a University, is that physical activity undoubtedly improves mental ability. There are many examples of great thinkers who used exercise to improve their creativity; The American president Jefferson, the poets Wordsworth and Coleridge, the philosopher Nietzsche. Wordsworth covered prodigious distances over the English countryside, as he composed his poetry. It is said that a visitor once came to see him whilst he was out walking. In his absence, the visitor asked the butler whether he would show him Wordsworth's study. To which the butler replied: "Sir, I can only show you my master's library. His study is out-of-doors". Nietzsche said — "give no credence to any thought that is not born out of doors — in which the muscles are not enjoying a feast also". And Coleridge said that "it was impossible to give a bad speech after a 10 mile walk". Hence, the need for a warm-up before a talk. Then there was the American Thoreau, who wrote: "the length of my daily writing equals the length of my daily walk. If I do not walk, I cannot write".

I think that there is far too much emphasis that creativity is the result of hard-work. Not so. To me it seems that creativity is greatest when the mind is unoccupied and free-wheeling. It is then that novel thoughts seem to appear from nowhere, and old, established ideas suddenly take on a new meaning. I was not surprised to read that "Lucky Jim" Watson — Nobel Laureate for his co-discovery of the molecular structure of DNA; a discovery which. he ascribes to the long hours he spent in the Cambridge public houses, wrote: "If you want to do something really outstanding, you will need to be slightly underemployed". I have found that to be the case. I am most creative when I am least employed. So I write my articles whilst running. it is said that James Watt discovered the steam engine whilst walking through Hyde Park, and even Einstein said that he refined his ideas whilst walking. I also believe that even politicians can be helped by exercise. After completing the 1982 Comrades Marathon, Dr Van Zyl Slabbert said that he wished politicians would spend more time running and less time talking. That way the country would be better served.

So I have said that exercise is really the only way I know that will give us back our bodies, and one of the few ways to develop our creativity. But that is not enough, there is more to it than that. There is, I believe a spiritual component to the human, that is ignored at great peril to ourselves and to our human race. And that is why it is so important to uphold and honour those who have the courage to advance the human spirit throught their own self-conquest on the sports fields.

So I believe that it is in the actions of the sportsmen and women, that we can see clearly what is uniquely human — the desire to discover and to perfect. The desire to push to the limits, to find out what makes us what we are. And we also appreciate that it is only when we are exposed to those mental and physical hardships that strip away the outer dressings with which we camouflage ourselves, that we find out who we are. As was said of those who survived Auschwitz. "Where what remained was man himself, melted down in the white heat of suffering and pain, to the essentials — to the human itself".

So it is that our most remembered heroes are those who have been through that white heat of suffering. The great mountaineers, who went to climb Everest not because, as Mallory said, "it is there" but because we We here, and we are human, and we must constantly push to the limit to discover and perfect our humanity. Or Robert Falcon Scott who travelled to the South Pole for reasons that his biographer, Elspeth Huxley, could not fathom. Probably it was something to do with the man himself: "Scott was the strongest combination of a strong man in a strong body I have ever known. And that because he was weak ... He conquered his weaker self and so became the strong leader we went to follow and came to love". And where they finally found him, stretched half way out of his sleeping bag, reaching out to comfort his beloved companion Wilson, they erected a memorial which contained the last line from Tennyson's Ulysses; a line that maybe sums it all up: "to strive, to seek, to find, and not to yield".

So there it is. Athletes are the most visible examples of the ceaseless search for that spiritual identity that makes us uniquely human. That is the message an athlete sets his University. That is the message I see when I watch Bruce Fordyce, exhausted beyond measure, the great athlete reduced to the most ignominous shuffle as he crosses the Comrades finish — striving for, seeking and finding his own human perfection, without yielding. It is a vital message for the future of ourselves, our race, our University.

South African Sports Medicine Association

Any Medical Practitioner who is interested in becoming a Foundation Member of the S.A.S.M.A. should pleasfe write to the address below, forwarding a cheque for R20 subscription Cfees. Please state whether you are a member of the Medical Association of South Africa, enclosing your M.A.S.A. membership number as well. You will be contacted, by the Association for elections etc.

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Clinical Information

peptic Ulceration- A Brief Review

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Peptic ulcer may be defined as a sharply circumscribed loss of the mucosa of the digestive tract where it is exposed to acid and pepsin. 95% of ulcers occur in the duodenal bulb and gastric antrum. Rare sites of peptic ulceration include the distal duodenum and proximal jejunum in patients with massive gastric hypersecretion; the small bowel adjacent to a surgical anastomosis with the stomach, the distal oesophagus, and the ileum adjacent to a Meckel's diverticulum containing functional gastric mucosa.

Etiology. Peptic ulcer consists of a heterogeneous group of diseases that may occur in many inherited and acquired conditions. Smokers have twice as many ulcers, both gastric and duodenal, as non smokers.[1] Their ulcers heal more slowly and are associated with greater morbidity and mortality. Aspirin increase the risk of gastric ulceration[2], and also increases the risk of bleeding from gastric and probably duodenal ulcers. Most other non-steroidal anti-inflammatory drugs can produce acute gastric mucosal lesions and it is likely these will also be implicated in the etiology of gastric ulcer. Cortiscosteroids in large doses and used for prolonged periods probably do increase the risk of peptic ulceration although this remains controversial. Alcohol by itself does not appear to cause ulcers[1], nor is diet a major pathogenic factor. Psychological stress is probably of importance in some patients.

Pathogenesis. Ulceration occurs when the balance between mucosal protective factors and the damaging action of acid pepsin is altered. In many patients with duodenal ulcer one or more factors may exist which increase the acid load on the duodenum, such as increased gastric acid output, or rapid gastric emptying. Mucosal resistance may also be impaired.

In contrast, patients with gastric ulceration usually have normal to low gastric acid output. The tone of the pyloric sphincter is reduced and duodenal contents may reflux back into the stomach. Like ethanol and aspirin, bile salts can impair the mucosal barrier to back-diffusion of acid and may cause acute superficial gastritis. It is possible that repeated attacks of acute gastritis may progress to chronic atrophic gastritis, which is found in almost all patients with gastric ulceration. The usual site for the ulcer is at the junction of the normal and affected areas, usually in the antrum.

Clinical Features: The classic symptom of peptic ulceration is burning epigastric pain occurring a few hours after meals or waking the patient at one or two a.m. The pain is usually relieved by food or antacids. Pain before breakfast may occur in almost 50% of duodenal ulcer patients. Pain is variable in nature among peptic ulcer patients, and many patients with typical ulcer symptoms do not have an ulcer. Physical examination may help to disclose a non-peptic cause for abdominal pain. Epigastric tenderness is not a useful clinical sign.

Diagnosis is made radiographically or endoscopically. Radiography is usually the preferred initial examination because it is cheap, readily available and well tolerated by patients. Radiographic findings of peptic ulceration are an ulcer crater, a collar of oedema around the ulcer, and folds radiating towards the ulcer. Radiographic studies may miss a small ulcer (less than 3 mm), a recurrent ulcer in the post-operative stomach, or an active ulcer in a scarred duodenum.

Although radiography is a sensitive (about 96%) detector of gastric carcinoma, it is uncertain whether all patients with benign appearing gastric ulcers should have endoscopy. Endoscopy should probably be performed if less than 50% healing has occurred after 4 to 6 weeks, if healing is not complete by 12-15 weeks, or if considered necessary because of the size of the ulcer, age of patient, associated weight loss, anorexia, etc.

Duodenoscopy is not necessary in uncomplicated duodenal ulcer disease but should be performed in any patient in whom surgery for ulcer is contemplated. It is also of value in patients with persistent epigastric pain and normal radiographic radiation.

Therapy

General Measures[3]

Hospitalisation is no longer considered necessary for uncomplicated ulcer disease. Mild sedatives may be a useful adjunct in selected patients. Patients should be advised to eat 3 meals a day of their own choosing, to avoid foods and spices that aggravate symptoms, and to avoid snacks at bedtime. Smoking and drinking alcohol should be interdicted, as should the use of non-steroidal anti-inflammatory drugs. Milk stimulates acid production and should not be used in place of antacids or other therapy.

Specific Measures

Antacids relieve pain of gastric ulcer but not duodenal ulcer[4]; although few studies have shown that antacids heal gastric ulcer an adequate antacid regimen would promote healing of both gastric and duodenal ulcers.[5,6]

High dose (1,008 milli-equivalents neutralising capacity per day)[7] and low dose (175 milli-equivalents per day)[8] antacid regimens are effective in healing 75% of duodenal ulcers.

Only commercial antacids containing aluminium hydroxide or magnesium hydroxide or both should be used.

Calcium carbonate containing antacids are

undesirable because they cause rebound acid hypersecretion and may cause milk alkali-syndrome with prolonged use.

Histamine H2 Receptor Antagonists

Cimetidine is significantly better than placebo in healing both gastric ulcer[9] and duodenal ulcer[10], and is one of the simplest and most convenient forms of treating peptic ulcer disease. Ranitidine, a newly released agent, is slightly more expensive but its twice daily dosage is even more convenient, and it appears to be free of cimetidine's unwanted anti-androgenic and drug-metabolising side effects. These agents heal ulcers but do not cure peptic ulcer disease, although they effectively prevent recurrence when administered long-term after healing is achieved.

Cytoprotective Agents

Sucralfate[11], coloidal bismuth[12] and carbenoxolone are all effective agents in treating both gastric and duodenal ulcers and in reducing the rate of relapse when used long term. Considerations of cost and the undesirable aldosterone-like side effects of carbenoxolone determine the preference for one agent over another.

Agents that are currently under investigation are prostaglandins, tricyclic anti-depressants and non anti-depressants, sulpiride, and pirenzepine, a new anti-muscarinic which is free of many of the unwanted side effects of the older anticholinergics.

Improvement of symptoms is prompt and occurs before demonstrable healing. Most ulcers will heal within four weeks, and most unhealed ulcers will respond to more prolonged therapy. Gastric ulcers usually heal within 12 weeks but large ulcers (more than 2½ cm) may take 15 weeks or more. Any gastric ulcer persisting beyond this time should be carefully biopsied and brushed to exclude malignancy. 50-70% of duodenal ulcers will recur within 6 months of discontinuing short term therapy; about one quarter of gastric ulcers which have healed completely before discharge and nearly two-thirds of those that have not healed completely relapse within four years, usually within the first 6 months. Maintenance therapy (eg cimetidine 400 mg at night or twice a day) reduces the relapse rate to about 25% for duodenal ulcer but relapse is rapid after stopping therapy. Indications for long term maintenance therapy[13] have not been determined; it should probably be considered for patients who relapse frequently (at least 3 times per year), those who suffer considerable morbidity and economic loss, and those who are unfit for surgery.

Prognosis

Duodenal ulcer disease tends to have a benign long term course. About three quarters of patients are symptom free for five or more years, but relapses are frequent over several years. Gastric ulcers may relapse once or even twice, but frequent relapses are rarely seen at least in part because these patients are trea'ted surgically. About 58% of gastric ulcer patients require surgery compared to about 22% of duodenal ulcer patients. The decision to operate in uncomplicated disease must be individualised.

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World Round-up

Chest Pain in Sportsmen

Chest pain is frequently alarming in the sportsman and it is not always simple to exclude angina — especially in the older sportsman, says Dr Peter Sperryn.

In an article "Chest Pain in the Sportsman" which *was* recently published in Medical News (April 21, 1983, Vol 15 No 16, 46), Dr Sperryn notes that typical angina may cause central retrosternal pain related to effort and sometimes cold, which may radiate to the left chest, shoulder and arm.

He further notes: "Rest relieves effort angina but a typical angina may not be so clearly related in the patient's mind to exertion and may present as mild shoulder, back, periscapula or arm pain. Radiation of angina to the neck and jaw is common."

According to the author a detailed history is important and the physical examination and the ECG may be normal, so that treatment is required on symptoms and history alone, or further more detailed examination will be performed. The testing ECG may be normal or may show ischaemic changes. The exercise ECG may show progressive ECT segment and T-way changes as the pulse rate speeds up.

He further points out that respiratory pain may be due to infection. "While more florid infections and pleurisy won't present as exercise related chest pain, enthusiasts may well try and exercise in the presence of virus infections." In practice, most sportsmen who come to the clinic complaining of chest pain have more straightforward musculoskeletal causes which may often be diagnosed on a careful history alone and confirmed by clinical examination.

Positional strain, sustained or awkward posture, such as driving or sleeping in an awkward position, or throwing, or racquet playing can all cause localised stiffness or tender spots across the muscles of the shoulder girdle. "This fibrositis is diagnosed on the combination of visible muscle spasm and locally exquisitely tender spots scattered through the muscle on palpitation. Sometimes it seems as if the whole muscle is inflamed to the touch. Warmth and simple aspirin are often effective," according the article.

Dr Sperryn states that many athletes don't realise that correct patterned movements may also relieve the pain and static isometric exercise can give considerable relief. "For instance, the patient stands with the head in the normal standing position and first one and then the other arm raised so as to oppose the palm of the hand to the temple. The head and arms then push against each other so that the head is not allowed to move".

According to the author this exercise, apart from being notably effective in cervical spondylosis and chronic pain, can also, by inducing a highly effective series of maximum muscle contractions, leave in its wake a more satisfactory degree of relaxation and thus help to break the vicious circle of pain.causing spasm.

The relationship between anxiety neurosis and palpable discomfort in the anterior chest wall is well established, it reaches its high point with the diagnosis of the effort syndrome, states the article.

The frequency of chest symptoms and the unexplained breathlessness in patients presenting as angina who were found to have no cardiac abnormality on extensive testing, including angiography, has been confirmed in a recent paper. "A high incidence of anxiety neurosis was found in these neurotic patients whereas a more depressive pattern emerged from true anginas with identical pain."

Dr Sperryn points out that virtually all sportsmen get into a degree of over anxiety quite often in their athletic achievements so "we have to explain the great variation in symptoms at the time". He adds: "By analogy, if abdominal stitch can be so effectively and frequently relieved by exercises to strengthen the abdominal muscles, perhaps someone should try treating the effort syndrome by chest and shoulder muscle weight training."

Major Development in Peptic Ulcer Therapy

During July Boehringer Ingelheim (Pty) Ltd will be introducing in South Africa a new medical approach to the treatment of peptic ulceration — pirenzepine dihydrochloride (Gastrozepin). Pirenzepine is the first ever selective muscarinic antagonist. Therapeutically it rapidly relieves ulcer pain and heals a high percentage of duodenal or gastric ulcers within 4-6 weeks with minimal side effects.

In the past medical treatment of ulcers revolved around antacids; this situation was revolutionised by the advent of the H2-receptor antagonists. Anticholinergic drugs, such as propantheline, also had their place, but their therapeutic utility was often limited by unwanted side-effects.

Modern pharmacological research at the molecular level, using radiolabelling techniques, revealed new subclasses of receptors within the parasympathetic nervous system. It has been demonstrated that there exists two types of muscarinic receptors which have been termed M1 and M2. M1 receptors are involved in vagal regulation of gastric secretion whereas M2 receptors mediate gastric motility, the bladder, heart, submandibular glands and visual accommodation. Both types of muscarinic receptor also exist within the central nervous system.

Pirenzepine is the first agent which can distinguish between these receptors sub-types in that it selectively blocks M1 receptors with minimal effects on M2 receptors. This is in sharp contrast to classical "anti-muscarinics" which have an equal affinity for all muscarinic receptors. Due to its selective nature, pirenzepine will not cause constipation, urine retentions, tachycardia or blurred vision. In addition, pirenzepine is hydrophilic and is virtually unable to cross the blood-brain barrier, therefore it has no central effects.

At the cellular level pirenzepine blocks vagal stimulation to gastric secretory cells. Thus it reduces the levels of both major aggressive factors in the pathogenesis of peptic ulceration — acid and pepsin. The existence of M1 receptors has also been demonstrated on G-cells and mast cells; pirenzepine will block vagal stimulation to these cells, thus reducing parietal cell stimulation by gastrin and histamine. The overall effect is to reduce secretory volume of pepsinogen/pepsin from the chief cell and hydrochloric acid from the parietal cell.

Clinically pirenzepine has been used worldwide for over five years during which time highly effective healing rates have been demonstrated. In duodenal ulcer for example, pirenzepine will heal on average 80 per cent within 4 weeks and in gastric ulcer 75 per cent within four to six weeks. (These are average healing rates from numerous endoscopically controlled trials).

In post-healing studies ulcer relapses have been shown to be lower following pirenzepine treatment than in those patients treated with cimetidine.

Pirenzepine has a long plasma half life of 11 to 12 hours and can therefore be administered twice a day. The recommended dose is one 50 mg tablet taken half an hour before morning and evening meals.

It can be concluded that pirenzepine represents a new pharmacological concept and will prove to be of great value in the physicians armamentarium for the effective healing of duodenal and gastric ulcers.