SANTALIS
PHARMACEUTICALS

CORPORATE OVERVIEW

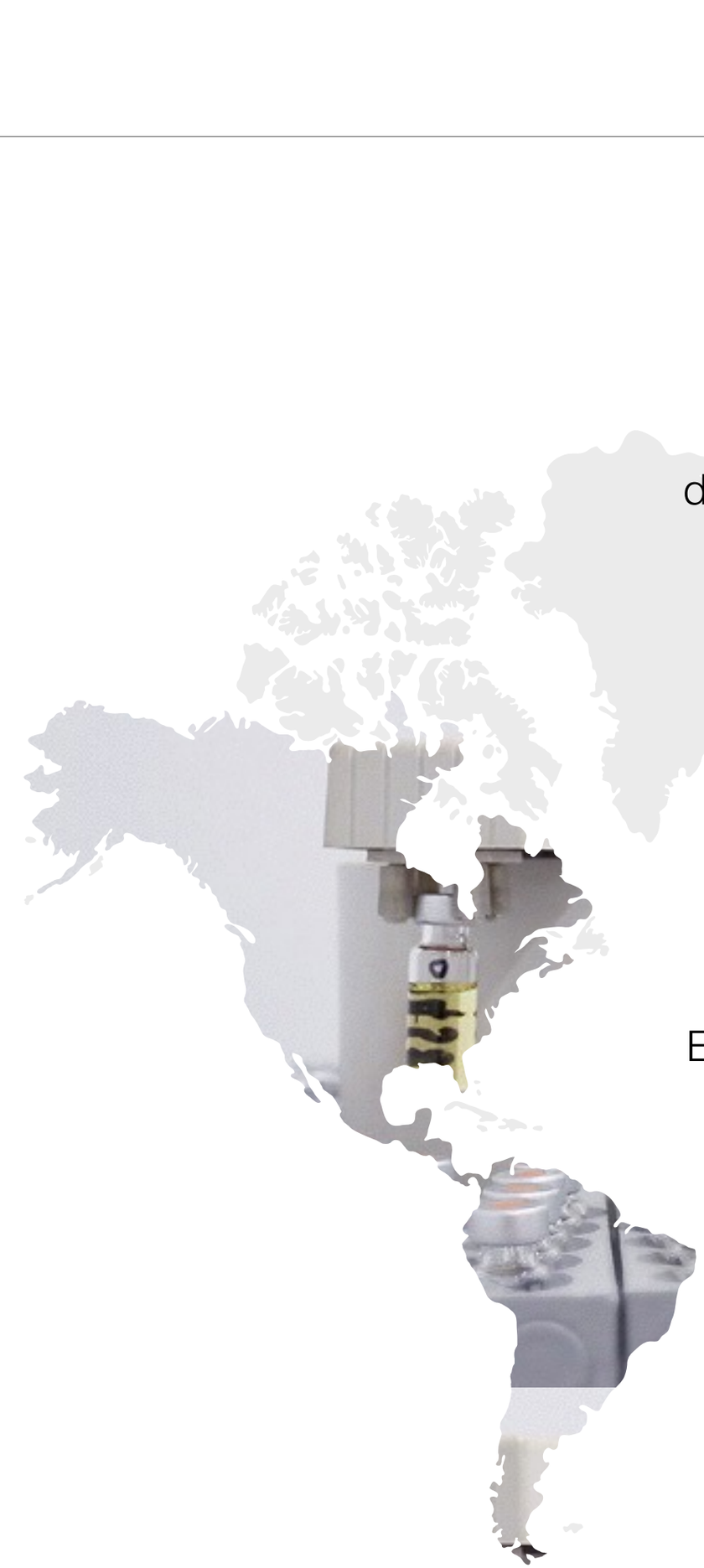
JP MORGAN HEALTHCARE CONFERENCE
SAN FRANCISCO, CA
JANUARY 9-12, 2017

SANTALIS - THE COMPANY

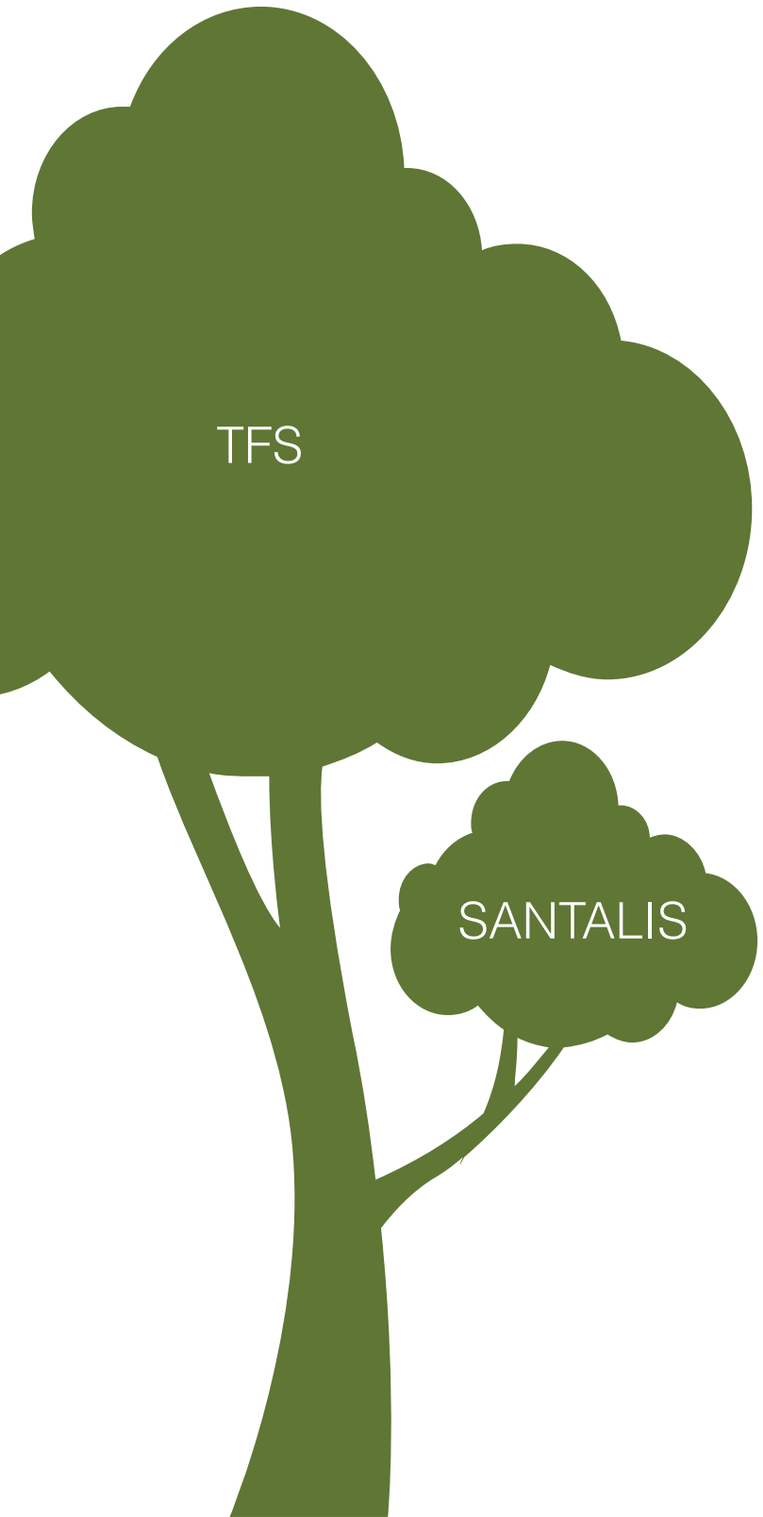
Santalis Pharmaceuticals, Inc. is a wholly owned, US-based subsidiary of TFS Corporation Ltd., specializing in the development of dermatological drugs based on East Indian Sandalwood Oil (EISO)

TFS is the world's leading Sandalwood plantation company and is listed on the Australian Securities Exchange (ASX:TFC) with a market capitalization of ~AUS$600M

Santalis has the exclusive world wide rights to TFS' sustainable, pharmaceutical grade EISO for healthcare uses and has a range of products targeting indications in both the OTC and Rx pharmaceutical markets



CORPORATE STRUCTURE



- Santalis is the product of a 2015 merger between TFS Corporation, Ltd. and two separately owned but co-managed companies, Santalis and ViroXis

- ViroXis was formed in late 2006 (TX “C” Corp) to pursue licensed IP related to the treatment of viral skin diseases with EISO (US patents and clinical data, inc. P2 HPV study). ViroXis was previously venture capital backed

- Santalis was formed in 2010 (TX “C” Corp) as a 50:50 joint venture with TFS to exploit non-viral uses of their EISO. Santalis was funded by TFS

- Together, Santalis and ViroXis (under the name Santalis) comprise the exclusive global rights to healthcare uses of TFS’ EISO (prescription drug and over the counter uses)

SENIOR MANAGEMENT

Paul Castella, PhD, MBA
Chief Executive Officer

Co-founder, Santalis Pharma and ViroXis Corp
Co-founder, President, BiO_2 Medical, CardioSpectra
Senior Partner, Co-founder, Targeted Technology Fund
PhD in Cell Biology - Cornell University Medical College, NYC

Ian Clements, MSc
Chief Operating Officer

Co-founder, Santalis Pharma and ViroXis Corp
Head of Commercial Operations, ILEX Oncology
Head of US Oncology Marketing, Novartis
Masters in Immunology - Kings College, London

Corey Levenson, PhD
Chief Scientific Officer

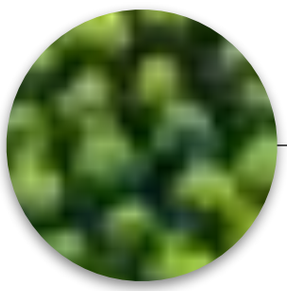
CTO, OncoVista
Senior Director, ILEX Oncology
PhD in Pharmaceutical Chemistry - UCSF, San Fransisco

Jim Traa, MBA
Chief Business Officer

VP, Caris Life Sciences
Senior Director, Genzyme Corporation
Commissioned Officer, US Navy

EAST INDIAN SANDALWOOD OIL

East Indian Sandalwood (*Santalum album*) is a semi-parasitic tree that takes decades to grow in the wild, where it is rapidly being depleted and is becoming endangered. To replace this dwindling resource, TFS has developed the world's most extensive plantations of East Indian sandalwood trees across northern Australia, as well as the infrastructure for processing the wood and EISO.



PLANTATIONS

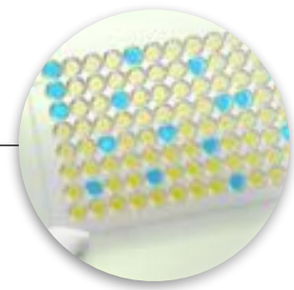
Over the last 16 years, TFS has planted more than12,000 hectares of East Indian Sandalwood trees, a semi-parasitic tropical hardwood, at a cost of ~$500M. In the wild, sandalwood is rapidly becoming an endangered species

SANDALWOOD

The trees are actively cultivated, along with several species of host trees, through to maturity at 15 years of age, at which time the entire tree is harvested for its heartwood

SANDALWOOD OIL

Sandalwood oil comprises about 3.7% of the weight of the heart wood and is produced by steam distilling the heartwood. In addition to uses in traditional medicine, EISO is a staple of the perfume industry



DRUG SUBSTANCE

TFS' EISO is produced to cGMP and ISO standards and is highly consistent and stable. It is the world's only pharmaceutical grade, sustainable, FDA acceptable EISO

BOTANICAL DRUG SUBSTANCE (API)

TFS' East Indian Sandalwood Oil (*Santalum album*) is the world's only source of sustainable EISO that meets quality and consistency requirements required by the FDA for pharmaceutical use

COMPOSITION

East Indian Sandalwood Oil (EISO) is a complex mixture of many sesquiterpenoids, mainly alpha- and beta-santalol, derived from the steam distillation of the tree's heartwood. The EISO drug substance (API) is the defined mixture established by Santalis with FDA

SUSTAINABILITY

Wild grown sandalwood from India is now either governmentally restricted or illegal to export, is considered a vulnerable species, and EISO from wild grown trees is NOT allowed by FDA for use in prescription drugs

REGULATORY

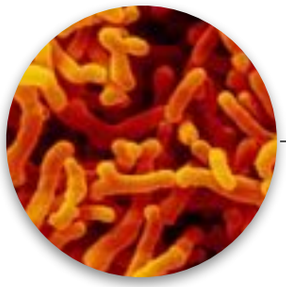
EISO is an ideal candidate for development under FDA's 2004 botanical drug development guidelines, due to its safety record, compositional and chemical stability, batch consistency and ease of formulation

QUALITY

TFS is the only source of pharmaceutical grade (cGMP ICH-Q7-API, ISO 3518) EISO and TFS maintains ISO 14,001 (environmental), 9,001 (Quality) and AS/NZ 4,801 (Health & Safety) standards across its operations

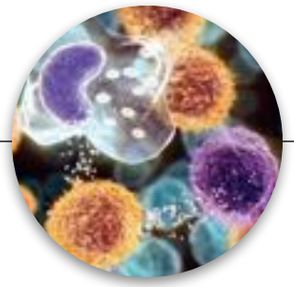
MEDICINAL PROPERTIES OF EISO

East Indian Sandalwood Oil (*Santalum album*) has been used in Ayurvedic and traditional medicine for thousands of years and is prized for its many health and religious benefits.



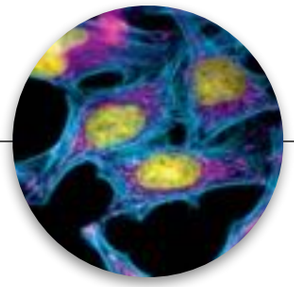
ANTI-INFECTIVE

EISO was traditionally on the US and British pharmacopeias to treat UTIs. EISO is highly effective at killing gram positive bacteria, including all drug resistant varieties tested (MRSA, TB, etc.) and most strains of fungi that cause skin disease



ANTI-INFLAMMATORY

EISO is a broad acting anti-inflammatory, inhibiting a wide range of chemokines and cytokines associated with disease, as well as reducing inflammation through inhibition of the COX enzymes (similar to the action of NSAIDs such as aspirin)



ANTI-PROLIFERATIVE

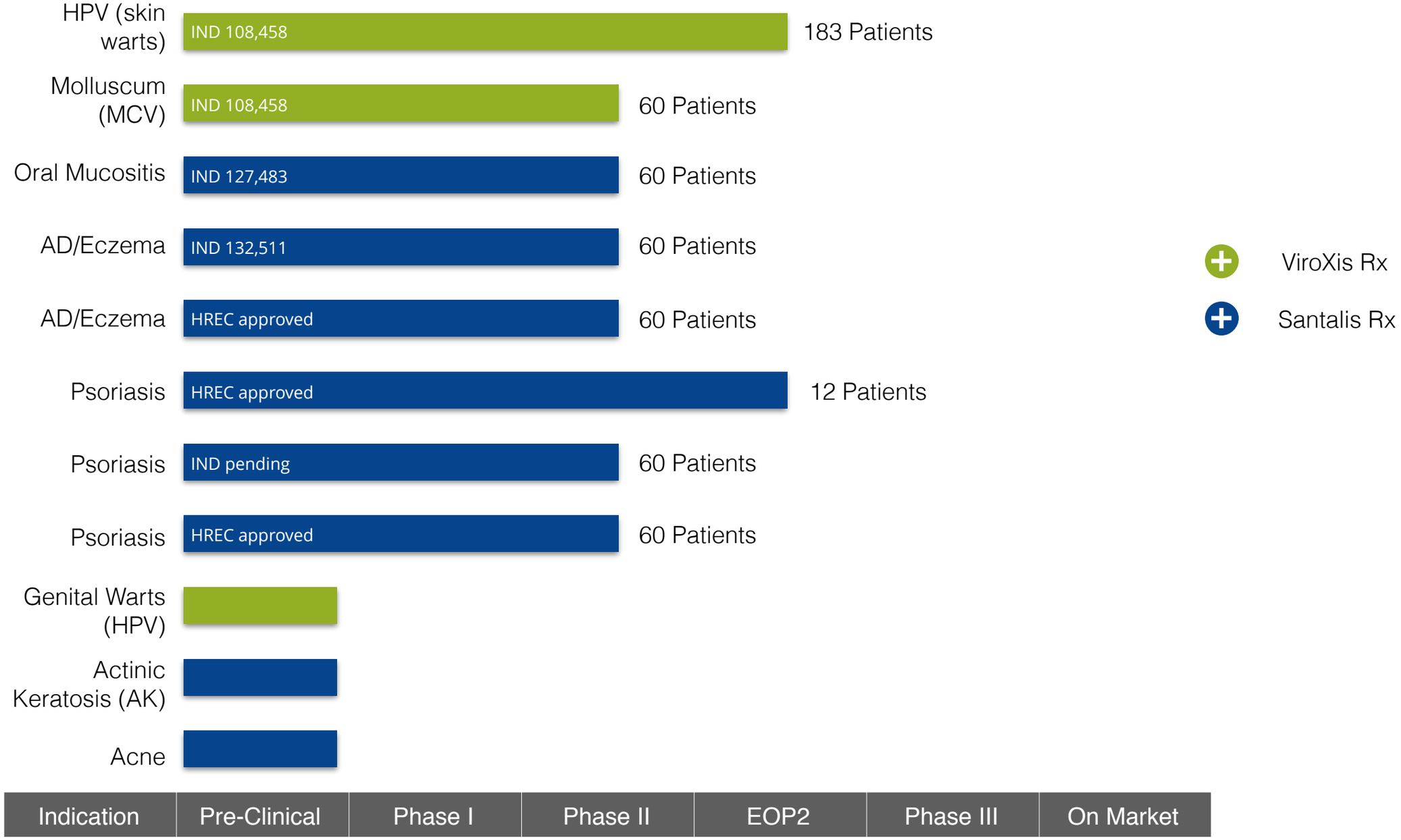
EISO acts through multiple pathways to induce cell cycle arrest and cell death in aberrantly diving cells (including cancer cells) without harming normally dividing cells

SAFETY PROFILE

EISO has been used for thousands of years in Ayurvedic and traditional medicine and is very well tolerated. Human testing shows it to be non-irritating and non-sensitizing. It is listed on the FDA food codex and is a listed medicine in Australia

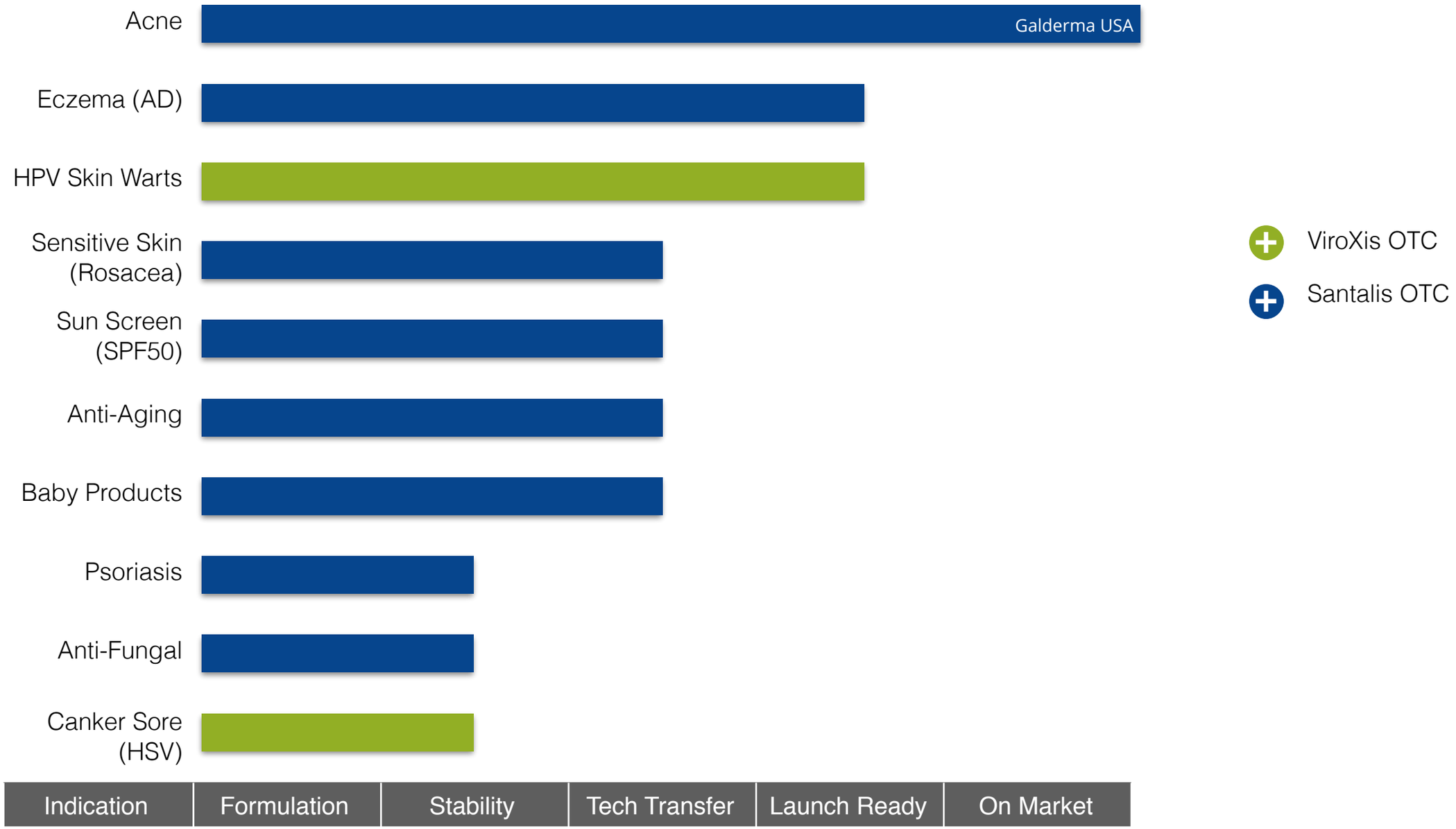
RX PORTFOLIO

Santalis will leverage (i) its monopoly supply of a unique drug candidate, (ii) the broad range of high value target indications, and (iii) its formulation and clinical development capability to maximize the yield on TFS' sole source of supply through license of its Rx and OTC products



OTC PORTFOLIO

EISO was extensively used in Western medicine prior to the advent of antibiotics and was on both the US and British Pharmacopeias. Santalis is reestablishing a BP monograph for TFS' pharma-grade EISO.



OTC PRODUCT LICENSING

- Santalis has developed a wide range of OTC formulations (US monograph) that exclusively contain TFS' EISO
- These products include several that are ready for production and are clinically supported with peer-review publications
- US rights to the Acne OTC products were licensed to Galderma SA and are sold in the US under the "Benzac®" brand
- Santalis is actively seeking world wide out-licenses to all remaining OTC (and cosmetic) formulations

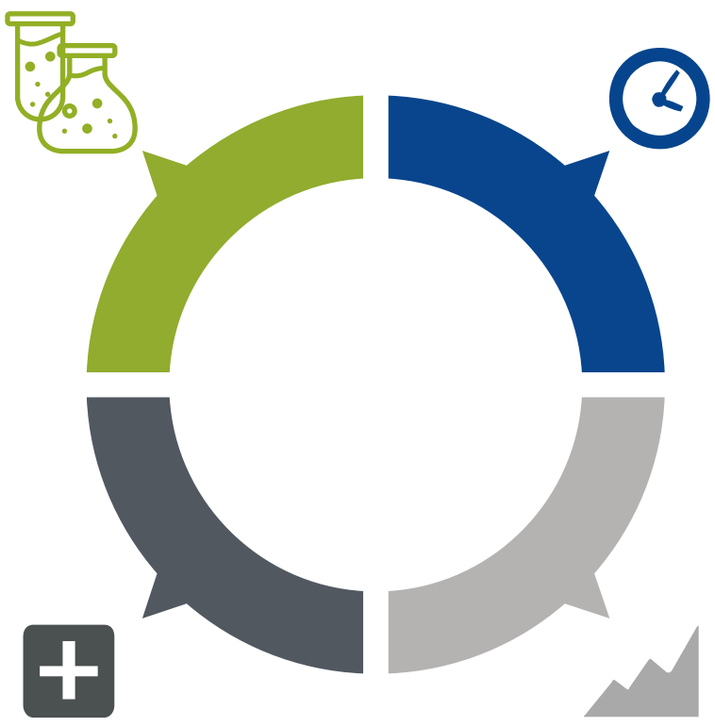
EISO RX VALUE PROPOSITION

UNIQUE API

EISO is a unique, non-substitutable botanical drug candidate

The only source of sustainable, ISO and cGMP specification, FDA acceptable EISO

EISO is compositionally consistent, chemically stable and easy to formulate



ACCELERATED PROGRAM

FDA botanical guidelines provide a lower cost and shorter timeframe for development (can enter clinic at P2 with no pre-clinical work)

EISO is listed on the FDA food codex (GRAS)

Comparative advantages of dermatology studies (cost, time, patient numbers)

UNIQUE CLINICAL BENEFIT

EISO has an exceptional therapeutic profile with multiple MOA and is extremely well tolerated

EISO targets disease-specific markers (such as PDE4, IL17) without the cost of biologics or the toxicity of small molecule compounds

LATE STAGE PORTFOLIO

Lead clinical candidate is entering FDA Phase 3 development (HPV, est. 2017)

Five Phase 2 programs ongoing in high value indications (multi-$B markets)

Multiple additional clinical candidates

SANTALIS VALUE PROPOSITION

Santalis is a uniquely positioned drug development company with a sole source supply of a valuable active pharmaceutical ingredient (API) that has multiple target indications in late stage development and a favorable risk/cost profile.

EXCLUSIVE EISO LICENSE

Unique, sustainable botanical drug (API)

Sole source supply - significant market protection

Low cost, rapid route to Rx approval

Multiple MOA suited to platform of indications

IP program - novel formulations, indications

CLINICAL STAGE RX PROGRAM

7 Phase 2 clinical studies across 5 indications

- HPV, MSV
- AD/Eczema, Psoriasis
- Oral Mucositis

Phase 3 IND program (HPV) initiation est. 2017

Numerous additional Rx targets (acne, AK, etc.)

OTC PRODUCT OPPORTUNITY

Suited to numerous OTC and healthcare uses

Unique market positioning as sustainably sourced, natural, safe botanical

Extensive portfolio of market ready products provides additional revenue streams

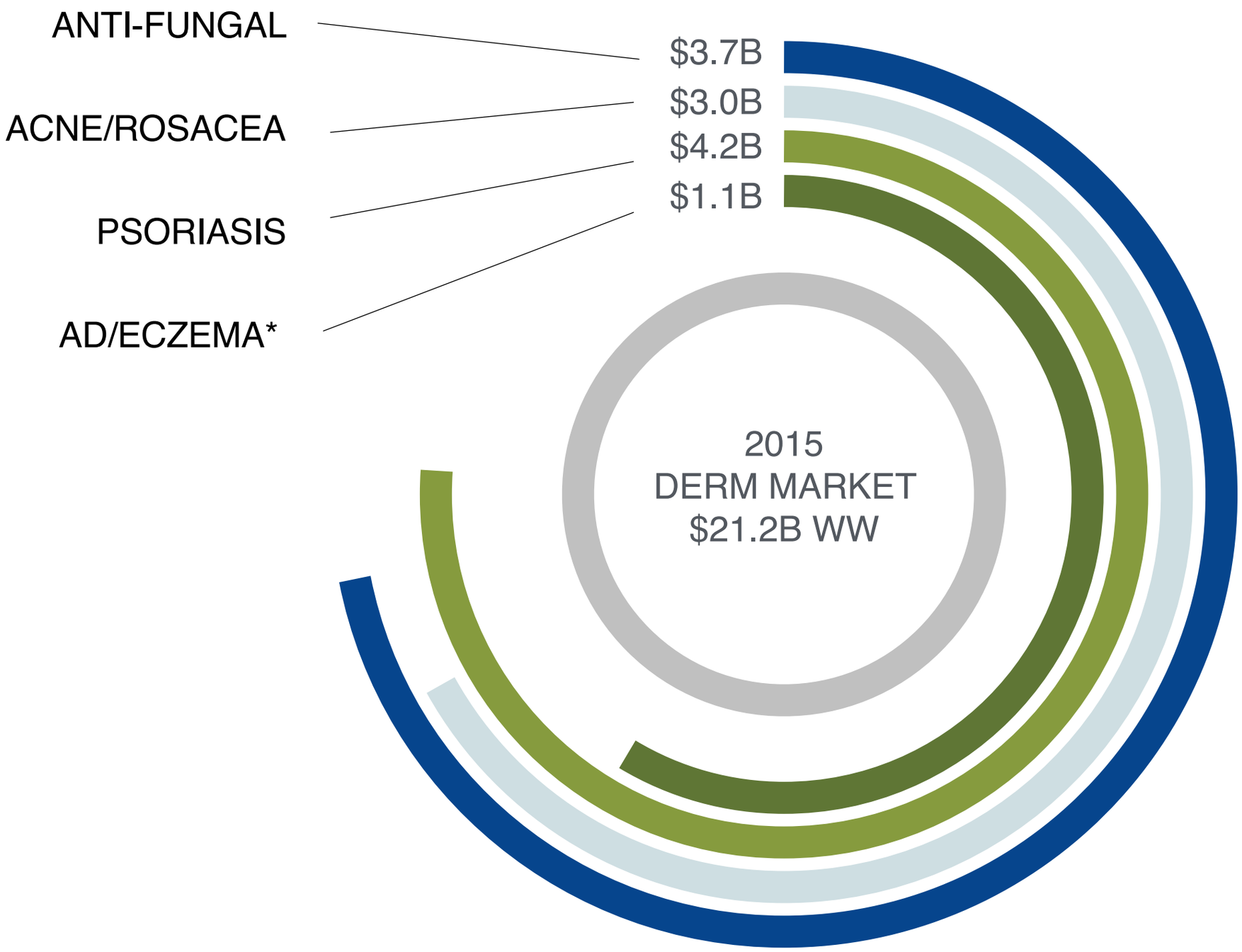
DERM COMPANY COMPARABLES

Dermatology is a highly attractive market space with numerous valuation comparables:

- Anacor
- Aclaris
- Demira
- Novan
- Foamix

EISO MARKET OPPORTUNITY

DERMATOLOGY MARKET OPPORTUNITIES



Note - There are no approved Rx drugs to treat HPV and MCV. *The AD/eczema market is expected to grow significantly now that new, biologic drugs have been developed (such as Regeneron's IL-4 targeting biologic, Dupiluimab, which showed a 36% RR at 3 months)

US HPV MARKET OPPORTUNITY

NO RX TREATMENTS

- Cryotherapy requires up to 6 treatments
- Cryotherapy response rate estimated at 49%*
- Significant side effects (pain, skin damage)
- Salicylic acid has a response rate estimated at 15%
- Significant side effects (pain, skin damage)
- HPV vaccines do not protect against common skin wart HPV strains

NO STANDARD OF CARE

- Cryotherapy, surgery, cauterization, topical keratolytic agents, immuno-modulation, or nothing!
- High recurrence rates, painful therapy and scarring
- Cosmetic issues limit the use of existing treatments
- Especially problematic for children, large or multiple warts and/or infections of the face

HIGH COSTS OF THERAPY

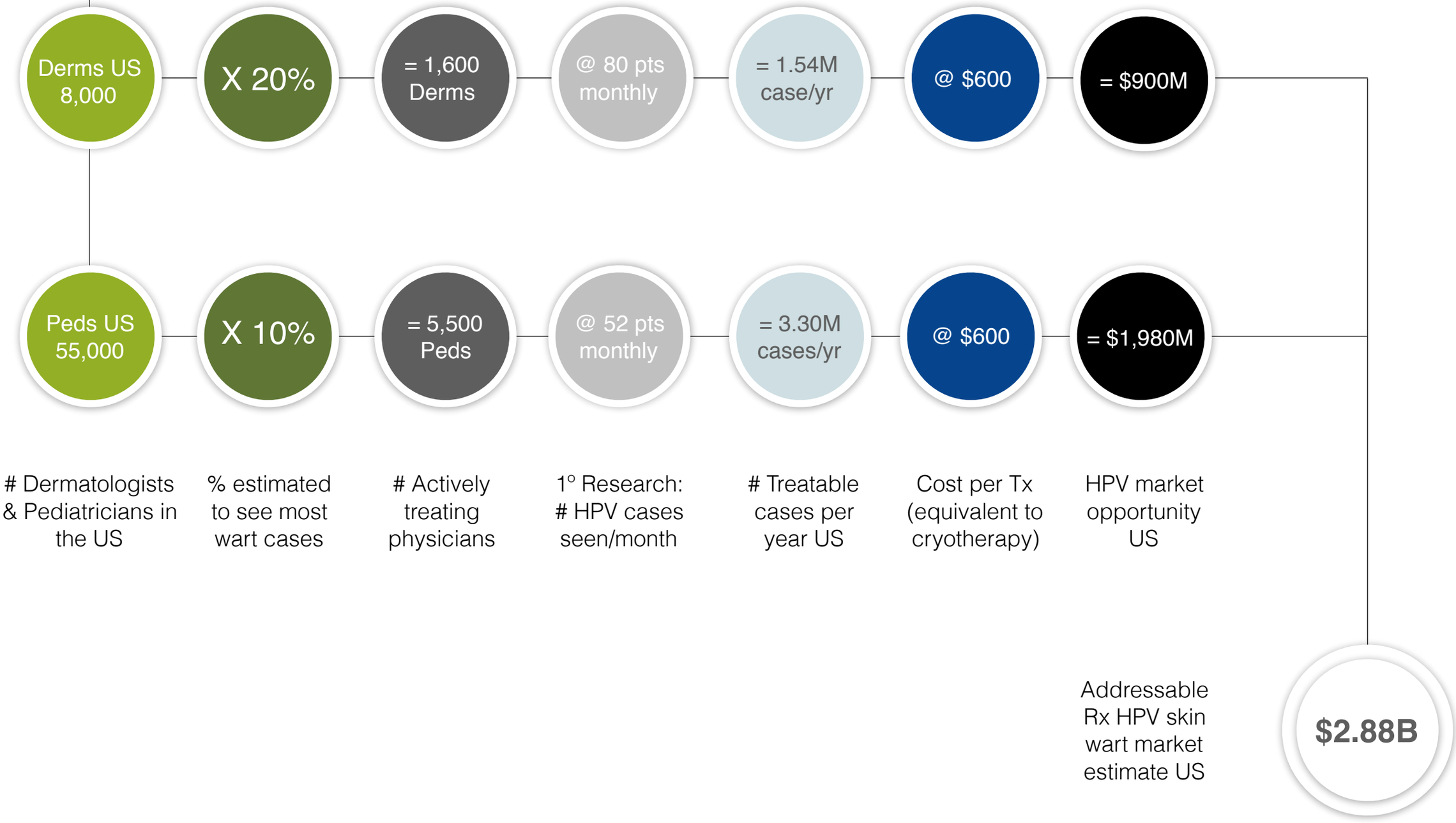
- Cryotherapy costs $610 for 3 visits (6 recommended)
- Laser Therapy (non-approved) ~$360 for 3 visits
- Bleomycin (non-approved, limited data) ~$495
- Veregen® for genital warts is $360-400/tube - total cost of Tx is $1,440-1,600 (off-label use)

LARGE UNMET CLINICAL NEED

- Prevalence: 11.9% of US population (>38.5M)
- Incidence: 10% in 1 to 18 age group (~7M)
- Substantial population seen by pediatric & dermatologists for problematic cases (>1M/year)
- Strong demand among dermatologists

**Randomized Controlled Trial of Cryotherapy with Liquid Nitrogen vs Salicylic Acid vs Wait and See for Cutaneous Warts: Bruggink et al, CMAJ, 2010*

US HPV MARKET OPPORTUNITY



CLINICAL PROGRAMS

ANTI-VIRAL RX STUDIES

Indication	IND #	Formulation	% EISO	Study Design	Trial Size	Status
HPV skin warts	108,458	Petrolatum based Ointment	10.0%	A Multi-Center, Double-Blind, Placebo-Controlled Phase 3 Trial to Evaluate the Efficacy, Safety and Tolerability of an EISO ointment for the Treatment of Common Warts (Verruca Vulgaris) in Children and Adolescents	450-600 patients over 18 months	EOP2 Meeting planned for Q1 2017
HPV skin warts	108,458	Petrolatum based Ointment	10/20/30%	A Multi-Center, Double-Blind, Placebo-Controlled Phase 2, Dose Ranging Trial to Evaluate the Efficacy, Safety and Tolerability of an EISO ointment for the Treatment of Common Warts (Verruca Vulgaris) in Adults	183 patients across 4 study arms	22% CR and 9% PR (>75% clearance) in 10% arm vs 0% CR and 0% PR for placebo in full compliance set. 4 minor AEs
HPV skin warts	50,075	cream (dermabase)	5.0% &10.0%	A Phase 2, randomized, double-blind trial using 5% or 10% alpha-santalol (EISO) in a cream base for the topical treatment of warts	48 patients (18 per arm)	26.7% CR in 10% arm, 6.7% in 5% arm, 0% in placebo arm. 2 minor AEs
HPV skin warts	NA	100% EISO	100%	Open label investigator sponsored (Children's Hospital, Columbus OH) trial of 100% EISO to treat HPV skin warts	10 patients	80% CR, 20% PR, no AEs
HPV skin warts	NA	sandalwood soap	<5.0%	Investigator sponsored (Children's Hospital, Columbus OH) Phase I/II randomized, double blind placebo controlled study of EISO soap to treat HPV skin warts	37 patients: 20 placebo, 17 treatment + 3 crossovers	74% CR and 16% PR in active arm vs 10% CR and 5% PR for placebo. No AEs
Molluscum contagiosum (MCV)	108,458	Oil in Water Emulsion with skin Permeators	10.0%	A Single-Center, Double-Blind, Placebo-Controlled, Randomized Safety and Efficacy Phase 2 Trial of VIR003 at One Dose Level for the Treatment of Molluscum Contagiosum in Pediatric Subjects	60 patients over 12-18 months	Currently enrolling patients
Molluscum contagiosum (MCV)	NA	sandalwood soap	<5.0%	Investigator sponsored (Children's Hospital, Columbus OH) Phase I/II open label study of EISO soap to treat MCV	10 patients	90% CR, 10% PR, No AEs

RX STUDIES

Indication	IND #	Formulation	% EISO	Study Design	Trial Size	Status
Eczema / AD	132,511	Cream - Oil in water mild emollient base	5.0%	A Single-Center, Double-Blind, Placebo-Controlled, Randomized Safety and Efficacy Phase 2 Trial of EISO cream at One Dose Level for the Treatment of Atopic Dermatitis (Eczema) in adult Subjects. (28 days of treatment)	60 patients	Currently enrolling patients
Eczema / AD	TGA Allowed, HREC approved	Cream - Oil in water mild emollient base	5.0%	A Single-Center, Double-Blind, Placebo-Controlled, Randomized Safety and Efficacy Phase 2 Trial of EISO cream at One Dose Level for the Treatment of Atopic Dermatitis (Eczema) in pediatric and adult Subjects. (28 days of treatment)	60 patients	Currently enrolling patients
Oral Mucositis	127,483	Mouth rinse	0.25%	A Single-Center, Open Label, Proof of Concept Trial to Evaluate the Efficacy, Safety, Tolerability of New Botanical Drug Product containing East Indian Sandalwood Oil (EISO) for the Prevention and Treatment of Oral Mucositis Induced by Radiation Therapy, with or without Concurrent Chemotherapy	10 patients	Currently enrolling patients
Psoriasis	TGA Allowed, HREC approved	Serum with penetration enhancers for maximum absorption	10.0%	A 45 Day, Multi-Center, Open-Label, Efficacy, Safety and Tolerability Phase 2 Trial of SAN021 for the Treatment of Moderate Psoriasis in Adults	60 patients	Currently enrolling patients
Psoriasis	submitted to FDA Q4 2016	Serum with penetration enhancers for maximum absorption	10.0%	A 45 Day, Multi-Center, Open-Label, Efficacy, Safety and Tolerability Phase 2 Trial of SAN021 for the Treatment of Moderate Psoriasis in Adults	60 patients	Ready to enroll, pending IND approval
Psoriasis	TGA Allowed, HREC approved	Serum with penetration enhancers for maximum absorption	10.0%	An open label Phase 2 28 day study of EISO serum to treat mild to moderate plaque psoriasis in adults	12 patients	7/11 (68%) patients experienced a ≥ 1.0 reduction in their IGA score by 28 days of treatment. 3/11 patients showed an improvement of <1.0. All reductions statistically significant. 1 mild AE

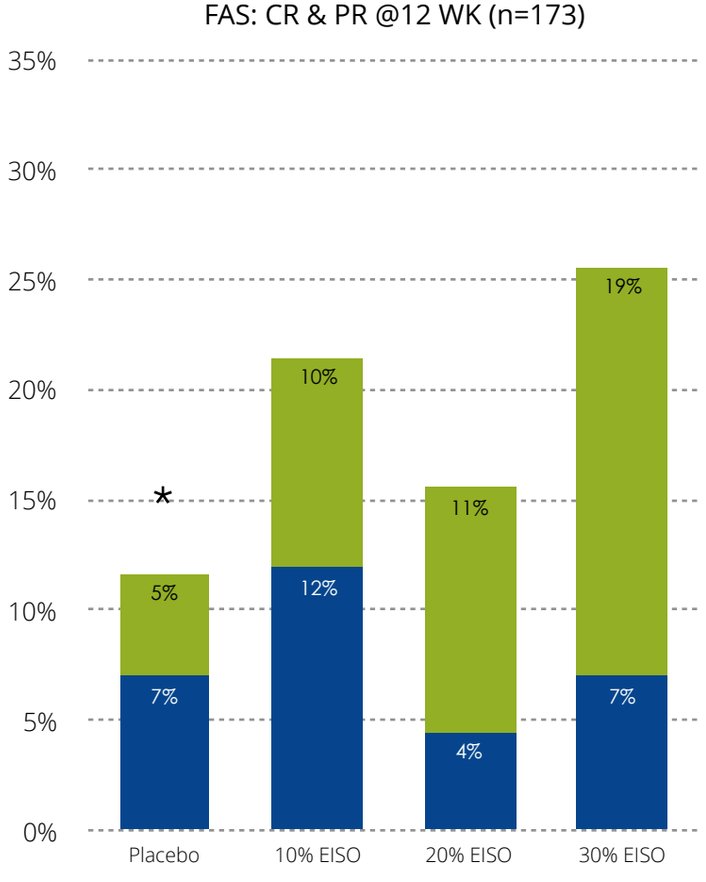
HPV PHASE II STUDY

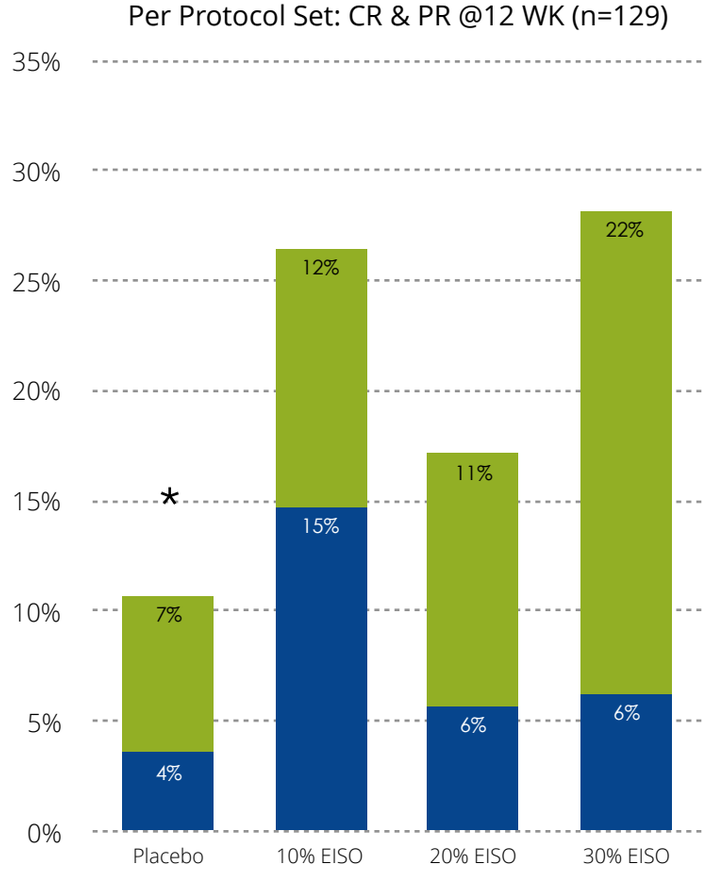
- Complete response (CR) was determined as a complete resolution of all treated warts within 12 weeks
- Partial response (PR) was determined as a 75% or greater reduction in wart area within 12 weeks of treatment

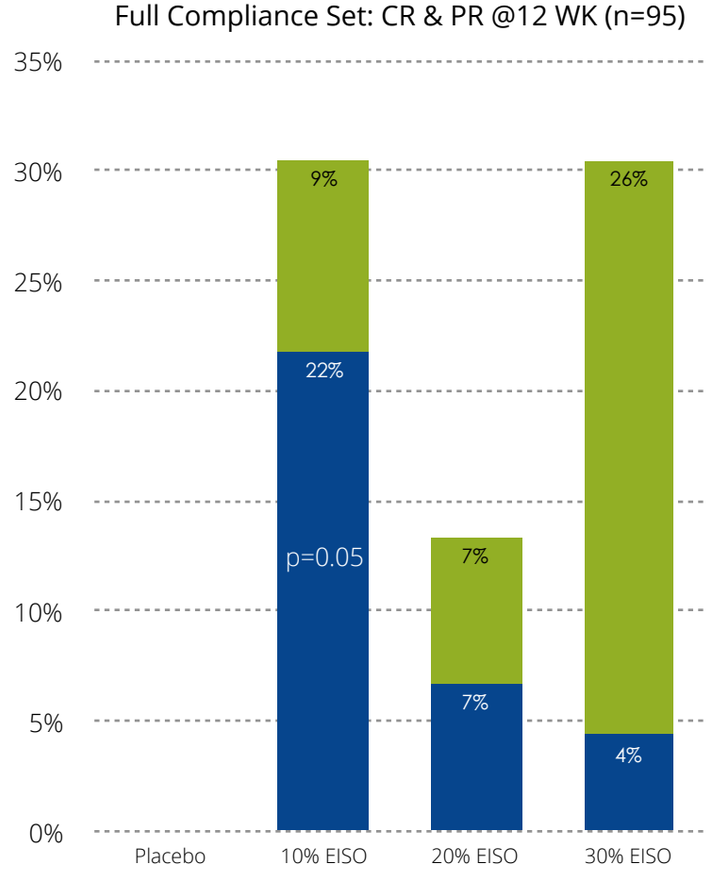
173 patients were included in the Full Assessment Set (FAS) and attended at least on study visit.

129 patients met the per protocol (PP) requirements from the full assessment set (FAS) of 173 enrolled into the study. Exclusion criteria included patients who did not stay on the study for at least 77 days, or failed to attend visits within scheduled periods.

95 patients met the sponsor compliance requirements from the study. Full study compliance criteria included removing patients who were determined to not have warts (blinded dermatologist analysis), did not use sufficient product (<33% of calculated dose), or did not have photos taken during visits to enable verification of response.







* One FAS placebo patient was erroneously recorded as a CR and two FAS placebo patients as a PR to a data entry errors (0% clearance at all other time points).

HPV PHASE II STUDY CASES

BEFORE

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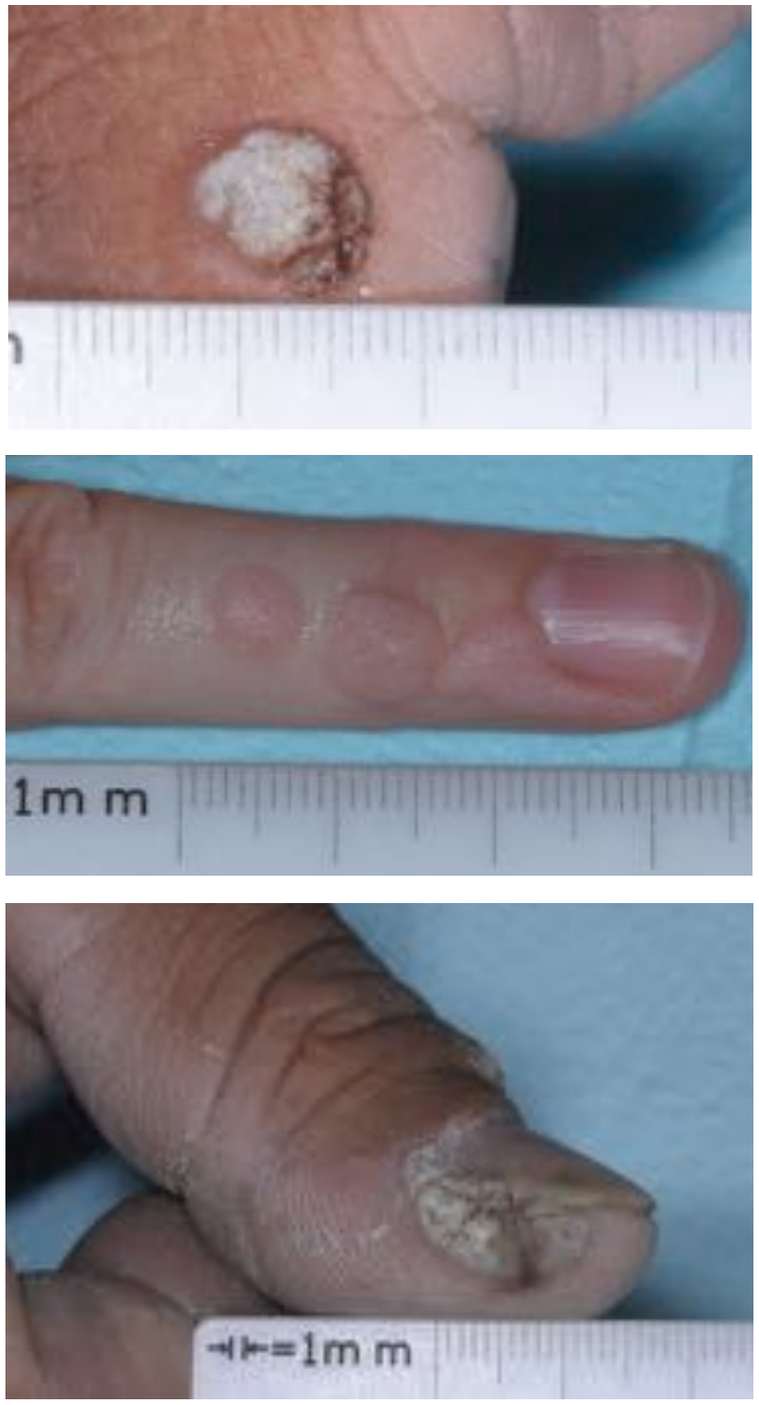
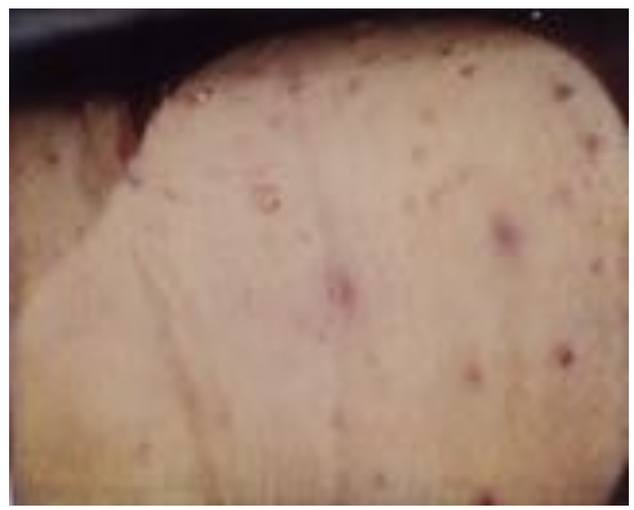
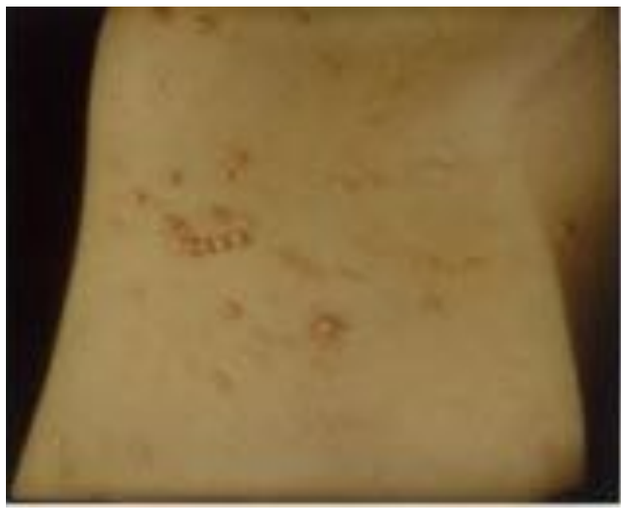


INVESTIGATOR SPONSORED MCV STUDY CASES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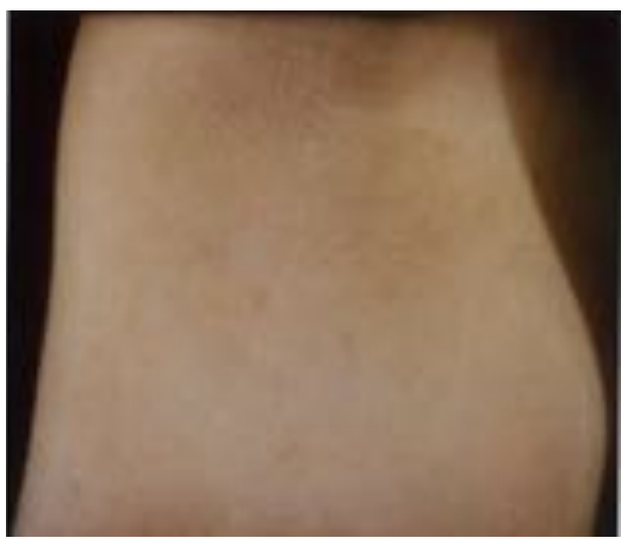


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PSORIASIS PHASE II STUDY CASES

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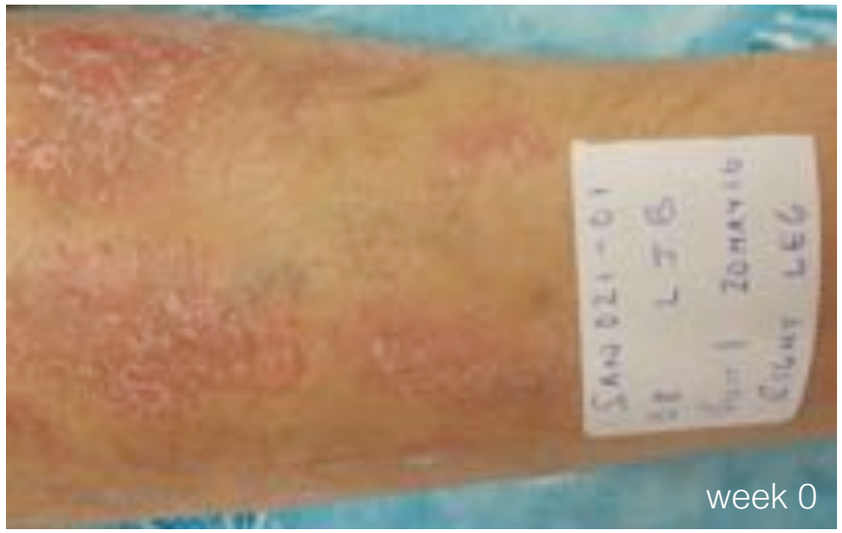

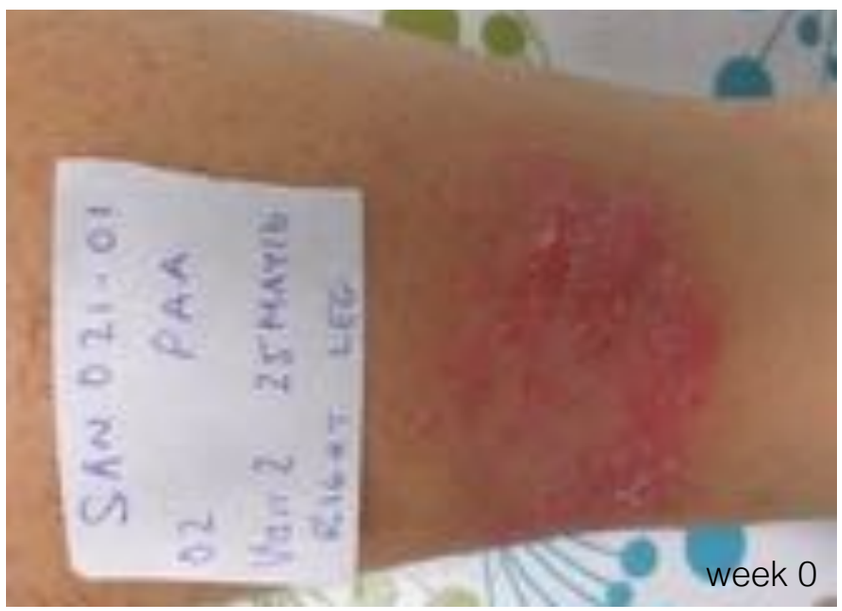

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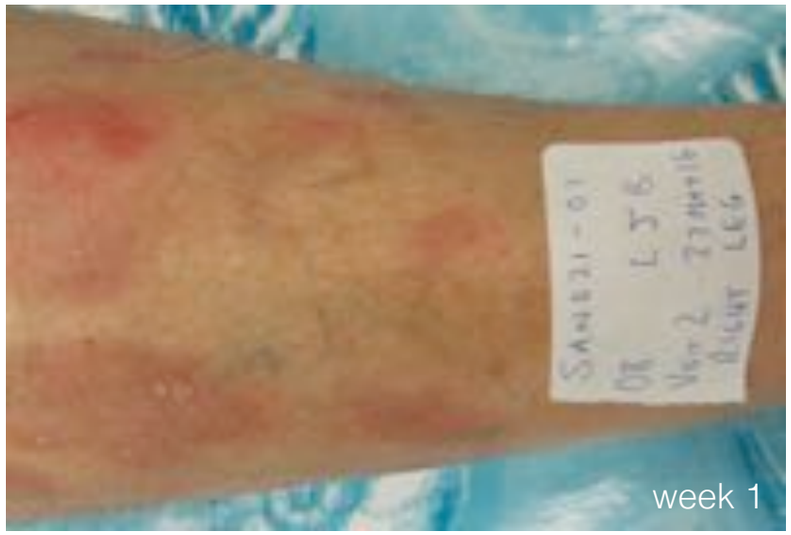
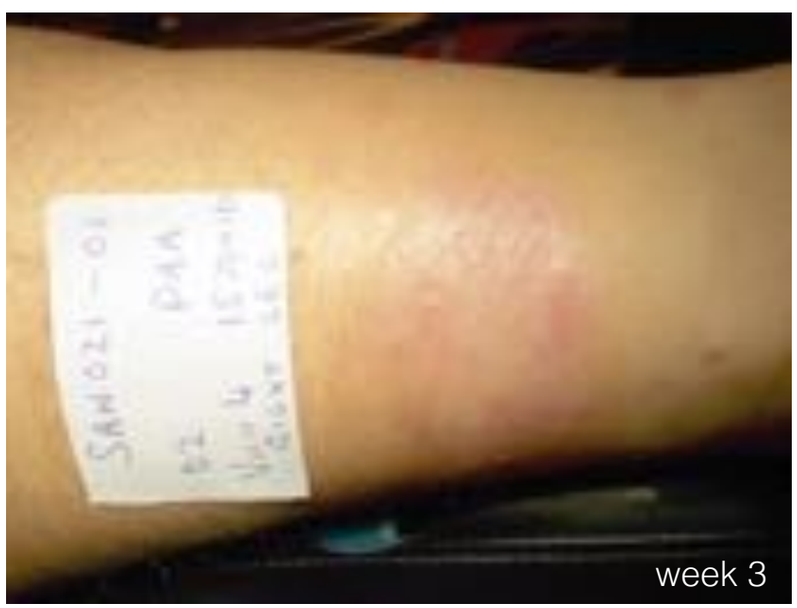
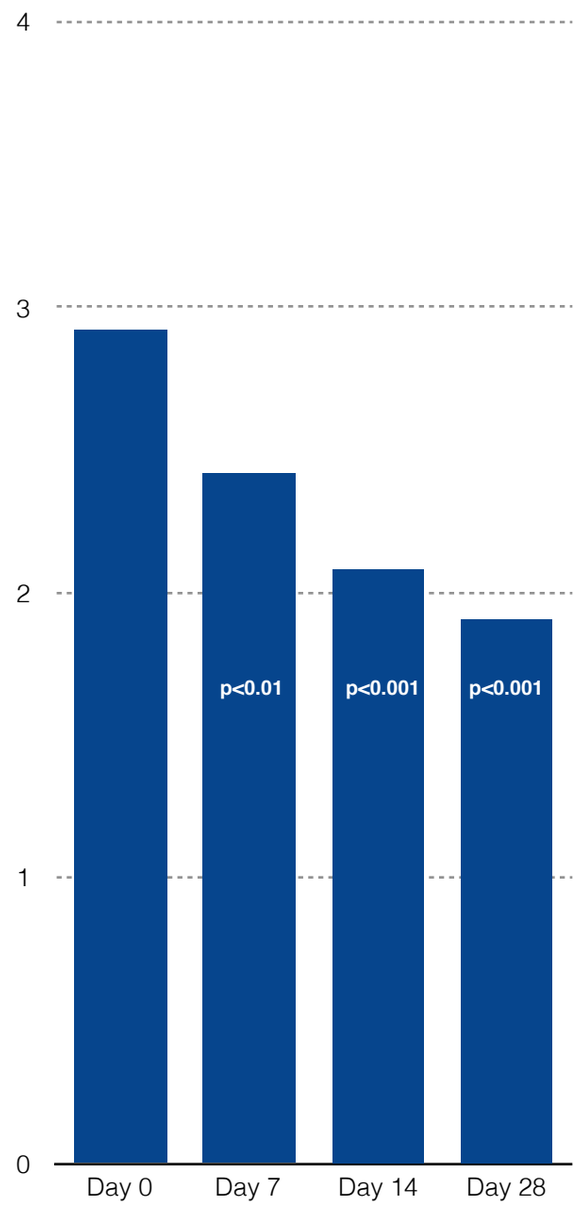




Investigator Global Assessment

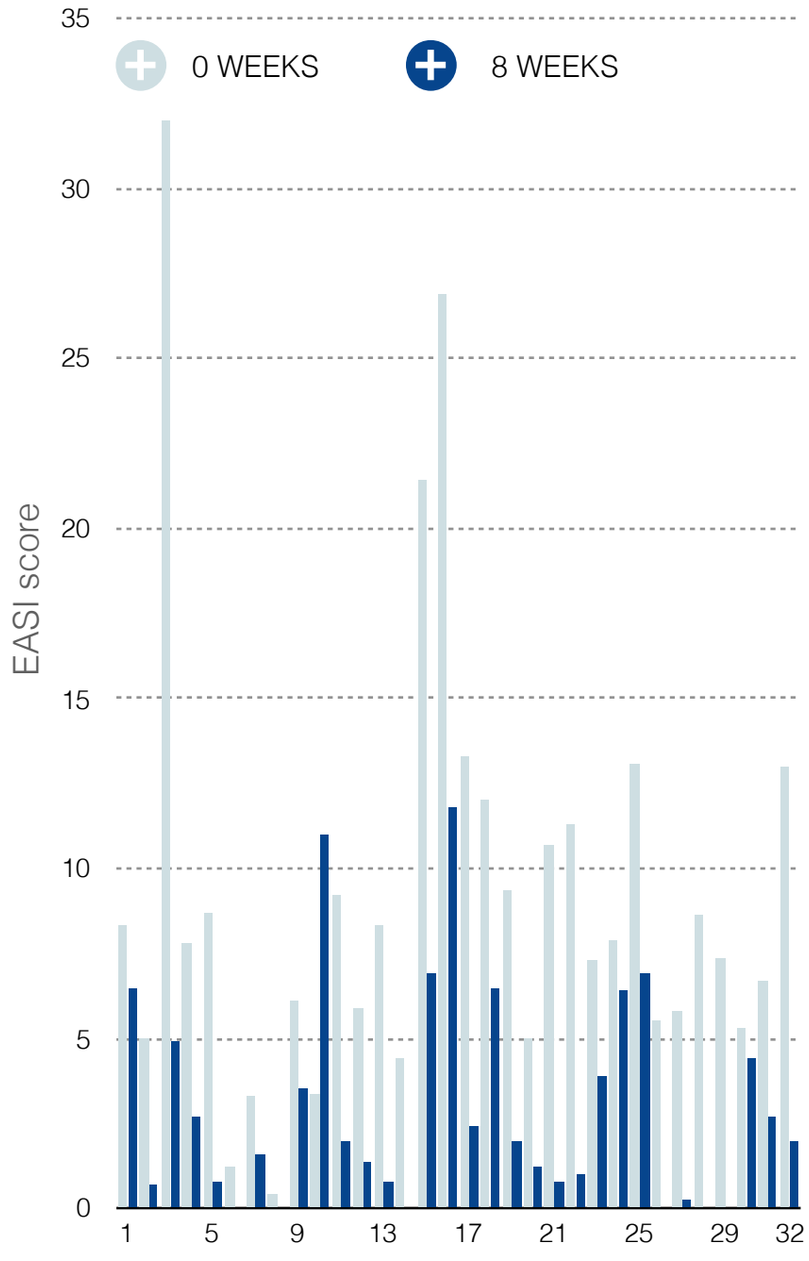
Scoring Day 28 (n=12)



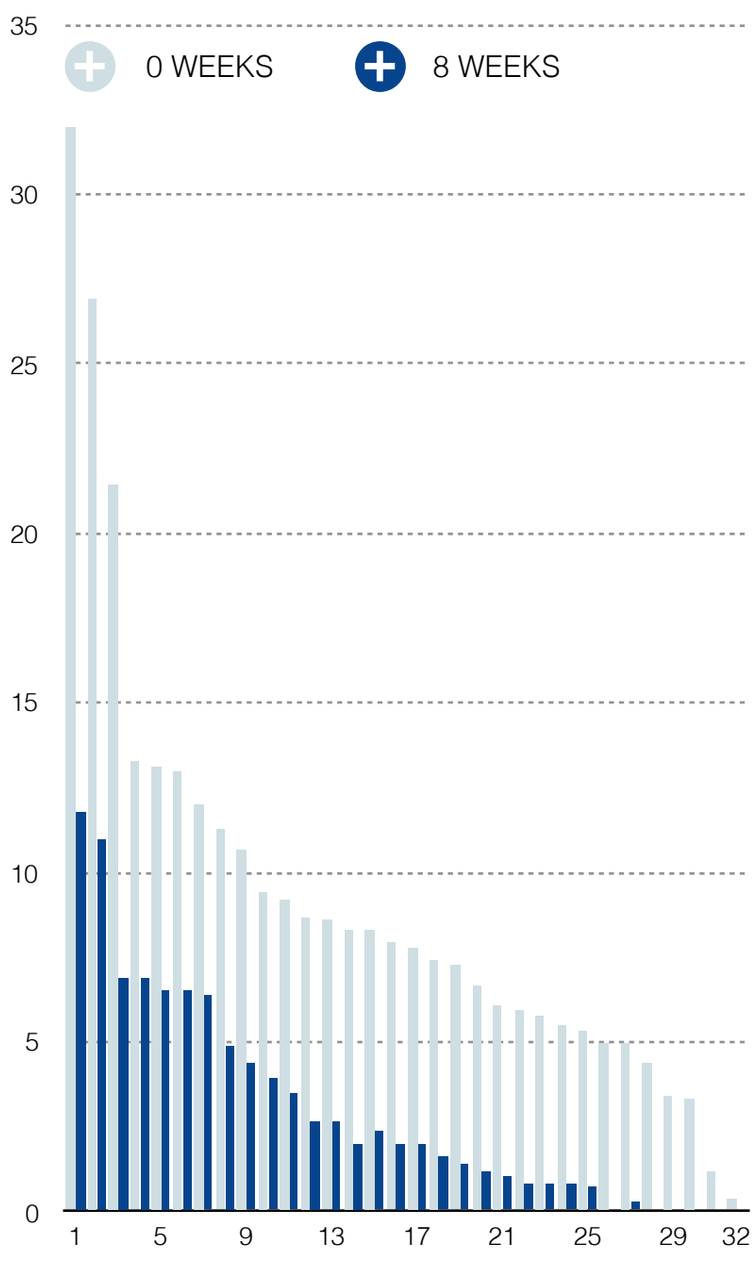
AD/ECZEMA STUDY

A clinical study of the EISO eczema treatment regimen in an open label Phase 2 study of 32 mild, moderate & severe pediatric patients showed a **68% reduction** in eczema severity (from 9.21 to 2.97 average EASI score)

Change in EASI score by patient 0-8 weeks



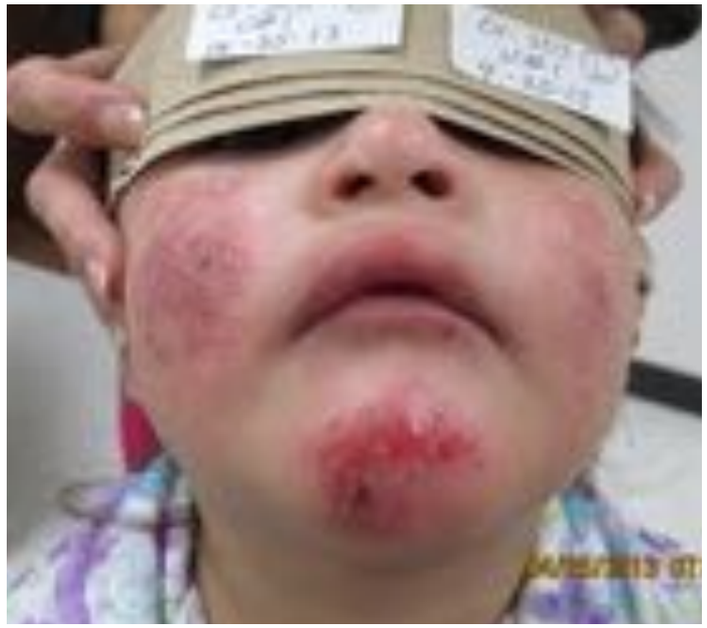
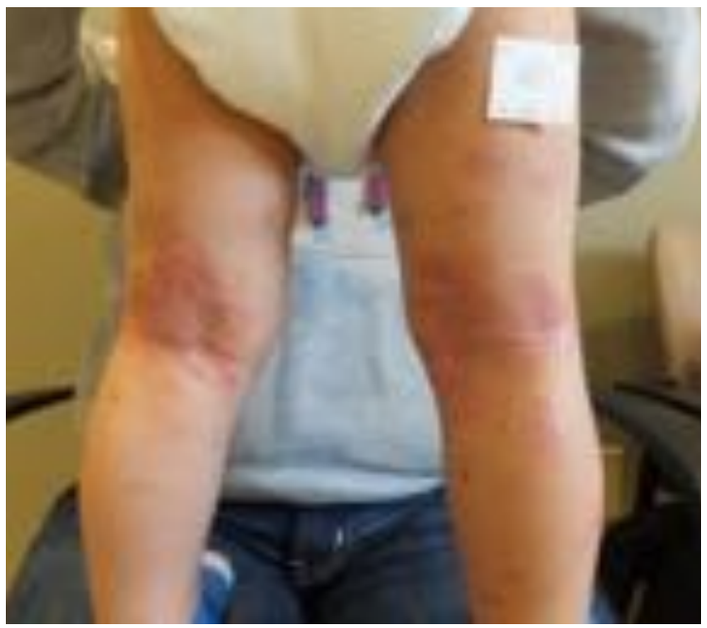
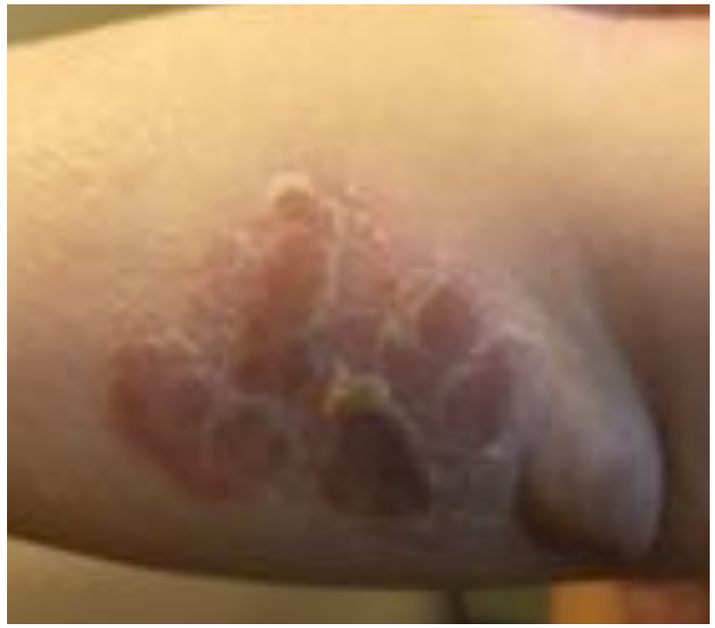
Ranked EASI score change 0-8 weeks



- **87.5%** of patients (28/32) met the 1° endpoint (a 25% or greater reduction in their EASI score)
- **75.0%** (24/32) of patients had a >50% reduction of their eczema EASI score
- **18.8%** (6/32) of patients had a complete remission of their eczema
- The 8 week study treatment course was well tolerated and there were no safety issues or adverse events (AEs)

AD/ECZEMA STUDY CASES

BEFORE

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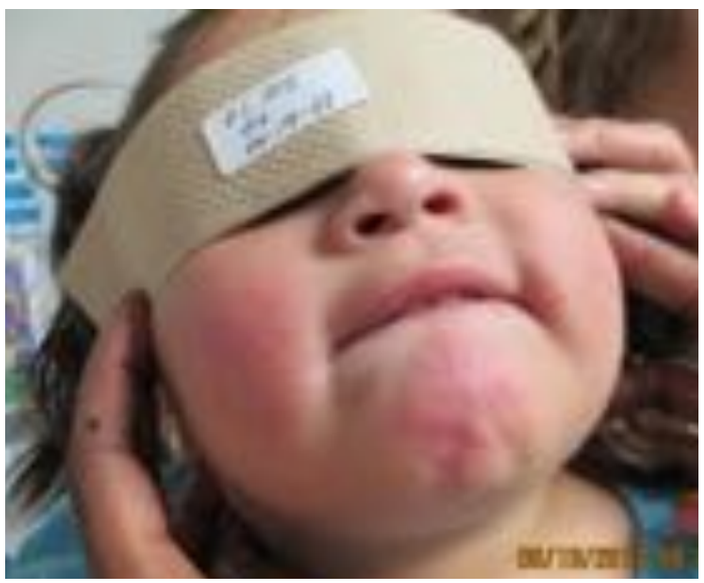
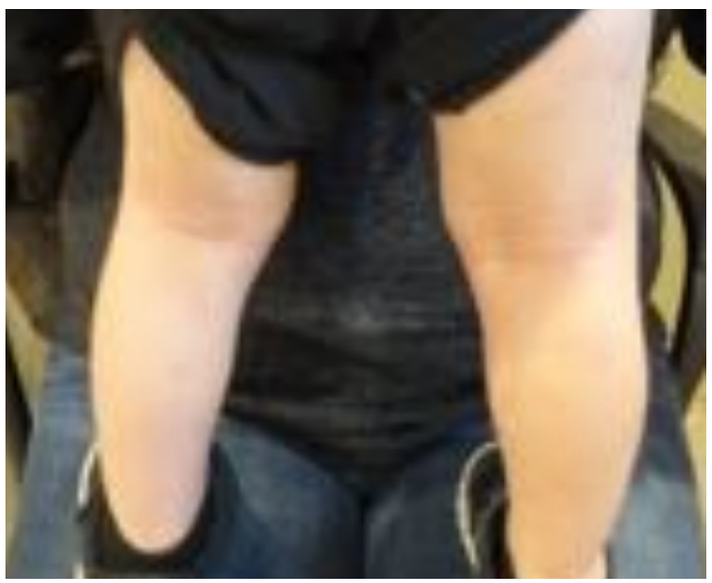
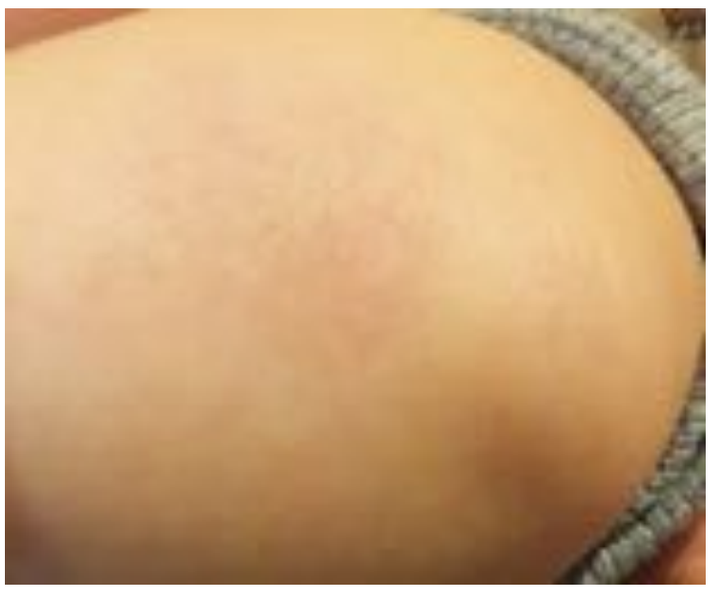
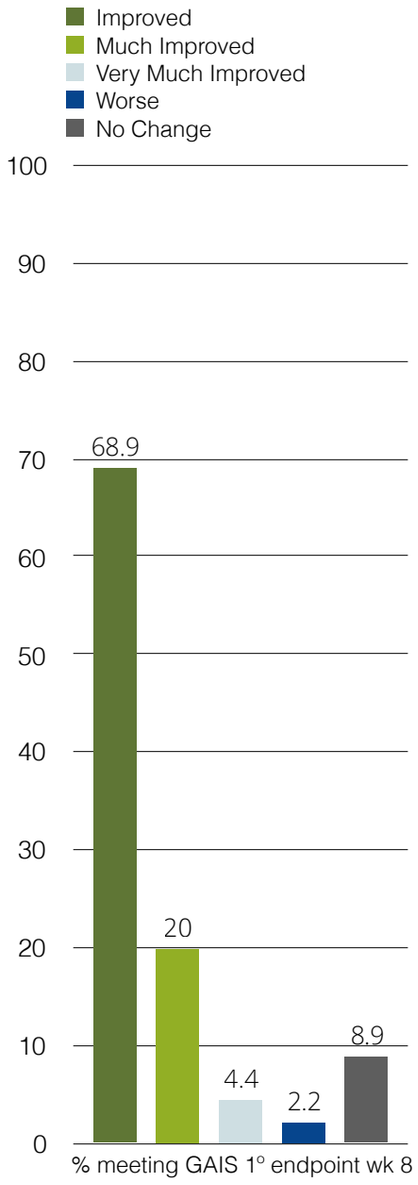
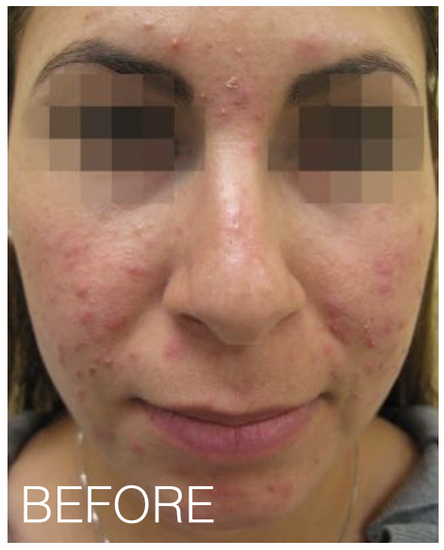
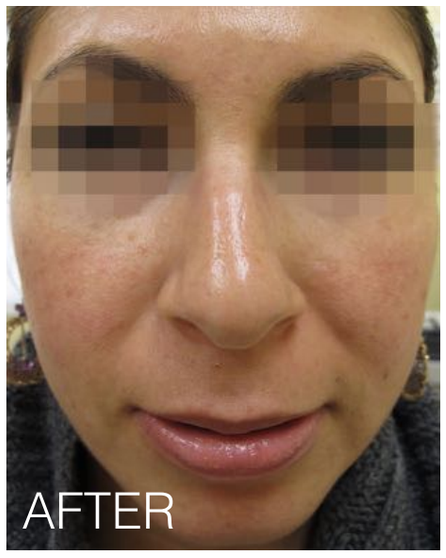




OTC ACNE

The acne regimen was designed to treat both the P. acnes and the inflammation associated with acne, and to enable skin defoliation with minimal irritation or drying. Our open label Phase II clinical trial for the OTC acne regimen was conducted by Dr. Ronald Moy, past president of the American Academy of Dermatology and published in the Journal of Drugs in Dermatology.







EISO is clinically validated to quickly reduce acne with few side effects:

Patients with mild to moderate acne were treated for eight weeks and assessed using the GAIS scale of acne severity as the primary endpoint.

The acne regimen contains low levels of salicylic acid per US monograph requirements in addition to EISO.

- **89.4**% met the 1° endpoint (8 wk)
- **91**% saw improvement in 2 weeks
- Notable reductions in lesion counts were seen in patients with severe, inflamed lesions
- The treatment was well tolerated with minimal side effects, such as drying or redness

ORAL MUCOSITIS (INTERIM)

Oral mucositis (OM) is a common and often debilitating complication of cancer treatment that results from the painful inflammation and ulceration of the mucous membranes lining the mouth and digestive tract.

Oral mucositis affects almost all patients undergoing high-dose chemotherapy and hematopoietic stem cell transplantation, 80% of patients with malignancies of the head and neck receiving radiotherapy, and a wide range of patients receiving chemotherapy.

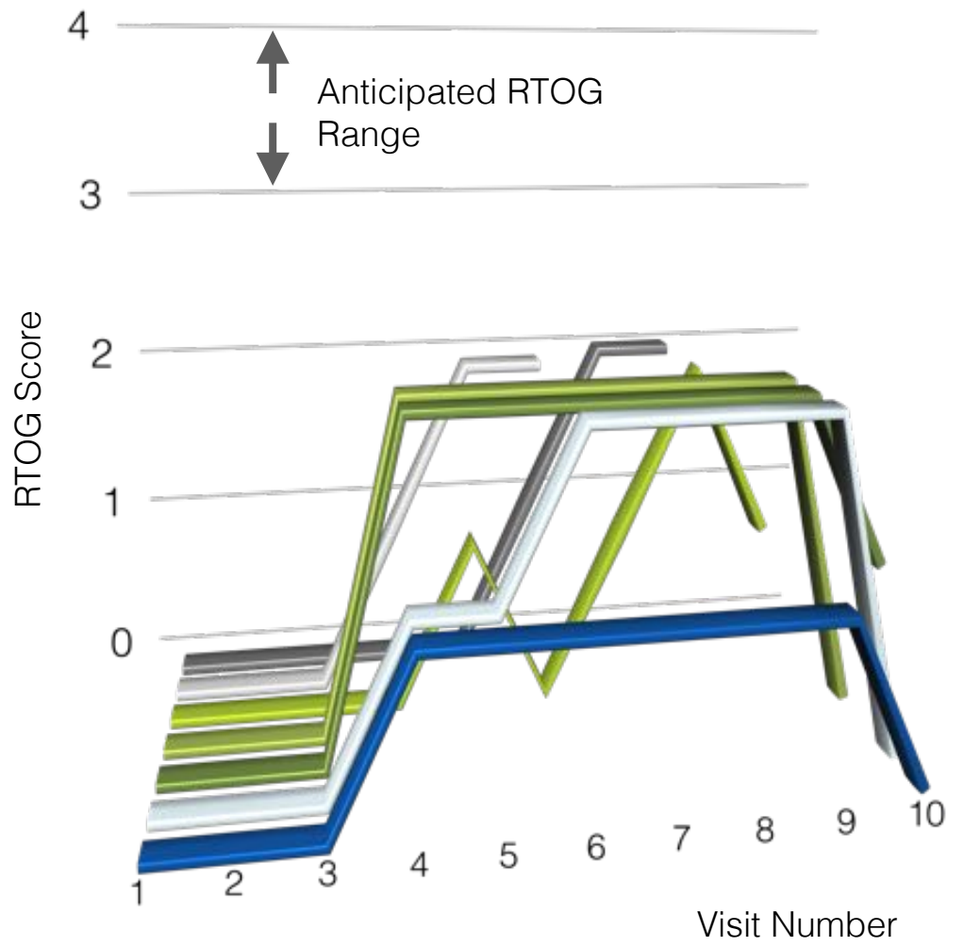
In Grade 3 oral mucositis the patient is unable to eat solid food, and in Grade 4, the patient is unable to consume liquids as well. There are no treatments to control this side effect.

Radiotherapy to the head and neck in combination with chemotherapy is associated with Grade 3 and Grade 4 oral mucositis, typically exceeding 90% of patients.

Santalis' OM Phase 2 proof of concept study was designed to determine if an oral rinse containing low levels of EISO would be safe and well tolerated for patients undergoing high dose radiation therapy (≥60 gy) with or without chemotherapy or biological therapies. 90%+ of this patient population would be expected to experience grade 3 or 4 OM and all would be expected to require nutritional support via a PEG feeding tube.

Patients were asked to rinse 3X daily with 15ml of the EISO solution and were evaluated for OM during routine treatment visits. Our interim data of the seven patients who were compliant with the protocol showed that the highest RTOG score for OM was a "2" and that three of the patients ended with a "0" score and two with a '1" score. Furthermore, two of the patients did not require PEG tube-administered nutrition.

Accordingly, the study is being scaled up to show if this lower than expected severity of OM can be demonstrated in a larger, placebo controlled study.



SCIENTIFIC DATA - OVERVIEW

MECHANISMS OF ACTION

EISO - a multi-action botanical drug candidate that can target a variety of conditions

ANTI-INFECTIVE

- Anti-bacterial & Anti-fungal
- Effects on membranes (porosity)
- Effects on cellular metabolism (protein synthesis, etc.)

ANTI-INFLAMMATORY

- Effects on cyclooxygenase (COX) pathway/prostaglandins
- Effects on pro-inflammatory chemokines & cytokines, blocks PDE4 activation
- Free-radical scavenging properties

ANTI-PROLIFERATIVE

- Effects on apoptosis pathways
- Effects on autophagy pathways
- Cell cycle arrest (microtubule dynamics)

ACNE

ONYCHOMYCHOSIS

MRSA

MOLLUSCUM

C. DIFFICILE

ROSACEA

PSORIASIS

AD/ECZEMA

ACTINIC KERATOSIS

PRURITIS

ORAL MUCOSITIS

HPV SKIN WARTS

BLADDER CANCER

Psoriasis

Aff. cases < 5[1] Aff. cases > 5 Nashville Biosciences

Gene	SNP	SNP_ type	Phenotype	P-value	Odds ratio	Affected cases
CASP9	rs146054764	Missense	Psoriasis vulgaris	0.000283	5.53	5
	rs146054764	Missense	Psoriasis	0.001939	4.29	5
	rs146054764	Missense	Psoriasis and related disorders	0.002474	4.14	5
PARP4	rs145290616	Missense	Psoriasis vulgaris	0.004443	5.68	3
	rs145290616	Missense	Psoriasis	0.01487	4.41	3
	rs145290616	Missense	Psoriasis and related disorders	0.01702	4.28	3
PARP15	rs9880647	Silent	Psoriasis and related disorders	0.01988	0.84	212
	rs9880647	Silent	Psoriasis	0.02346	0.84	203
TUBB1	rs62639974	Missense	Psoriasis	0.03132	3.63	3
	rs62639974	Missense	Psoriasis and related disorders	0.03659	3.49	3
PARP14	rs11719086	Missense	Psoriasis vulgaris	0.04023	0.81	106
KDR	rs56286620	Missense	Psoriasis vulgaris	0.04379	2.48	5

Eczema / Atopic dermatitis (AD)

Aff. cases < 5[1] Aff. cases > 5 Nashville Biosciences

Gene	SNP	SNP_ type	Phenotype	P-value	Odds ratio	Affected cases
CASP9	rs2308941	Missense	Chronic dermatitis due to solar radiation	0.007126	1.75	26
	rs2308941	Missense	Dermatitis due to solar radiation	0.01331	1.66	27
	rs1052571	Missense	Chronic dermatitis due to solar radiation	0.03287	0.86	288
	rs1052576	Missense	Chronic dermatitis due to solar radiation	0.03388	0.86	288
KDR	rs1870377	Missense	Chronic dermatitis due to solar radiation	0.02857	0.83	163
	rs1870377	Missense	Dermatitis due to solar radiation	0.03059	0.84	178
PARP1	NULL	Missense	Atopic/contact dermatitis due to other or unspecified	0.03102	0.21	2
PARP10	rs11136344	Missense	Contact dermatitis and other eczema due to plants [except food]	0.02841	0.41	8
PARP15	rs12489170	Missense	Chronic dermatitis due to solar radiation	0.03908	0.79	90
	rs12489170	Missense	Dermatitis due to solar radiation	0.04415	0.81	99
PARP4	rs1822135	Missense	Atopic/contact dermatitis due to other or unspecified	0.008707	1.25	154
	rs9511259	Missense	Atopic/contact dermatitis due to other or unspecified	0.01051	1.25	153
	rs1372085	Missense	Atopic/contact dermatitis due to other or unspecified	0.01274	1.24	152
PARP8	rs142626343	Missense	Acute dermatitis due to solar radiation	0.00221	18.22	1

Oral mucositis

Aff. cases < 5[1] Aff. cases > 5 Nashville Biosciences

Gene	SNP	SNP_ type	Phenotype	P-value	Odds ratio	Affected cases
CASP8	rs3769824	Missense	Stomatitis and mucositis	0.04164	0.68	29
PARP12	rs35456446	Missense	Stomatitis and mucositis	0.04291	0.67	26
PARP4	rs147633033	Missense	Stomatitis and mucositis	0.00105	2.73	11
	rs1050114	Missense	Stomatitis and mucositis	0.003465	2.25	14
	rs147633033	Missense	Stomatitis and mucositis (ulcerative)	0.007082	3.8	4
PARP9	rs146564634	Missense	Stomatitis and mucositis	0.01615	1.93	14

- Gene that produces protein targeted by alpha-santalol
- Single nucleotide polymorphisms in each gene that were examined
- Type of single nucleotide polymorphis m (best are missense and nonsense)
- Disease phenotypes associated in patients that have the SNP in question
- Strength of association score (the lower the better)
- Direction of association - >1 shows risk, <1 shows protection
- Number of patients with disease + SNP in database

TARGET VALIDATION

EISO has an extensive record of clinical usage derived from traditional and Ayurvedic medicine, as well as in Western medicine. However, Santalis has drawn on state of the art genetic analysis to identify and validate key clinical opportunities for further development

In particular, we have teamed up with researchers that utilize a 350,000 patient strong database of disease phonemes and associated genetic characterizations (single nucleotide polymorphism, or SNP) to identify promising targets for EISO, based in its known molecular interactions (Caspases, tubulins, NFkB, etc.)

Utilizing this “pheWAS” approach, we have confirmed that psoriasis, oral mucositis and eczema have a very high predictive correlation of clinical success (85-99%)

PUBLICATIONS

Acne | Moy et al, JDD, Dec 2012

Publication of results from the clinical study of the OTC acne kit in 50 patients, showing very strong efficacy and tolerability at 8 weeks as determined by a quantitative measure used in Rx studies. Published in the December 2012 edition of the Journal of Drugs in Dermatology.

Anti-inflammation | Sharma et al, Phytotherapy Research, Dec 2013

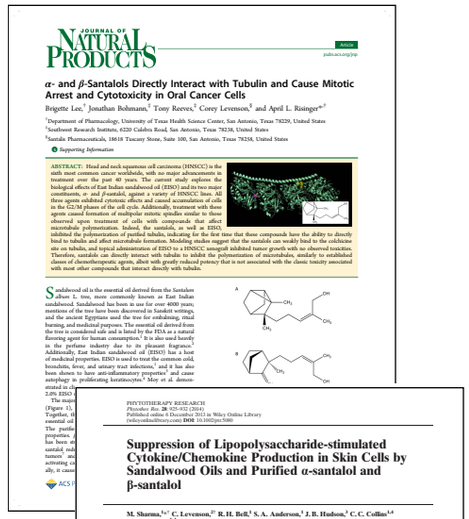
Publication of results from the study of EISO and santalols in skin cell co-cultures (collaboration with University of British Columbia): Suppression of Lipopolysaccharide-stimulated Cytokine/Chemokine Production in Skin Cells by Sandalwood Oils and Purified α-santalol and β-santalol

Anti-proliferation | Dickson et al, Archives of Biochemistry and Biophysics, July 2014

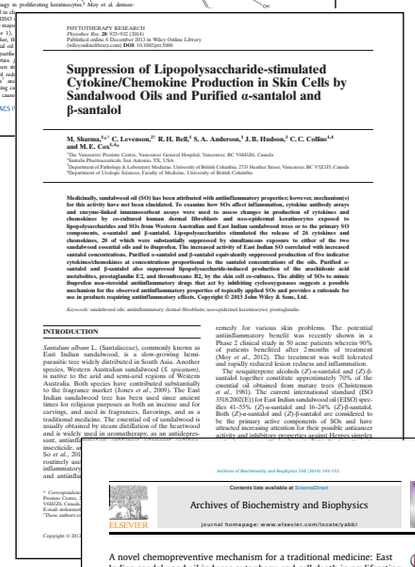
Publication of the results of the study of the potential skin cancer chemopreventive properties of EISO (collaboration with Arizona Cancer Center): A novel chemopreventive mechanism for a traditional medicine: East Indian sandalwood oil induces autophagy and cell death in proliferating keratinocytes

Anti-proliferation | Lee et al, Journal of Natural Products, June 2015

Publication of the results from the study of EISO in oral cancer cells in vitro and in vivo (Collaboration with UT Health Science Center San Antonio): α-and β-santalols directly interact with tubulin and cause mitotic arrest and cytotoxicity in oral cancer cells


JOURNAL OF NATURAL PRODUCTS

α- and β-Santalols Directly Interact with Tubulin and Cause Mitotic Arrest and Cytotoxicity in Oral Cancer Cells


PHYTOTHERAPY RESEARCH

Suppression of Lipopolysaccharide-stimulated Cytokine/Chemokine Production in Skin Cells by Sandalwood Oils and Purified α-santalol and β-santalol

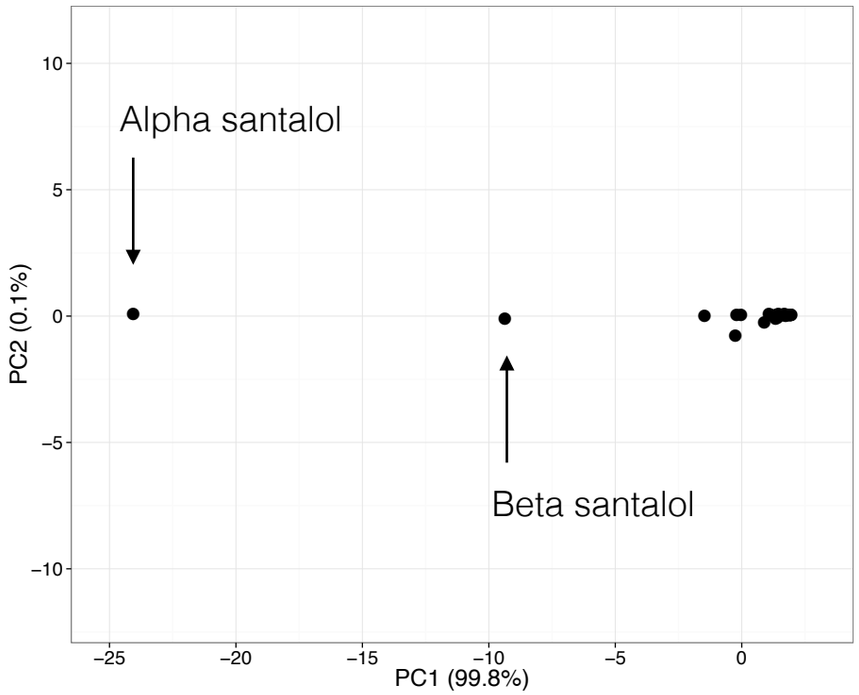

Archives of Biochemistry and Biophysics

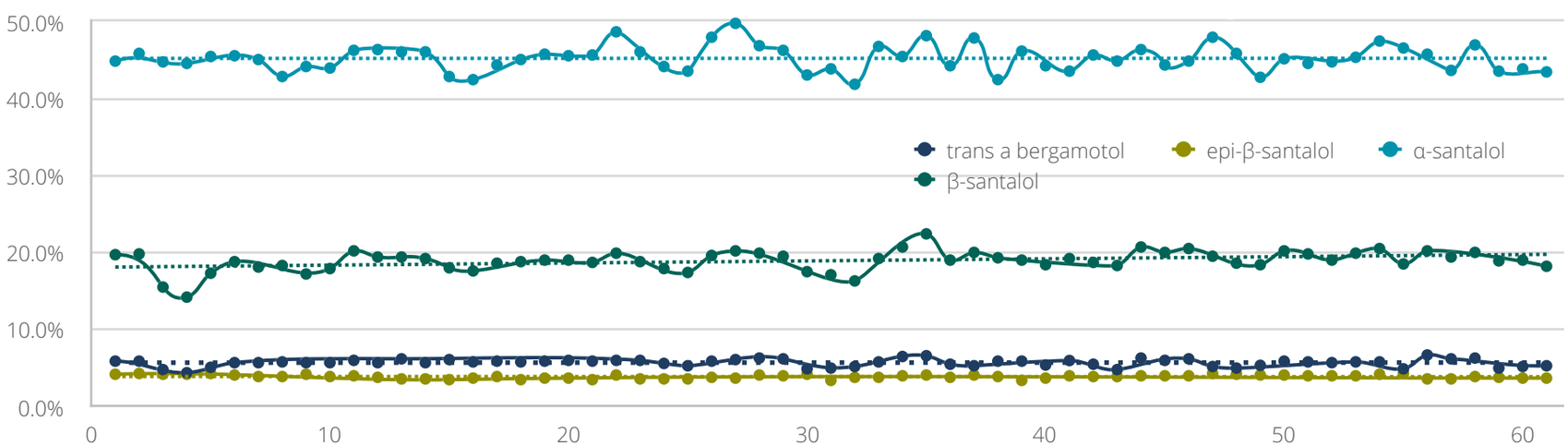
A novel chemopreventive mechanism for a traditional medicine: East Indian sandalwood oil induces autophagy and cell death in proliferating keratinocytes

BATCH CONSISTENCY

TFS' EISO meets FDA CMC requirements for a botanical drug substance, with minimal unblended batch to batch variation of the major components. Furthermore, EISO is an extremely stable product and has been formulated into a wide variety of preparations (creams, ointments, gels, liquids, sprays, etc.) with good long-term stability (shelf life >2 years under real-time and accelerated testing). EISO has also been formulated into stable preparations with other potentially reactive drugs (such as salicylic acid, BPO, etc.).

TFS' EISO shows extremely low variability using principal component analysis (PCA) with 99.8% conformity across 60 distillation runs. Similarly, heat map analysis of 26 runs shows similar consistency of the major components.





Example of batch analysis for individual EISO distillation lots (n = 60) showing percentage concentration of the 4 main constituents

SAFETY PROFILE

EISO is effective at low concentrations and demonstrates very little to no toxicity on normal skin, allowing for the use of therapeutically effective concentrations without the side effects typically seen for other drugs.

EISO is safely used today, and for hundreds of years past, in both traditional Chinese and Indian (Ayurvedic) medicine and widely used in the west as a fragrance in the cosmetic industry and as a food additive. Millions of EISO-containing acne products developed by Santalis have been used by people in the US with no reported adverse events.

EISO is an FDA-approved (21CFR§172.510) and widely used food additive, approved by the Flavor and Extract Manufacturers Association (FEMA) as Generally Recognized as Safe (GRAS) for human consumption. As a food additive, the average daily consumption of sandalwood oil is 0.0074 mg/kg.

EISO is also listed in the United States Pharmacopoeia Food Chemicals Codex (USP-FCC), the British Pharmaceutical Codex, the Martindale Complete Drug Reference [BPC, Martindale], and the Council of Europe (COE) as a Commission E herbal product.

EISO is approved by the Australian Therapeutic Goods Administration (TGA) for topical and inhalation products as a Listed medicine with collectively nearly 100 years of marketing experience. As of October 2010, 28 products containing EISO were included on the ARTG as Listed products intended for topical or oral use, or for inhalation [Forbes rpt]. Of the 28 EISO-containing Listed medicines in the ARTG, six products are comprised of 100% EISO.

Collectively, as of October 2010, there have been nearly 100 years of marketing experience with these agents with no known adverse events reported to the TGA. Topical products include S. album essential oil as a single ingredient, as well as combination formulations with other essential oils. The concentration of EISO in these products extends from 0.25 µL/mL (0.25%) to 1 ml/ml (100% S. album). Claims listed on the register for EISO-containing products are wide-ranging and include use as a skin antiseptic and antibacterial. There are no restrictions on the maximum concentration, duration of use or dose of EISO within Australian products. There are no restrictions on the use of EISO in Australian medicines for oral or topical use.

EISO is an aromatic natural raw material known not to contain any naturally occurring alleged allergens as listed in the European Commission Directive, SCCNFP/0017/98

Non-sensitizing, non-irritating |In extensive, Repeated HRIPT Studies conducted by Santalis to test 100% EISO and numerous topical formulations in human subjects, EVERY score reported was ZERO. In the literature, Two patch test studies were conducted with sandalwood oil and one patch test study was conducted with alpha-santalol. In the first study, sandalwood oil was applied full strength for 24 hours to 18 human subjects with no reaction (Katz 1946). The second study was a 48-hour closed patch test in which a 10% concentration of sandalwood oil in petrolatum produced no irritancy in human subjects (Kligman 1971). A 20% concentration of alpha-santalol in petrolatum also failed to produce irritation in human subjects (Opdyke 1974).

A study of EISO-containing products, including samples containing up to 10% EISO and others containing the irritant Benzoyl Peroxide (BPO) showed that NO cumulative irritation was observed in 35 subjects treated over the course of 14 days (cumulative score of “0” on a scoring range from 0 to 420 per patient)

MARKET COMPARABLES

VALUATION COMPARABLES

NOVAN	NASD: NOVN PHASE 3 DEVELOPMENT - SB204 ENTERPRISE VALUE* **$522 M**	ACNE/SKIN FUNGUS
ACLARIS	NASD: ACRS PHASE 2 DEVELOPMENT - A-101 ENTERPRISE VALUE* **$843 M**	SEBORRHEIC KERATOSIS/HPV
FOAMIX	NASD: FOMX PHASE 2 COMPLETE - FMX101 ENTERPRISE VALUE* **$424 M**	ACNE
DEMIRA	NASD: DERM PHASE 3 DEVELOPMENT - CLIMZIA ENTERPRISE VALUE* **$1.17 B**	PSORIASIS

* SOURCE: BLOOMBERG

VALUATION COMPARABLES

CREABILIS	PURCHASED BY SIENNA 2016 PHASE 2 COMPLETE - SNA-120 TOTAL DEAL VALUE **$150M+**	PSORIASIS/ PRURITUS
ZIARCO	ACQUIRED BY NOVARTIS 2016 PHASE 2B DEVELOPMENT - ZPL-389 TERMS NOT DISCLOSED	ECZEMA/PSORIASIS
EXICURE	DRUG RIGHTS TO PURDUE PHASE 1 DEVELOPMENT - AST-005 DEAL VALUE **$790 M**	PSORIASIS
ANACOR	PURCHASED BY PFIZER 2016 PHASE 3 COMPLETE - CRISABOROLE PURCHASE PRICE **$4.5 B**	ATOPIC DERMATITIS (ECZEMA)

VALUATION RATIONALE

SANTALIS IS UNIQUELY SITUATED AS A DERMATOLOGY-FOCUSED PHARMACEUTICAL COMPANY:

- PROPRIETARY DRUG SUBSTANCE WITH SOLE SOURCE SUPPLY AND SIGNIFICANT MARKET PROTECTION
- BROAD BIOLOGICAL ACTIVITY WITH BOTH DISEASE-SPECIFIC TARGETS (IL-4, IL-17, PDE4, ETC.) AND MULTIPLE MECHANISMS OF ACTION - APPLICABLE TO NUMEROUS CLINICAL APPLICATIONS
- WIDE RANGE OF HIGH VALUE TARGET CLINICAL INDICATIONS, MANY OF WHICH HAVE NO CURRENT RX TREATMENT
- PORTFOLIO OF LATE STAGE CLINICALS - NUMEROUS SHOTS ON GOAL
- DIVERSIFICATION INTO GLOBAL OTC PRODUCT MARKETS

BASED ON COMPARABLE VALUATIONS FOR COMPANIES AT THIS STAGE OF DEVELOPMENT, SANTALIS' ATTRIBUTES WOULD SUGGEST A VALUATION IN THE US$300-$500M RANGE, WITH SIGNIFICANT UPSIDE UPON PROGRESS OF ITS CLINICAL TRIALS THROUGH PHASE 3 AND REGISTRATION STAGES

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