The Prescribing of Sunscreen Preparations: A Contribution to Health — B Summers and RS Summers

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Curriculum vitae

Beverley Summers is Senior Lecturer/Clinical Research Associate in the Department of Pharmaceutics at the Medical University of Southern Africa (MEDUNSA). She qualified at the University of Nottingham in 1972. For some years she was employed in community pharmacy, and managed pharmacies in Kent. She obtained her MSc (Med) at Medunsa in 1987 and her PhD there in 1990. Her main research interests are anti-convulsant pharmacokinetics, hospital pharmacy, and the effects of UV radiation on the skin. She has published and presented on these topics locally and overseas.

Rob Summers is Professor and Head of the Department of Pharmaceutics at Medunsa. He gained his BSc (Pharm) and MSc at Rhodes, and his PhD at Bradford, Yorkshire. He was previously Head of the Department of Pharmacy at the University of Zimbabwe. He has been a member of many scientific, medical and pharmaceutical organisations. He has a wide variety of research interests, on which he has published extensively, and lectured in Europe, the UK, and the USA.

Summary

Suncreen products available on the South African market were investigated in 1984 and in 1987 and the problems associated with the lack of information and the unreliability and inconsistency of SPF claims highlighted. This product-information is now updated in tables for toiletries and tables for cosmetics (which make SPF claims), and will serve as a ready reference for GPs to the companies, brand names, preparations, active ingredients, SPF claims and SPF-testing status of almost 170 preparations: information which will help GPs to prescribe with more confidence.

S Afr Fam Pract 1991; 12: 409-21

KEYWORDS:
Sunscreening Agents; Drug Evaluation.

Introduction

Health professionals and the lay public alike are gradually becoming more aware of the dangers of sun exposure for the lighter-skinned members of our population. Sun-induced skin damage has great social and economic cost. In sun-related skin cancers alone there were over 18 000 reported cases in South Africa in 1986 and 1987,[1,2] of which over 90% occurred in the white population with its high sensitivity, and over 60% in males, with their proclivity for out-of-door occupations and pastimes. The ultraviolet (UV) portion (200-400nm) of the sun's spectrum has been implicated in the aetiology of these cancers, which include squamous and basal cell carcinoma (associated with long-term sun exposure), and malignant melanoma, the most feared form of skin cancer, which has been linked to early blistering sunburn. Individuals at particular risk for malignant melanoma include those with blonde or red hair, freckles and particularly those with numerous large moles (dysplastic naevi).[3]

UV Radiation

The ultraviolet (UV) portion of the sun's spectrum is divided into 3 wavebands, UVC, UVB and UVA. UVC (200-290nm) is shortwave, high energy radiation. It is potentially the most dangerous but is currently mainly screened by the ozone layer. UVB (290-320nm) is the burning and carcinogenic band. UVA (320-400nm) is lower in energy than UVB but penetrates to the dermis (see Figure 1). UVA radiation was initially thought to be harmless. More recently, however, it has become apparent that UVA is associated with significant negative effects. They include:

1. skin fragility[4] (a tendency to bruise, blister and peel)
2. lesions of the melanocytes[5]
3. photodermatoses[6,7]
4. photoaging,[8] due to collagen and elastin breakdown, which may occur at a much faster rate than chronological aging
5. immunosuppression,[9,10,11] due to both inhibition of Langerhans cells and induction of suppressor T cells, and
6. non-melanoma skin cancer[12,13]

UVA is the most common form of radiation used in solaria and sunbeds. It must be realised that a UVA-induced tan offers little protection

... Sunscreens

to further UV damage,[14] in contrast to UVB effects which include thickening of the epidermis and stratum corneum,[15] both of which are protective responses.

Sunscreen agents

Sun filters and absorbers can form highly effective barriers against UV when incorporated into sunscreen products. Filters can be chosen to screen out specific UV wavelengths and their judicious use, combined with UV reflectors such as zinc oxide or titanium dioxide, can provide highly effective broad-spectrum protection. A summary of the wavelengths screened by the major chemical groups of sunscreens is shown in Figure 2. Broad-spectrum protection over the UVB and UVA bands is essential. Nearly all sunscreens have some reported instances of sensitisation, but for the majority of agents these are rare. Para-amino benzoic acid (PABA) commonly causes photosensitivity and has been linked to mutagenicity. Octyl dimethyl PABA (Padimate 0) on the other hand, causes only rare cases of photosensitisation.

More than 18 000 reported cases of sun-related skin cancers in RSA in 1986/7

SPF-testing

Sunscreen products in South Africa still do not require "full disclosure" labelling, *ie* manufacturers are not compelled by law to provide the details of the active sun filters or their concentrations. Furthermore it is not yet compulsory to substantiate Sun Protection Factor (SPF) claims for products

$$SPF = \frac{\text{Minimal erythemal dose with sunscreen}}{\text{Minimal erythemal dose without sunscreen}}$$

where dose is a function of time and UV intensity in MEDs.

In simple terms the SPF is the number of times longer that can be spent in the sun with the sunscreen on, before reddening, than without it. The SPF of a sunscreen is predominantly a measure of its UVB screening ability, though high SPF values cannot be obtained without the incorporation of UVA protective agents. For the user's protection SPFs must be reliably and uniformly tested. Several methods exist by which this can be performed. The most commonly-used method at present for products marketed in South Africa is the American Foods and Drugs Administration (FDA) method, followed by that of the (German) Deutches Insitut für Normung (DIN). More recently the Standards Association of Australia (SAA) procedure has been used. It is similar in many respects to the FDA method and forms the basis for the South African Bureau of Standards (SABS) standard specification for sunscreen preparations, which is currently in draft form. The xenon arc lamp, which produces a smooth UV emission spectrum, is used in the FDA and SAA methods. The use of such an artificial UV source has great advantages over natural sunlight, in terms of reliability, consistency and time span. The lamp delivers an MED in anything from 30 seconds to 2 minutes. Compare this with natural sunlight where 10-20 minutes exposure is needed for one MED, never mind the lengthy exposure that would be needed to test, for example, an SPF 20 product!

UVA not harmless - yet most often used in solaria and sunbeds

"Childhood protection affords lifetime protection" (said of skin cancer)

The Photobiology Laboratory in the Department of Pharmaceutics at Medunsa currently uses the Australian procedure, pending approval of the SABS standard specification.

Sunscreen preparations

It is difficult for general practitioners to recommend and prescribe sunscreen preparations with confidence without accurate information about active ingredients, wavelengths screened and SPF-testing methods used. In 1984 and 1987 we investigated sunscreen products available on the South African market[16,17] and highlighted problems associated with the lack of information and the unreliability and inconsistency of SPF claims. We have now updated our previously-published product information tables for toiletries (See Table 1) and cosmetics (See Table 2) which make SPF claims.

The tables comprise a "ready reference" to the companies, brand names, preparations, active

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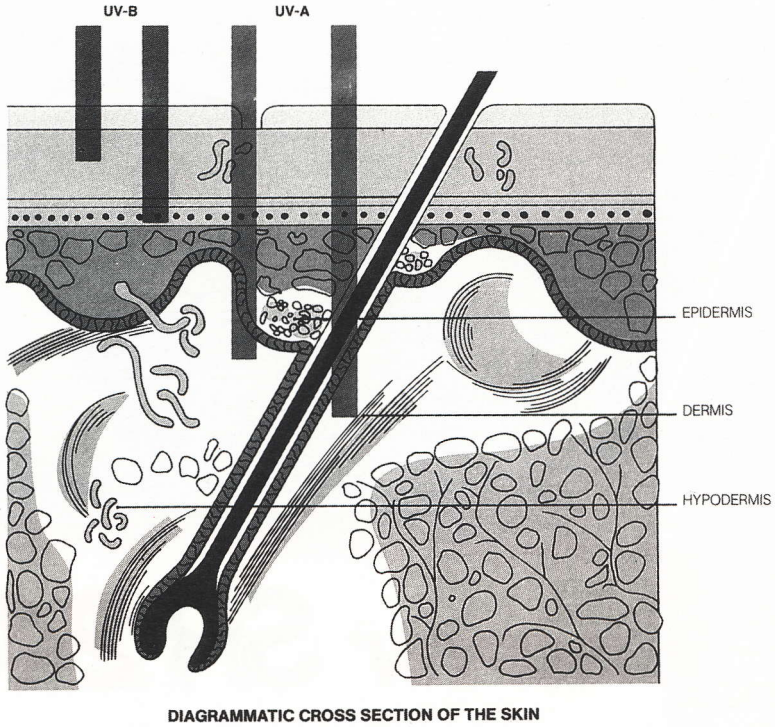

DIAGRAMMATIC CROSS SECTION OF THE SKIN

Figure 1. Penetration of the skin by ultraviolet radiation
With acknowledgement to Givaudan

Children should apply sunscreens when they clean their teeth in the morning

ingredients, SPF claims and SPF-testing status of the almost 170 sunscreen preparations on the South African market. The tables should be used whenever the use of a sunscreen is considered, because at the time of writing SPF-testing of approximately 47% of products (78 in number) could not be confirmed.

Recommending and prescribing a sunscreen preparation

The first step in this process is to identify the patient's skin phototype (See Chart 1). Next choose an SPF number which is appropriate to the phototype and to the purpose of use of the sunscreen (see Table 3). Then use the sunscreen product tables (Tables 1 and 2) to choose a product with the correct SPF, provided that proper information on the active ingredients, UV spectrum screened and SPF-testing status is given.

Sunscreen preparations in infants and children

It has been said of skin cancer that childhood protection affords lifetime protection. Approximately 80% of total lifetime sun exposure is obtained before the age of 20. In addition the most lethal form of skin cancer, malignant melanoma, has been linked with episodes of blistering sunburn in childhood.

Sunburn is not limited to caucasian children alone

Harmful short-term effects of the sun in young children are sunburn, dehydration and hyperthermia which may give rise to convulsions. Long-term effects which are mainly manifested only in adulthood are telangiectasis, solar keratosis, and squamous and basal cell carcinoma. Sunburn is not limited to caucasian children alone.

High protection (SPF $\geqslant$15) sunscreens are recommended for young children, as sun exposure is often unplanned and may be unsupervised. Children should apply sunscreens when they clean their teeth in the morning. They should also be protected by additional applications whenever they are to be subjected to excessive exposure, *eg* swimming galas, athletics meetings and other sports.

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No sunscreen preparations for children below 6 months

Note:

Sunscreen preparations should not be used for children below 6 months old, as the high permeability of their skin allows absorption of active ingredients which may be harmful.

Figure 2. Chemical groups of sunscreen agents and wavelength ranges absorbed

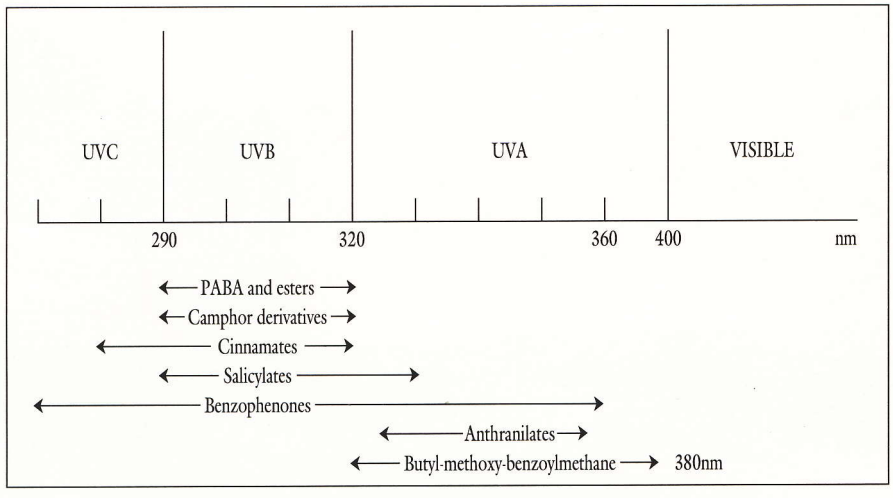

Chart 1. Skin Phototypes

Type	Response	Characteristics
I	Always burns easily Never tans	Redheads Freckled Celtic
II	Burns easily Tans minimally	Fair-skinned Fair-haired Caucasians
III	Burns moderately Tans gradually	Darker Caucasians
IV	Burns minimally Always tans well	Latins Arabs Asians
V	Rarely burns Tans profusely	
VI	Never burns Deeply pigmented	Negroids

Future developments

In some countries the concentration of individual active ingredients or the total combined amounts of all active ingredients are limited to reduce the incidence of unwanted adverse reactions. These limitations imply that formulation of the product as a whole and not just the type and concentration of UV filter will become more important. For example, for the same concentrations of actives we have in our laboratory obtained SPF values of 8, 10 and 18 for different formulations. In other words, in sunscreen preparations at least there are no "generic equivalents". Another development which will be of increasing importance is the use of micronised inert pigments to block UV light, in place of chemical filters. In the long-term these and other improvements will lead to the introduction of more and more effective sunscreen preparations. It will remain essential, however, to utilise current, accurate information to recommend and prescribe effective sun protection. Prescribers should also note that some exciting discoveries are being made about the basic mechanisms of sun-induced inflammation and carcinogenesis. In the former case the role of inflammatory mediators such as prostaglandins, interleukin-1 (IL-1) and platelet activating factor (PAF) is being elucidated. In the latter the influence of free radicals in DNA damage and thence mutagenesis and carcinogenesis is being unravelled.

In both instances knowledge of fundamental mechanisms will eventually lead to the development of new methods of prevention and treatment of sun-induced skin damage, in both the acute and chronic situations.

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Table I: Sunscreen Preparations

Brand Name	Manufacturer (+ Labelling & Testing)	Active Ingredient	Concentration and Products	SPF	UV Wavelength Filtered (NM)	Possible Adverse Effects
Ambre Solaire	Elebelle (Pty) Ltd AIL:N; SPL:Y; SPT:Y)	Benzophenone 3	2,2% Tropical & bronzing oils	2	UVB/A*270-350	X
		Benzophenone 4	2,0% Intense bronzing gel	2	UVB/A*270-330	X
		Ethyl hexyl paramethoxy cinnamate	1,5% Water-resistant	3	UVB 280-320	X
		Benzophenone 3	1,5% lotion		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	2,0% Water-resistant	4	UVB 280-320	X
		Benzophenone 3	1,0% cream		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	3,0% Water-resistant	5	UVB 280-320	X
		Benzophenone 3	1,5% lotion		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	4,5% Antwrinkle	5	UVB 280-320	X
		Benzophenone 3	2,0% cream		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	7,5% Antiwrinkle	8	UVB 280-320	X
		Benzophenone 3	2,0% cream		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	6,0% Water-resistant	8	UVB 280-320	X
		Benzophenone 3	2,0% cream		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	7,5% Water-resistant	9	UVB 280-320	X
		Benzophenone 3	2,0% lotion		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	7,5% Water		UVB 280-320	X
		Padimate 0	3,5% resistant	15	UVB 290-315	XX
		Benzophenone 3	2,0% lotion		UBV/A*270-350	XX
		Ethyl hexyl paramethoxy cinnamate	5,0% Sunblock	15	UVB 280-320	X
		Ethyl hexyl paramethoxy cinnamate	7,5% Antiwrinkle		UVB 280-320	X
		Padimate 0	3,5% cream	15	UVB 290-315	XX
		Benzophenone 3	2,0%		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	2,0% Auto bronzant		UVB 280-320	X
		Benzophenone 3	0,5% visage	–	UVB/A*270-350	X
Beach Baby	Newcare Marketing and Sales (AIL:N; SPF:N; SPT:N)	(–)	(–) "Step one"	?	?	?
			(–) "Step two"	?	?	?
Canyon Organics	Canyon Organics (AIL:N; SPL:Y; SPT:N)	Ethyl hexyl paramethoxy cinnamate	3,0% Lotion	5	UVB 280-320	X
		Ethyl hexyl paramethoxy cinnamate	(–) Moisturiser	2	UVB 280-320	X
Derma-D	Pacos Products (AIL: (–); SPL:(–); SPT:(–))	Benzophenone 3	(–) Lotion	(–)	UVB/A*270-350	X
		PABA	(–)		UVB 290-320	!
Everysun	Permark International AIL:N; SPL:Y; SPT:Y,D)	Ethyl hexyl paramethoxy cinnamate	2,0% Aqua sport	2	UVB 280-320	X
		Ethyl hexyl paramethoxy cinnamate	3,0% Aqua sport	3	UVB 280-320	X
		Ethyl hexyl paramethoxy cinnamate	6,0% Aqua sport	5	UVB 280-320	X
		Ethyl hexyl paramethoxy cinnamate	2,0% Milk	2	UVB 280-320	X
		Ethyl hexyl paramethoxy cinnamate	7,5% Milk	5	UVB 280-320	X
		Butyl methoxy dibenzoyl methane	2,5%		UVA 320-390	X
		Ethyl hexyl paramethoxy cinnamate	3,5% UV Blocker		UVB 280-320	X
		Padimate 0	3,5% Total Block	16	UVB 290-315	XX
		Phenyl benzimidazole 5 sulphonic acid	3,0%		UVB 270-320	X
Eulactol	Eulactol Laboratories (AIL:Y; SPL:Y; SPT:N)	Padimate 0	7,0%		UVB 290-315	XX
		Benzophenone 3	2,0% Cream	15	UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	2,0%		UVB 280-320	X
Gosport	Union Swiss Ltd (AIL:(–); SPL:Y; SPT:N)	Ethyl hexyl paramethoxy cinnamate	5,0% Water-resistant	10	UVB 280-320	X
		Butyl methoxy dibenzoyl methane	1,3% lotion		UVA 320-390	X

... Sunscreens: Table I cont

Brand Name	Manufacturer (+ Labelling & Testing)	Active Ingredient	Concentration and Products	SPF	UV Wavelength Filtered (NM)	Possible Adverse Effects
Labello	Smith & Nephew (AIL:N; SPL:Y; SPT:Y,D)	Ethyl hexyl paramethoxy cinnamate Methyl benzylidene camphor	(–) } Lip stick (–) }	12	UVB 280-320 UVB 290-320	X X
Nivea	Smith & Nephew (AIL:N; SPT:Y; SPL:Y,D)	Ethyl hexyl paramethoxy cinnamate	2,1% Tropical sun oil	2	UVB 280-320	X
		Ethyl hexyl paramethoxy cinnamate Methyl benzylidene camphor	2,0% } Tropical water- 1,5% } resistant lotion	3 3	UVB 280-320 UVB 290-320	X X
		Ethyl hexyl paramethoxy cinnamate	1,3% Insect-resistant lotion	3	UVB 280-320	X
		Ethyl hexyl paramethoxy cinnamate Methyl benzylidene camphor	4,5% } Water resistant 1,5% } lotion	5	UVB 280-320 UVB 290-320	X X
		Ethyl hexyl paramethoxy cinnamate Methyl benzylidene camphor Butyl methoxy dibenzoyl methane	6,5% } Water 2,0% } resistant 1,0% } lotion	8	UVB 280-320 UVB 290-320 UVA 320-390	X X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Methyl benzylidene camphor Phenyl benzimidazole 5-sulphonic acid	1,9% 0,5% } Water-resistant 0,7% } cream 3,0%	12	UVB 280-320 UVA 320-390 UVB 290-320 UVB 270-320	X X X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Methyl benzylidene camphor Phenyl benzimidazole 5-sulphonic acid	7,5% 2,0% } Sunblock 6,0% } cream 4,0%	16	UVB 280-320 UVA 320-390 UVB 290-320 UVB 270-320	X X X X
Pabina	SCS Pharmalab (Noristan) (AIL:Y; SPT:N; SPL:N)	Para amino benzoic acid	5,0%	(–)	UVB 290-320	!
Piz Buin*	Swisspharm (AIL:Y; SPL:Y; SPT:Y,F)	Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane	4,0% } Lotion 0,5% }	4	UVB 280-320 UVA 320-390	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Titanium dioxide (micronised)	5,0% 1,2% } Lotion 0,5%	6	UVB 280-320 UVA 320-390 UVA/B**	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Titanium dioxide (micronised)	5,5% 1,5% } Lotion 1,5%	8	UVB 280-320 UVA 320-390 UVA/B**	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane	6,5% } Oil-free 1,5% } lotion	8	UVB 280-320 UVA 320-390	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane	6,0% } Lotion 1,5% } (children)	8	UVB 280-320 UVA 320-390	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Titanium dioxide (micronised)	6,5% 1,5% } Lotion 1,5%	12	UVB 280-320 UVA 320-390 UVA/B**	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane	3,5% } Cream 0,5% }	4	UVB 280-320 UVA 320-390	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane	4,0% } Cream 0,8% }	6	UVB 280-320 UVA 320-390	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane	4,8% } Cream 1,3% }	8	UVB 280-320 UVA 320-390	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Titanium dioxide (micronised)	6,0% 0,5% } Cream 2,0%	12	UVB 280-320 UVA 320-390 UVA/B**	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Zinc oxide Talc	6,0% 1,5% 6,0% 1,5% } Allergy cream	12	UVB 280-320 UVA 320-390 UVA/B** UVA/B**	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Titanium dioxide (micronised)	7,0% 2,0% } Lotion 2,0%	15	UVB 280-320 UVA 320-390 UVA/B**	X X

... Sunscreens: Table I cont

Brand Name	Manufacturer (+ Labelling & Testing)	Active Ingredient	Concentration and Products	SPF	UV Wavelength Filtered (NM)	Possible Adverse Effects
Piz Buin (cont)		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Zinc oxide Titanium dioxide Methyl benzylidene camphor Talc Iron oxide	7,5% 2,0% 5,0% 2,0% 1,0% 3,5% 0,9% } Tinted Sun block cream	24	UVB 280-320 UVA 320-390 UVA/B** UVA/B** UVB 290-320	X X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Titanium dioxide (micronised)	7,5% 2,0% 3,0% } Lotion	24	UVB 280-320 UVA 320-390 UVA/B**	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Methyl benzylidene camphor Titanium dioxide (micronised)	7,5% 2,0% 1,0% 3,0% } Cream	24	UVB 280-320 UVA 320-390 UVB 290-320 UVA/B**	X X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane	5,0% 1,5% } Stick	8	UVB 280-320 UVA 320-390	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane	7,5% 4,0% } Combi/stick cream	15	UVB 280-320 UVA 320-390	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Pigments	5,5% 0,7% (–) } Combi/stick stick	15	UVB 280-320 UVA 320-390 UVA/B**	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Zinc oxide Titanium dioxide Iron oxide	7,0% 0,5% 5,5% 2,0% 0,9% } Sunblock stick	24	UVB 280-320 UVA 320-390 UVA/B** UVA/B** UVA/B**	X X
		Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane	1,5% Classic Brown 0,5% lotion, oil, gel & cream	2	UVB 280-320 UVA 320-390	X X
NB All products are water-resistant						
Santorini	Kirchmann Labs (AIL:(–); SPL:(–); SPT:N)	Homomenthyl salicylate Benzophenone 3 Phenyl benzimidazole 5-sulphonic acid Benzophenone 3 Isoamyl paramethoxy cinnamate Padimate 0 Benzophenone 3	6,0% 1,6% } Oil 2,5% 0,8% } Low viscosity lotion 7,0% 3,0% } Water-resistant cream	4 8 15	UVB 290-320 UVB/A*270-350 UVB 270-320 UVB/A*270-350 UVB 290-320 UVB 290-315 UVB/A*270-350	X X X X X XX X
SP 20	Permark International AIL:N; SPL:Y; SPT: (–))	Para amino benzoic acid New SP range for 1992	5,0% Lotion	20	UVB 290-320	!
Spectraban	Stiefel Labs UK (AIL:Y; SPL:Y; SPT:Y)	Padimate 0 Benzophenone 3 Ethyl hexyl paramethoxy cinnamate	3,2% Lotion 5,0% 5,0% } Lotion	4 15	UVB 290-320 UVB/A*270-350 UVB 280-320	XX X X
Sunderm 21	Geo Schwulst Labs (AIL:N; SPL:Y; SPT:Y,F)	Ethyl hexyl paramethoxy cinnamate Benzophenone 3	7,5% 4,0% } Cream	21	UVB 280-320 UVB/A*270-350	X X
Sundown	Johnson & Johnson (AIL:Y; SPL:Y; SPT:Y,F)	Padimate 0 Benzophenone 3 Padimate 0 Benzophenone 3 Padimate 0 Benzophenone 3	6,5% 3% } Waterproof lotion 7% 3% } Stick 4,75% 1,75% } Waterproof lotion	15 15 8	UVB 290-315 UVB/A*270-350 UVB 290-315 UVB/A*270-350 UVB 290-315 UVB/A*270-350	XX X XX X XX X
Sun Factor	Sun Factor Labs (AIL:N; SPL:Y; SPT:N)	Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane	3,0% 3,3% } Lip balm	15	UVB 280-320 UVA 320-390	X X

... Sunscreens: Table I cont

Brand Name	Manufacturer (+ Labelling & Testing)	Active Ingredient	Concentration and Products	SPF	UV Wavelength Filtered (NM)	Possible Adverse Effects
Teknique	Cruelty-Free Beauty Products (Pty) Ltd (AIL:N; SPL:Y; SPT:N)	Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Para amino benzoic acid	2,5% 1,0% } Moisturiser 6,0% Moisture gel	5 5	UVB 280-320 UVA 320-390 UVB 290-320	X !
Tropitone	Permark International (AIL:N; SPL:Y; SPT:A)	Isoamyl paramethoxy cinnamate Phenyl benzimidazole 5-sulphonic acid Isoamyl paramethoxy cinnamate Isoamyl paramethoxy cinnamate	2% Oil 2,0% Gel 3,5% Milk 7,0% Milk	2 4 4 8	UVB 290-320 UVB 290-320 UVB 290-320 UVB 290-320	X X X X
Uvistat	Boehringer Ingelheim (AIL:Y; SPL:Y; SPT:Y)	New products for 1991/2 details not yet available				
Valeur	Spectrachem (AIL:N; SPL:Y; SPT:N)	Ethyl hexyl paramethoxy cinnamate Ethyl hexyl paramethoxy cinnamate Benzophenone 3	6,8% Cream 7,0% } "Total 3,0% } sunblock"	7 15	UVB 280-320 UVB 280-320 UVB/A*270-350	X X X
Vanda	Vanda Cosmetics (AIL:N; SPL:Y; SPT:N)	Benzophenone 3 Butyl methoxy dibenzoyl methane	4,2% } Sports 0,4% } creme	6	UVB/A*270-350 UVB 320-390	X
Vaseline	Elida Ponds (AIL:N; SPL: [1]Y, [2]N; SPT:Y,F)	Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Ethyl hexyl paramethoxy cinnamate	9,0% } Lip 1,8% } therapy 2,0% Lip Ice	15[1] -[2]	UVB 280-320 UVA 320-390 UVB 280-320	X X
Vita Force	Pharma Natura (AIL: (—); SPL:(—); SPT:(—))	Para amino benzoic acid	5% PABA 5000 cream	—	UVB 290-320	!
Woolworths	Woolworths (AIL:Y; SPL:Y; SPT:Y,S. Products SPF 8 and above)	Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Ethyl hexyl paramethoxy cinnamate Ethyl hexyl paramethoxy cinnamate Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Benzophenone 3 Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Benzophenone 3	2,3% } Self-tanning 1,0% } lotion 2,5% Bronzing oil 3,5% Oil-free bronzing gel 7,0% } Oil-free 1,0% } tanning mist 7,5% } Moisturising 2,0% } facial 3,0% } sunblock 7,5% } Water-resistant 2,5% } body 3,5% } lotion	2 2 4 8 15 15 	UVB 280-320 UVA 320-390 UVB 280-320 UVB 280-320 UVB 280-320 UVA 320-390 UVB 280-320 UVA 320-390 UVB/A*270-350 UVB 280-320 UVA 320-390 UVB/A*270-350	X X X X X X X X
Xeroderm	Van Dyk Pharmaceutical Products AIL:N; SPL:Y; SPT:N)	Ethyl hexyl paramethoxy cinnamate Benzophenone 4	7,0% 3.0% } Xeroderm	16	UVB 280-320 UVB/A*270-330	X X

AIL:	Active ingredients on label
SPL:	SPF on label
SPT:	SPF confirmed by testing
*	UVB and part UVA
**	Reflects UVA/B and some visible
(—)	Information not supplied by manufacturer
!	Photosensitivity common
XX	May cause photosensitivity
?	Not known
X	Rare cases of photosensitivity
Y	Yes
N	No
D	DIN test method
F	FDA test method
S	SAA test method (Medunsa)
A	Awaiting

... Sunscreens

Table II: Sunscreen Products from Cosmetic Houses

Brand Name	Manufacturer/ Distributor (+ Labelling & Testing)	Active Ingredients	Concentration and Products	SPF	UV Wavelength Filtered (NM)	Possible Adverse Effects
Annique	Forever Young CC (AIL:N; SPL:Y; SPT:A)	New products for 1991/92 details not yet available				
Avroy Shlain	Avroy Shlain Cosmetics (AIL:(—); SPL:Y; SPT:A)	New products for 1991/92 details not yet available				
Charles of the Ritz	Charles of the Ritz (AIL:Y; SPL:Y; SPT:Y)	Ethyl hexyl parathoxy cinnamate	(—) Bronzing emulsion (tinted & non-tinted)	3	UVB 280-320	X
		Ethyl hexyl parathoxy cinnamate	(—) Self-tanning lotion	6	UVB 280-320	X
		Ethyl hexyl parathoxy cinnamate	(—) Bronzing	15	UVB 280-320	X
		Benzophenone 3	(—) protector		UVB/A*270-350	X
		Ethyl hexyl parathoxy cinnamate	(—) Ultra	22	UVB 280-320	X
		Benzophenone 3	(—) sunblock		UVB/A*270-350	X
Clarins	House of Gallia (AIL:N; SPL:Y; SPT:Y)	Phenyl benzimidazole 5 sulphonic acid	3,0% Non-oily gel	2/3*	UVB 270-320	X
		Ethyl hexyl parathoxy cinnamate	4,5% Self-tanning	4/6*	UVB 280-320	X
		Butyl methoxy dibenzoyl methane	2,0% milk		UVA 320-390	X
		Ethyl hexyl parathoxy cinnamate	4,5% Self-tanning	4/6*	UVB 280-320	X
		Butyl methoxy dibenzoyl methane	2,0% cream		UVA 320-390	X
		Ethyl hexyl parathoxy cinnamate	4,5% Sun Wrinkle		UVB 280-320	X
		Butyl methoxy dibenzoyl methane	2,0% control	6/8*	UVA 320-390	X
		Benzophenone 3	1,0% cream		UVB/A*320-350	X
		Ethyl hexyl parathoxy cinnamate	5,0%		UVB 280-320	X
		Butyl methoxy dibenzoyl methane	2,0% Sun milk	6/8*	UVA 320-390	X
		Benzophenone 3	1,2%		UVB/A*320-350	X
		Ethyl hexyl parathoxy cinnamate	7,5%		UVB 280-320	X
		Benzophenone 3	3,0% Ultra protection	15/19*	UVB/A*320-350	X
		Butyl methoxy dibenzoyl methane	2.0%		UVA 320-390	X
Note: Clarins packages give both DIN and FDA SPFs : DIN/FDA						
Clinique	Horton Products (AIL:Y; SPL:Y; SPT:Y,F)	Ethyl hexyl parathoxy cinnamate	3,0% Suntan	4	UVB 280-320	X
		Benzophenone 3	1,0% encourager		UVB/A*270-350	X
		Ethyl hexyl parathoxy cinnamate	7,5% Oil-free	6	UVB 280-320	X
		Benzophenone 3	2,5% sunscreen		UVB/A*270-350	X
		Ethyl hexyl parathoxy cinnamate	6,0% Sunscreen	8	UVB 280-320	X
		Benzophenone 3	2,0%		UVB/A*270-350	X
		Ethyl hexyl parathoxy cinnamate	5,0% Lip block	11	UVB 280-320	X
		Benzophenone 3	2,1%		UVB/A*270-350	X
		Titanium dioxide	21,0% Continuous coverage make-up	11	UVA/B**	
		Ethyl hexyl parathoxy cinnamate	7,5% Eyezone	14	UVB 280-320	X
		Homomenthyl salicylate	4,7% sunblock		UVB 290-320	XX
		Ethyl hexyl parathoxy cinnamate	7,5% Face zone	15	UVB 280-320	X
		Benzophenone 3	3,0% sunblock		UVB/A*270-350	X
		Ethyl hexyl parathoxy cinnamate	7,5%		UVB 280-320	X
		Benzophenone 3	5,0% Oil-free	15	UVB/A*270-350	X
		Ethyl hexyl salicylate	5,0% sunblock		UVB 290-320	XX
		Homomenthyl salicylate	5,0%		UVB 290-320	X
		Ethyl hexyl parathoxy cinnamate	7,5%		UVB 280-320	X
		Benzophenone 3	4,5% Sunblock	19	UVB/A*270-350	X
		Octyl salicylate	5,0%		UVB 290-320	X
		Ethyl hexyl parathoxy cinnamate	7,5%		UVB 280-320	X
		Benzophenone 3	6,0% Total cover	30	UVB/A*270-350	X
		Padimate 0	5,0% sunblock		UVB 290-315	XX
		Octyl salicylate	5,0%		UVB 290-320	X

... Sunscreens: Table II cont

Brand Name	Manufacturer/ Distributor (+ Labelling & Testing)	Active Ingredients	Concentration and Products	SPF	UV Wavelength Filtered (NM)	Possible Adverse Effects
Elizabeth Arden	Faberge (AIL:N; SPL:Y; SPT:Y)	Padimate 0	3,0% Tanning cream	4	UVB 290-315	XX
		Padimate 0	2,0% Day cream	4	UVB 290-315	XX
		Padimate 0	3,0% Sunshading	8	UVB 290-315	XX
		Benzophenone 3	2,0% cream		UVB/A*270-350	X
		Padimate 0	8,0% Spot protection	15	UVB 290-315	XX
		Benzophenone 3	3,0% stick		UVB/A*270-350	X
		Padimate 0	8,0% Immunage	15	UVB 290-315	XX
		Benzophenone 3	3,0% cream		UVB/A*270-350	X
		Padimate 0	8,0% Superblock	24/34	UVB 290-315	XX
		Benzophenone 3	3,0% cream		UVB/A*270-350	X
Ellen Betrix	HM Betrix & Co Frankfurt Distributed in SA by Jothenil (AIL:N; SPL:Y; SPT:Y,D)	Ethyl hexyl paramethoxy cinnamate	3,0% Waterproof	3	UVB 280-320	X
		Benzophenone 3	2,0% milk		UVB/A*270-350	X
		Padimate 0	5,0% Waterproof	6	UVB 290-315	XX
		Benzophenone 3	2,0% milk		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	2,0%		UVB 280-320	X
		Methyl benzylidene camphor	3,0% Face cream	6	UVB 290-320	X
		Butyl methoxy dibenzoyl methane	2,0%		UVA 320-390	
		Methyl benzylidene camphor	4,0% Stick	8	UVB 290-320	X
		Benzophenone 3	2,0%		UVB/A*270-350	X
		Padimate 0	8,0%		UVB 290-315	XX
		Benzophenone 3	3,0% Waterproof milk	12	UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	2.0%		UVB 280-320	X
Estée Lauder	Horton Products (AIL:N; SPL:Y; SPT:Y)	Ethyl hexyl paramethoxy cinnamate	1,5%		UVB 280-320	X
		Butyl methoxy dibenzoyl methane	2,0% Tanning milk	2	UVA 320-390	X
		Benzophenone 3	0,1%		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	1,5% Antiwrinkle		UVB 280-320	X
		Butyl methoxy dibenzoyl methane	2,0% cream for	2	UVA 320-390	X
		Benzophenone 3	0,5% face		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	3,0%		UVB 280-320	X
		Butyl methoxy dibenzoyl methane	2,0% Sunning lotion	4	UVA 320-390	X
		Benzophenone 3	0,2%		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	3,0% Antiwrinkle		UVB 280-320	X
		Butyl methoxy dibenzoyl methane	2,0% cream for	4	UVA 320-390	X
		Benzophenone 3	0,2% face		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	4,0% Oil-free	6	UVB 280-320	X
		Benzophenone 3	0,5% formula		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	4,0% Age shield	6	UVB 280-320	X
		Benzophenone 3	0,5% cream		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	7,5% Sunstick	12	UVB 280-320	X
		Benzophenone 3	4,5% (water resistant)		UVB/A*270-350	X
		Ethyl hexyl paramethoxy cinnamate	7,0% Advanced		UVB 280-320	X
		Octyl salicylate	2,3% protection	12	UVB	X
		Benzophenone 3	4,6% (water resistant)		UVB/A*270-350	X
		Padimate 0	8,0%		UVB 290-315	XX
		Ethyl hexyl paramethoxy cinnamate	7,5% Sun Out	30+	UVB 280-320	X
		Benzophenone 3	3,0%		UVB/A*270-350	X
		Titanium dioxide	1,0%		UVA/B**	
		Ethyl hexyl paramethoxy cinnamate	7,5%		UVB 280-320	X
		Benzophenone 3	5,0% Water-resistant	30	UVB/A*270-350	X
		Octyl salicylate	5,0% baby block		UVB	X
		Padimate 0	8,0%		UVB 290-315	XX

... Sunscreens: Table II cont

Brand Name	Manufacturer/ Distributor (+ Labelling & Testing)	Active Ingredients	Concentration and Products	SPF	UV Wavelength Filtered (NM)	Possible Adverse Effects
Gallia	Permark International (AIL: (—): SPL:Y; SPT:A)	Isoamyl parametoxy cinnamate Phenyl benzimidazole 5-sulphonic acid Butyl methoxy dibenzoyl methane Titanium dioxide Kaolin Zinc stearate Iron oxides	5,5% 2,0% 2,5% 3,0% } Double cover 2,0% 2,0% 0,7%	16+	UVB 290-320 UVB 290-320 UVA 320-390 UVA/B** UVA/B** UVA/B** UVA/B**	X X X
Innoxa	Innoxa (AIL:Y; SPL:Y; SPT:Y,S)	Ethyl hexyl paramethoxy cinnamate Benzophenone 3 Ethyl hexyl paramethoxy cinnamate Padimate 0 Ethyl hexyl paramethoxy cinnamate Benzophenone 3 Padimate 0 Benzophenone 3 Butyl methoxy dibenzoyl methane Padimate 0 Benzophenone 3 Butyl methoxy dibenzoyl methane	2,0% } Oil-free 0,5% } spray 5,0% Self-tan cream 4,5% Lotion 8,0% } Hair block 1,0% } 7,5% 3,0% } Sun stick 2,0% 7,5% } Total block 4,0% } lotion water 2,0% } resistant	4 7 15+ 15	UVB 280-320 UVB/A*270-350 UVB 280-320 UVB 290-315 UVB 280-320 UVB/A*270-350 UVB 290-315 UVB/A*270-350 UVA 320-390 UVB 290-315 UVB/A*270-350 UVB 320-390	X X X XX X X XX X X XX X X
Jeanne Gatineau	Robanda Sales (AIL:Y; SPL:Y; SPT: (—))	Methyl benzylidene camphor Butyl methoxy dibenzoyl methane Silica	(—) (—) } Creams (—)	2,3 4,5 6,9	UVB 290-320 UVA 320-390 ?	X X ?
Justine	Justine Cosmetics AIL:N; SPL:Y; SPT:Y,D)	Ethyl hexyl paramethoxy cinnamate Ethyl hexyl paramethoxy cinnamate Ethyl hexyl paramethoxy cinnamate Ethyl hexyl paramethoxy cinnamate Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Benzophenone 3 New ultra block lotion for 1991/2	2,5% Just Tan 1,7% Suntan gel 4,0% Suntan lotion 4,0% Waterfast lotion 7,5% } Block Out 3,0% } cream 7,5% } Block Out 4,0% } balm 7,5% 2,0% } Lotion 4,5%	2 2 4 4 10 10 15	UVB 280-320 UVB 280-320 UVB 280-320 UVB 280-320 UVB 280-320 UVA 320-390 UVB 280-320 UVA 320-390 UVB 280-320 UVA 320-390 UVB/A*270-350	X X X X X X X X X X X
Juvena	Africa Swiss Cosmetics (AIL:N; SPL:Y; SPT:Y,D)	Phenyl benzimidazole 5-sulphonic acid Butyl methoxy dibenzoyl methane Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Phenyl benzimidazole 5-sulphonic acid Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane Ethyl hexyl paramethoxy cinnamate	(—) } Rapid Tan (—) } cream (—) } Water sport (—) } milk (—) (—) } Total cover cream (—) (—) Self-tan cream	4 8 12 4	UVB 270-320 UVA 320-390 UVB 280-320 UVA 320-390 UVB 270-320 UVB 280-320 UVA 320-390 UVB 280-320	X X X X X X X X
Lancôme	Lancôme (AIL:N; SPL:Y; SPT:N)	Benzophenone 3 Ethyl hexyl paramethoxy cinnamate	3,5% } Conquête du Soleil 7,4% } sunblock	15	UVB/A*270-350 UVB 280-320	X X
Payot	Laboratories Payot (AIL:Y; SPL:Y; SPT(—))	New products for 1991/2 - details not yet available				
Reeva	Reeva Forman Ltd (AIL:N; SPL:N; SPT:N)	Ethyl hexyl paramethoxy cinnamate Ethyl hexyl paramethoxy cinnamate Ethyl hexyl paramethoxy cinnamate Butyl methoxy dibenzoyl methane	2,0% Lotion 4,0% Lotion 5,0% } Sage 1,0% } blockout	4 10 (—)	UVB 280-320 UVB 280-320 UVB 280-320 UVA 320-390	X X X X

... Sunscreens: Table II cont

Brand Name	Manufacturer/ Distributor (+ Labelling & Testing)	Active Ingredients	Concentration and Products	SPF	UV Wavelength Filtered (NM)	Possible Adverse Effects
Revlon	Revlon	4 new products for 1991 MANUFACTURER UNWILLING TO SUPPLY DETAILS				
Roc	Roc internationale (AIL:Y; SPL:Y; SPT:Y)	Phenyl benzimidazole 5-sulphonic acid	(–) Non-oily gel	4	UVB 270-320	X
		Phenyl benzimidazole 5-sulphonic acid	(–)		UVB 270-320	X
		Butyl methoxy dibenzoyl methane	(–) Invisible sunscreen	10	UVA 320-390	X
		Ethyl hexyl paramethoxy cinnamate	(–)		UVB 280-320	X
		Ethyl hexyl paramethoxy cinnamate	(–)		UVB 280-320	X
		Benzophenone 3	(–) Sunscreen stick	10	UVB/A*270-350	X
		Butyl methoxy dibenzoyl methane	(–)		UVA 320-390	X
		Ethyl hexyl paramethoxy cinnamate	(–) Total sunblock creams		UVB 280-320	X
		Benzophenone 3	(–) (tinted & water-	15	UVB/A*270-350	X
		Butyl methoxy dibenzoyl methane	(–) resistant colourless)		UVA 320-390	X

AIL:	Active ingredients on label
SPL:	SPF on label
SPT:	SPF confirmed by testing
*	UVB and part UVA
**	Reflects UVA/B and some visible
(–)	Information not supplied by manufacturer
!	Photosensitivity common
XX	May cause photosensitivity
?	Not known
X	Rare cases of photosensitivity
Y	Yes
N	No
D	DIN test method
F	FDA test method
S	SAA test method (Medunsa)
A	Awaiting

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Table 3. Recommended SPF values based on the Summers Skin Type/SPF conversion factor

Skin Type	SPF to tan (minimum)	SPF for high protection* (SPF tan x 4)
I	6	24
II	5	20
III	4	16
IV	3	12
V	2	8
VI	1	4

Note: * Because of advancing knowledge of the negative effects of sun exposure we have increased the recommended SPF values for high protection for all skin phototypes