

**FACTOR**  
THERAPEUTICS

# Ocular Wound Care Program Update

*July 2017*



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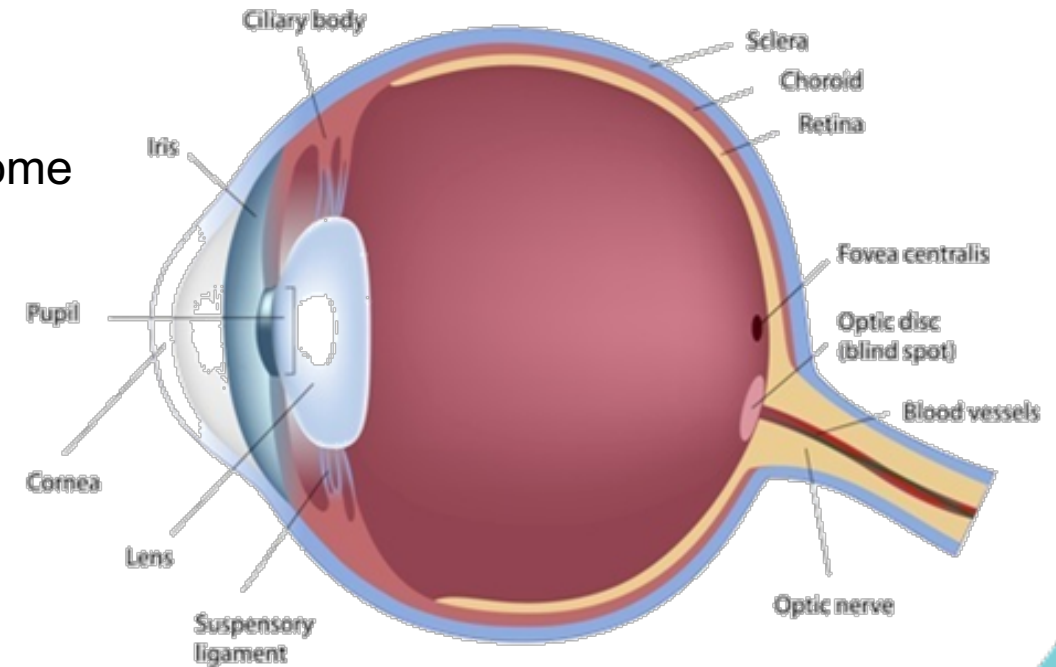
# Program Overview



- ◊ Factor's core IP is a platform technology
  - Vitronectin (collagen-targeting) peptide + growth factors
  - Multiple potential applications in advanced wound care
  
- ◊ This program evaluates Factor's technology in ocular (eye) wound care
  
- ◊ With modest R&D expenditure, we have evaluated VF001 and two other candidates (VF003/004) in a standard tissue model, assessing corneal cell proliferation and migration
  
- ◊ Key outcomes :
  - ✓ Built value in our core platform for other indications (including potentially an orphan indication)
  - ✓ Demonstrated proof-of-concept – VF001 and VF004 appear suitable for the indication
  - ✓ New intellectual property filed, potentially providing significant patent life extension
  - ✓ Clear rationale established to move to IND-enabling studies
  - ✓ Additional clinical utility for VF001

# What are Persistent Corneal Epithelial Defects?

- ◊ The epithelial surface of the cornea is a living, protective barrier and its integrity is critical for sight
- ◊ Consequences of corneal damage are significant
  - ◊ Pain and impaired vision
  - ◊ Risk of infection, scarring and neovascularisation<sup>1</sup>
  - ◊ May lead to loss of eyesight
- ◊ Most corneal injuries heal rapidly, however they can become chronic – persistent corneal epithelial defects (PCED)
- ◊ PCED is a type of chronic wound affecting the eye
  - Progression to PCED can delay healing by weeks
  - PCED increases the chance of recurrent defects
- ◊ Epidemiology :
  - PCED from neurotrophic keratitis (US) : 150,000 patients<sup>2</sup>
  - Post-cataract/glaucoma surgery: 25 million patients world-wide of which 1-2% are susceptible to PCED<sup>3</sup>



# PCED is an “Orphan Indication”

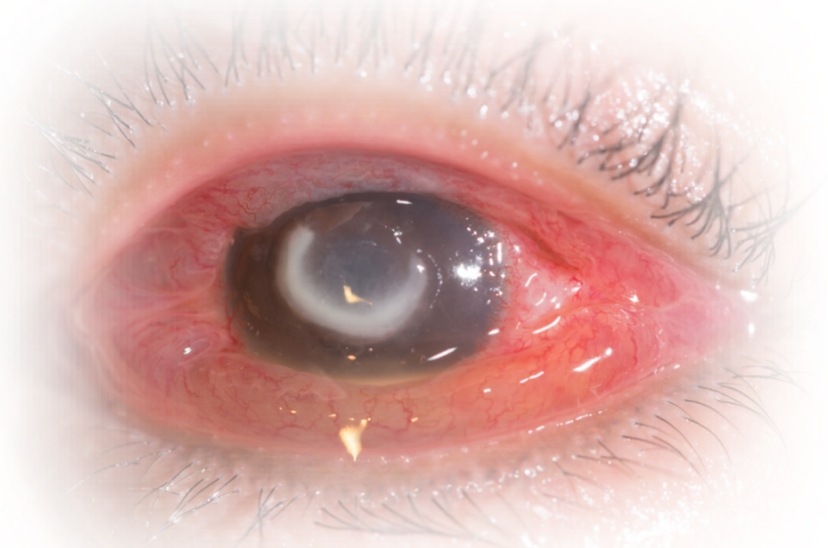
❖ PCED is an orphan indication and can arise from:

- Surgical and non-surgical trauma
- Tear-film disorders
- Neoplasia (cancer)
- Corneal graft
- Chemical and thermal burns
- Neurotrophic, diabetic and herpetic keratopathies
- Immune disorders

❖ Like other chronic wounds, diabetes is a common co-morbidity (50 percent of PCED cases<sup>1</sup>)

❖ For healthcare practitioners, managing patients with epithelial defects is difficult, time-consuming, and cost- and resource-intensive.

❖ Patients must make repeated office visits for treatment of often lingering disease. Cost-benefit is similar to other chronic wound care applications



*Damage to the corneal surface can result in a chronic wound state that can be hard to heal without additional treatment*

# PCED May Lead to Bigger Indications

100-150,000  
Patients<sup>1</sup>

PCED : High value, relatively small patient population.  
Orphan indication potentially provides an expedited  
regulatory pathway for approval

4,000,000 Patients<sup>2</sup>

A post-surgical product to accelerate wound healing (i.e. after cataract/glaucoma surgery) and minimize fibrosis is a major opportunity, but would likely have a lower price-point



# Typical Treatments

*Somewhat like other chronic wounds:*

- ◊ Aggressive lubrication
  - High frequency artificial tears or ophthalmic ointments
- ◊ Discontinuation of problematic medications
- ◊ Punctal occlusion (for dry eye)
  - Plugging the tear drainage area of the eye to keep the tears in the eyes longer
- ◊ Debridement
  - Remove thickening -> restoration of a healthy leading edge

*These treatments are time-consuming, and cost- and resource-intensive  
New therapeutic approaches are required*



# Product Development Landscape

Like other chronic wound applications – major unmet need, few success stories ...

Product	Company	Mechanism of Action	Development Status
<b>Nexagon</b>	University of California CoDa Therapeutics	Connexin 43 (gap junction protein) antisense gel for PCED	Phase 2 terminated April 2015 “drug manufacturer could not supply study drug”
<b>DE-105</b>	R-Tech Ueno (from Santen Pharma)	First stage substance P + IGF-1 for PCED	Ph 2 completed 2012 (No data published)
<b>Thymosin <math>\beta</math>4</b>	ReGenTree	Acts by reducing inflammation. Promotes re-epithelialisation. Inhibits apoptosis	Phase 3 dry eye (non-persistent) initiated Nov 2016; 500 patients
<b>EBI-005</b>	Eleven Biotherapeutics	IL-1 inhibitor (dry eye)	Phase 3 failed (2015)
<b>EyeGate OBG</b>	EyeGate Pharmaceuticals	CMHA-S hydrogel	Phase I (surgical setting)

## Other treatment approaches:

- Amniotic membrane grafting
- Autologous serum
- Umbilical cord blood serum
- Platelet-rich plasma
- Human growth hormone, insulin, nerve growth factor, EGF
- Limbal stem cell transplant
- Scleral contact lenses



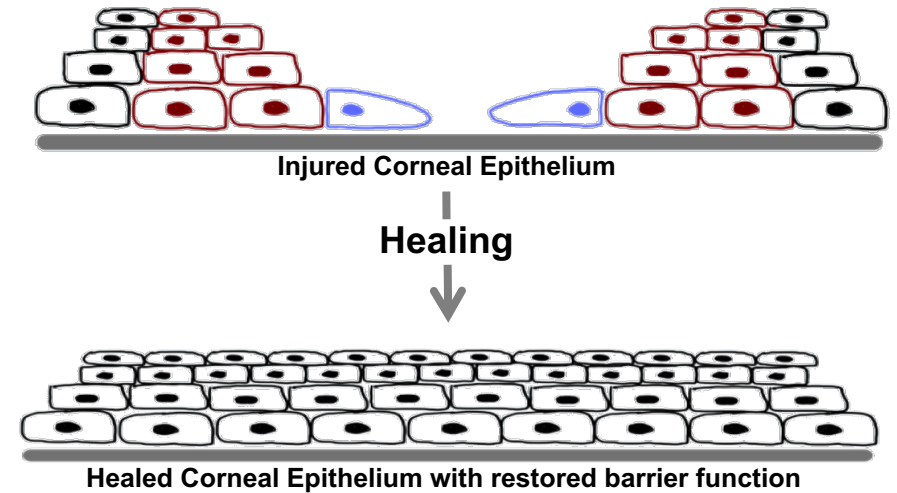
# Ocular Wound Healing

## Stages:

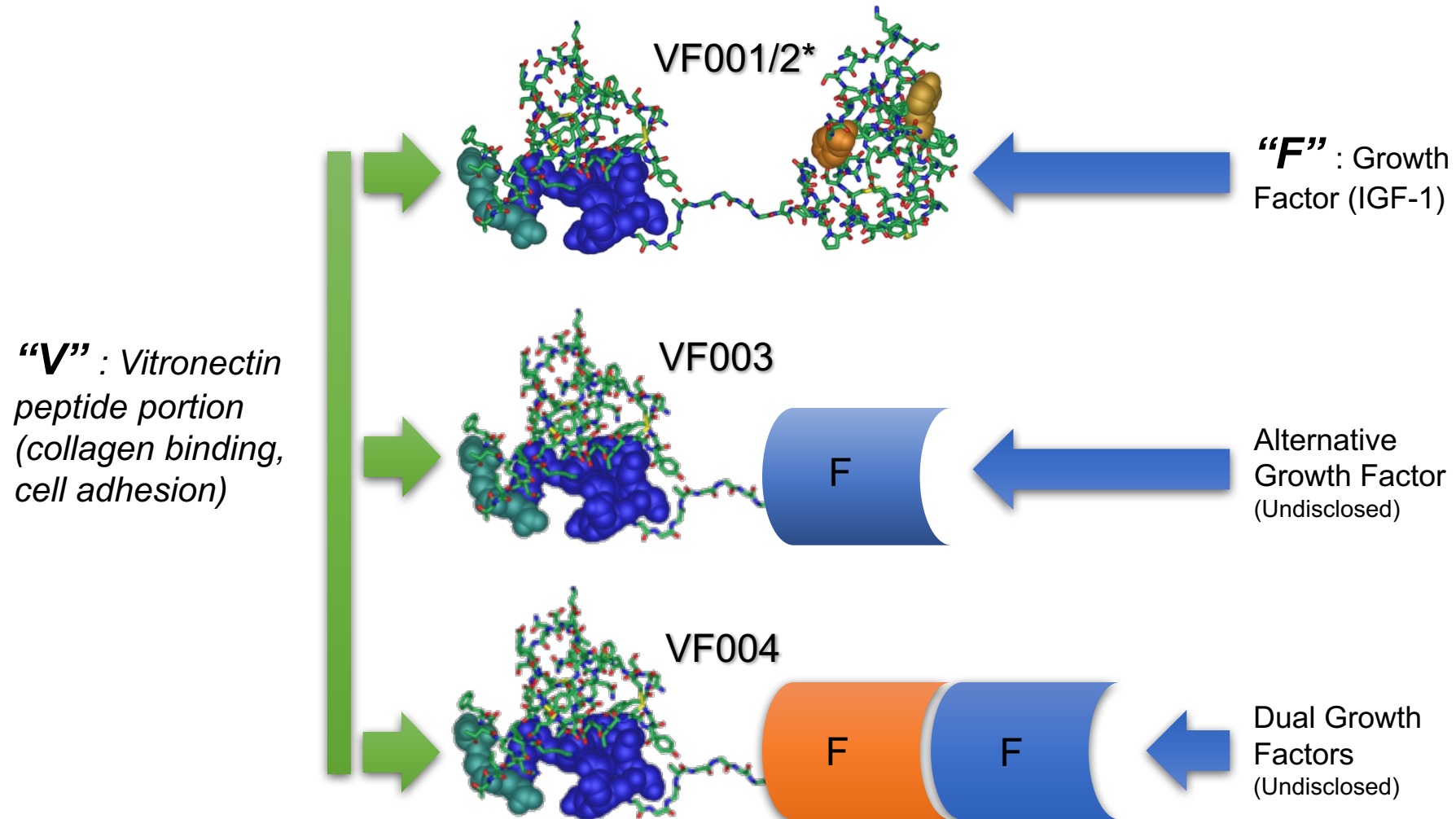
1. Attachment & migration of adjacent epithelial cells to close the injured site
2. Proliferation of migrated cells to re-establish epithelial thickness
3. Differentiation of new epithelium to restore structure and function

## Rationale for exploring Factor technology for PCED:

- ◊ Vitronectin-targeted growth factors (“VF”) have the ability to rapidly adsorb onto exposed extracellular matrix and support epithelial cell migration over the wound base while stimulating cell proliferation



# What are VF003 / VF004 ?

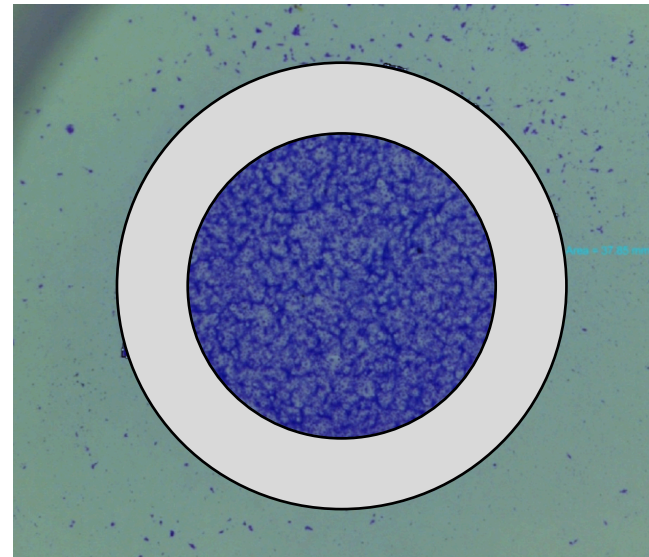
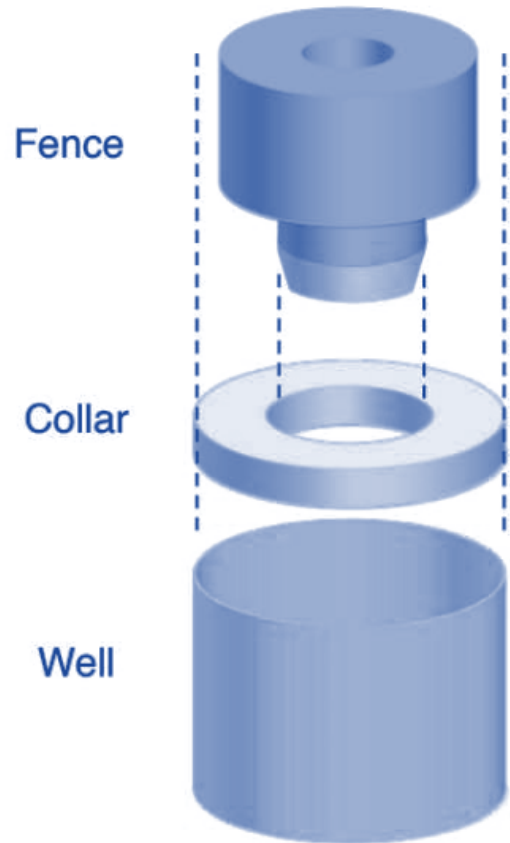


*The growth factors used in VF003 and VF004 were chosen to theoretically optimise the migration and proliferation of corneal epithelial cells.*

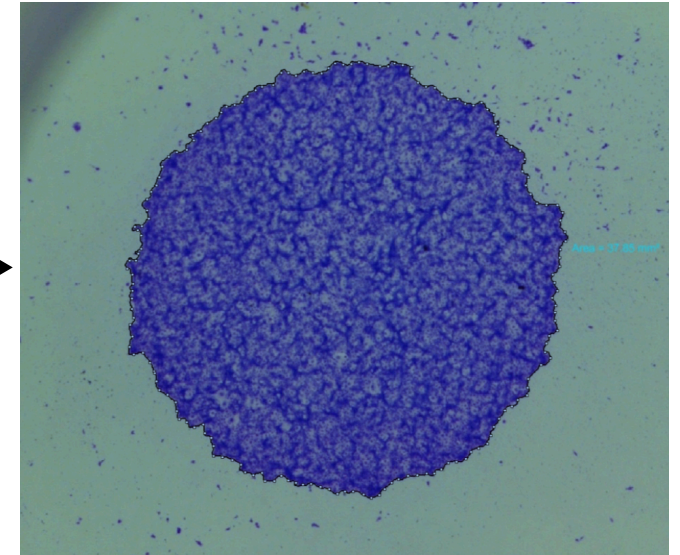
*All of these constructs build on the core Factor vitronectin program. We have manufactured these new molecules at lab scale and evaluated their basic expression feasibility. This is a significant undertaking in its own right.*

\*VF002 is a high viscosity formulation of VF001

# Tissue Growth Assay to Measure VF Potency



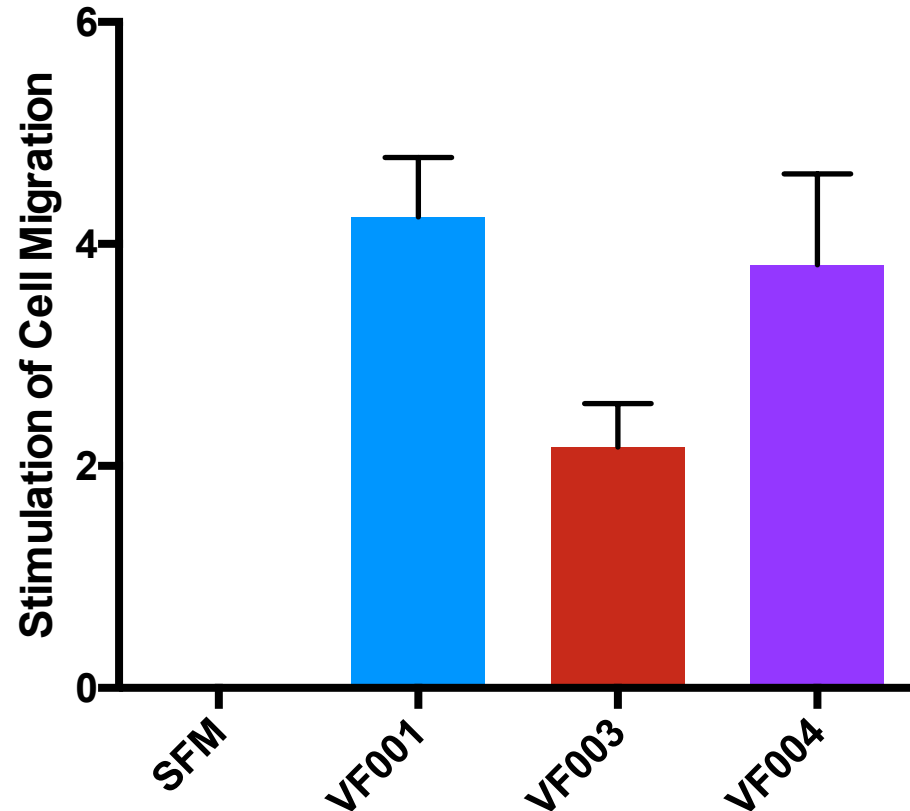
48h  
migration  
→  
+ mitomycin-C to  
inhibit proliferation



- *In vitro* “Fence Assay” – tissue culture
- Cells seeded using fence and collar
- Cells attach over a defined circular area
- Fence and collar are removed and treatments added

- Surface areas measured
- Serum-free media (SFM) used to set baseline (normal) migratory response
- Area above SFM treatment response measures relative potency of VF candidates

# VF001 and VF004 are Potent Stimulators of Corneal Epithelial Cell Migration

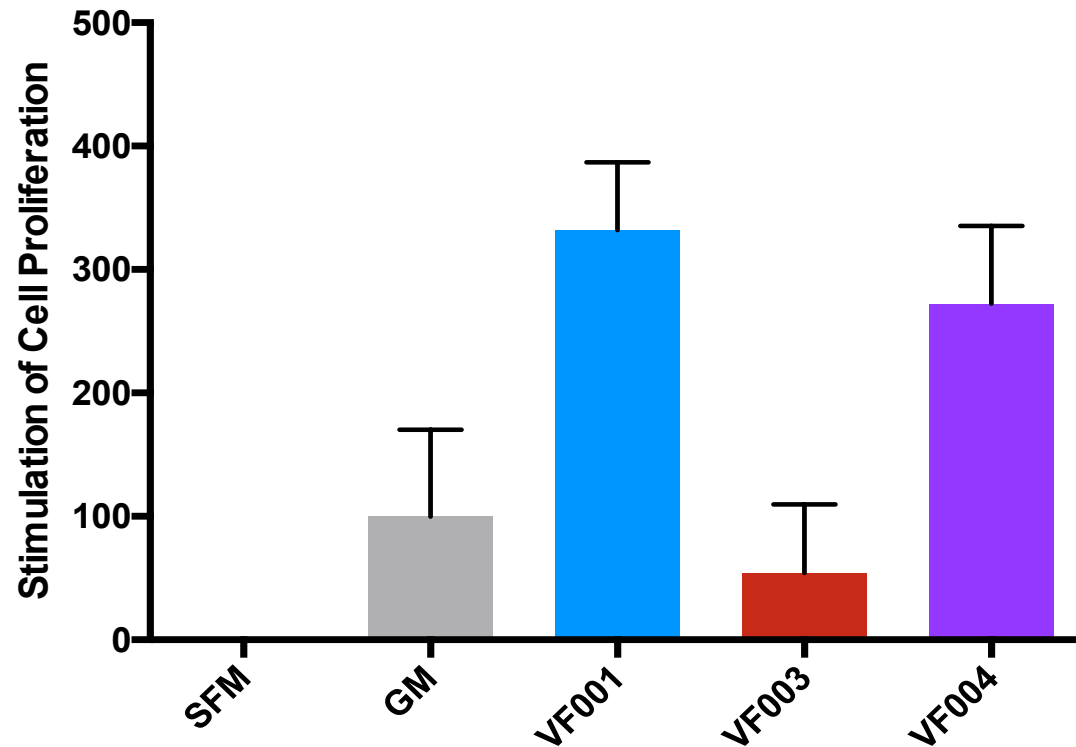


SFM = serum-free media (control)

N=6, duplicates from 3 independent experiments

- Stimulation of cell migration based on the HCE-T human corneal epithelial cell “fence assay” over 48h
- Responses represent increases in cell surface area (mm<sup>2</sup>) relative to serum-free media control (SFM)
- VF candidates were tested across a range of concentrations
  - 150nM data displayed on graph
  - Same trends across different concentrations
- ***VF001 & VF004 responses were equally strong at stimulating cell migration and significantly greater than VF003***

# VF001 and VF004 are Potent Stimulators of Corneal Epithelial Cell Proliferation



SFM = serum-free media (control)  
GM = growth media containing 10% serum (comparator)  
N=9, triplicates from 3 independent experiments

- Stimulation of cell proliferation based on the HCE-T human corneal epithelial cell “fence assay” over 48h
- Relative assessment (to controls) with:
  - Response to SFM (serum-free media) set at “0 %”
  - Response to GM (growth media containing 10% serum) set at “100%”
  - GM is to measure normal cell proliferation
- VF candidates were tested across a range of concentrations
  - 150nM data displayed on graph
  - Same trends across different concentrations
- **VF001 & VF004 responses were significantly greater than that of GM (~300% increase) while VF003 response was similar to GM**

# Clear Rationale for Clinical Translation

- ◇ VF001 appears to be a good candidate for the PCED application, building further value in our lead program
- ◇ We have plenty of bulk GMP drug available in inventory
- ◇ Currently VF001 is very simply formulated (in phosphate-buffered saline or “PBS”) and could be very quickly tested in patients as an ocular irrigation
- ◇ Existing clinical data and safety profile of VF001 supports rapid clinical evaluation of this new indication
- ◇ Existing validated manufacturing process and pre-filled syringe used in study VF00102 (VLUs<sup>1</sup>) could be utilised for a clinical study in PCED



# Provisional Patent Submission

- ◊ Provisional Patent drafted and submitted to Australian Patent Office (application number 2017902737) – July 2017. Data collection over the next 12 months will support PCT (international) applications
- ◊ Method(s) for treating or preventing a corneal epithelial wound
- ◊ Specification also claims new VF candidates (as composition of matter)
- ◊ **Broad Indications captured:** all ocular surface conditions that would benefit from a topical treatment that stimulates corneal epithelial cell proliferation and migration



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# Summary and Next Steps

- ◇ VF001 stimulates strong proliferation and migration in human corneal epithelial cells – evidence of potential for treating PCED, a high-value advanced wound care application with the potential to expand more generally to the post-surgical setting
- ◇ With the existing data and ongoing clinical evaluation of VF001, expansion into an ocular clinical development program could happen within 6-9 months, subject to financing
- ◇ Similar efficacy observed for VF001 and VF004, which we will investigate further before selecting our clinical candidate. There is a speed advantage in pushing VF001
- ◇ Currently preparing for IND-enabling *in vivo* studies based on appropriate models to further validate usefulness of lead VF candidates as ocular wound healing treatments
- ◇ ***Factor continues to build value in its core IP platform, including new indications and applications for the significant investment in VF001***