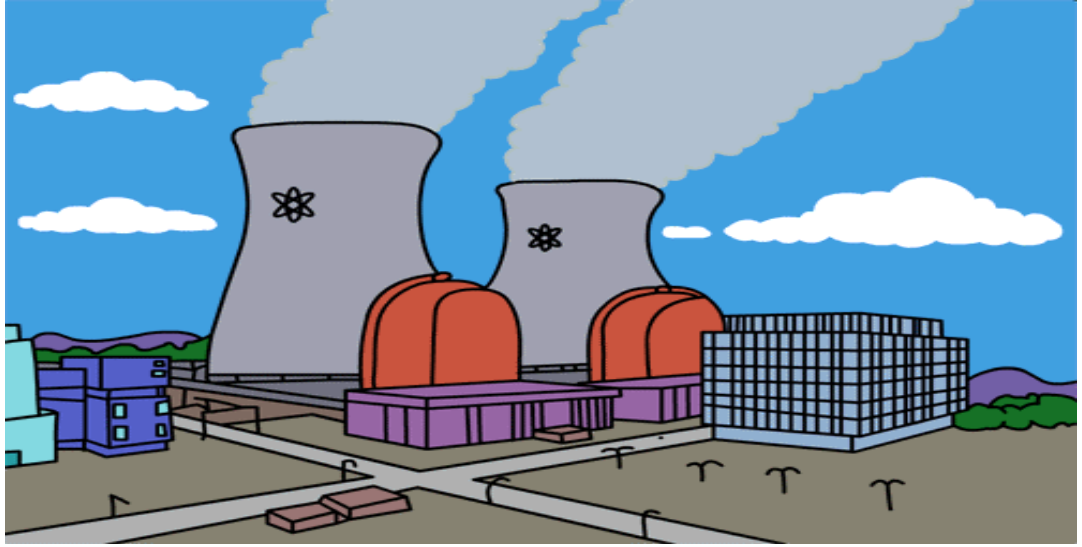


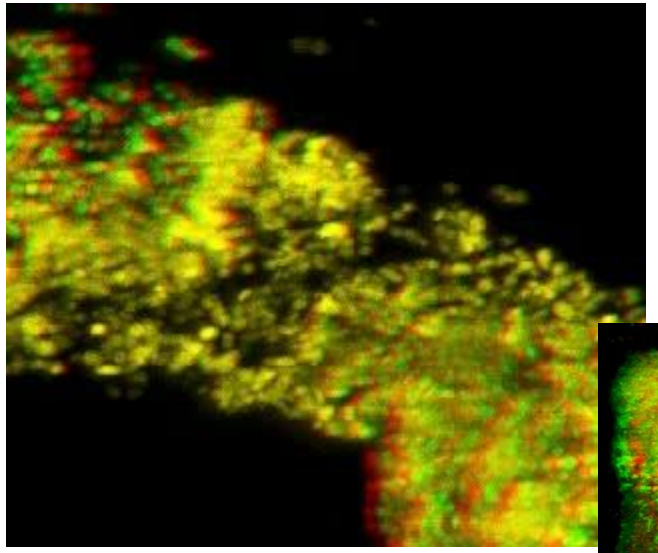
Biofilm Reactors: Chronic Wounds /Gauze

The Covered Wound Bed is a Static Biofilm Reactor
Influenced by Eh and pH via Perfusion,
Enhancing Up Regulation to
Recalcitrant Biofilm Phenotype (P^{BF})
And changing Ratio from Planktonic Phenotype (P^{P})
in Chronic Wounds

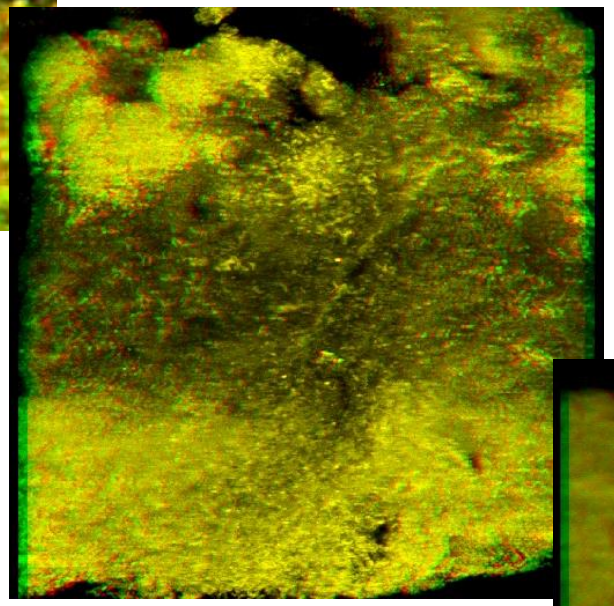
Planktonic Predominate ≤1 (Susceptible) $\frac{P^{BF}}{P^{P}}$ ≥1 Biofilm Predominate (Recalcitrant)

Wounds
Elderly female with wound to the posterior leg as a result of trauma from legs hitting the back of a recliner chair. Patient has a long history of Coumadin use. The wound is a result of interstitial hemorrhage and tissue necrosis. The wound size is 9x 7cm x.5 cm . The wound was treated with sharp debridement followed by application of Santyl Ointment applied to the wound daily for slow enzymatic debridement.

Wound Biofilm Structure: 1-3-5 Days Utilizing CDFF Using 3-D

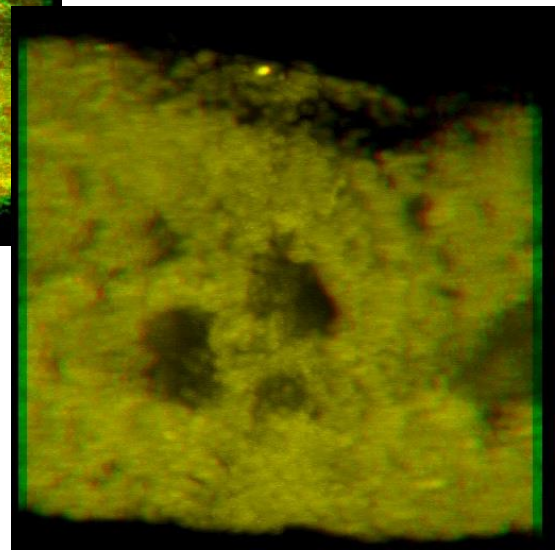


Stage II
Losely
Organized



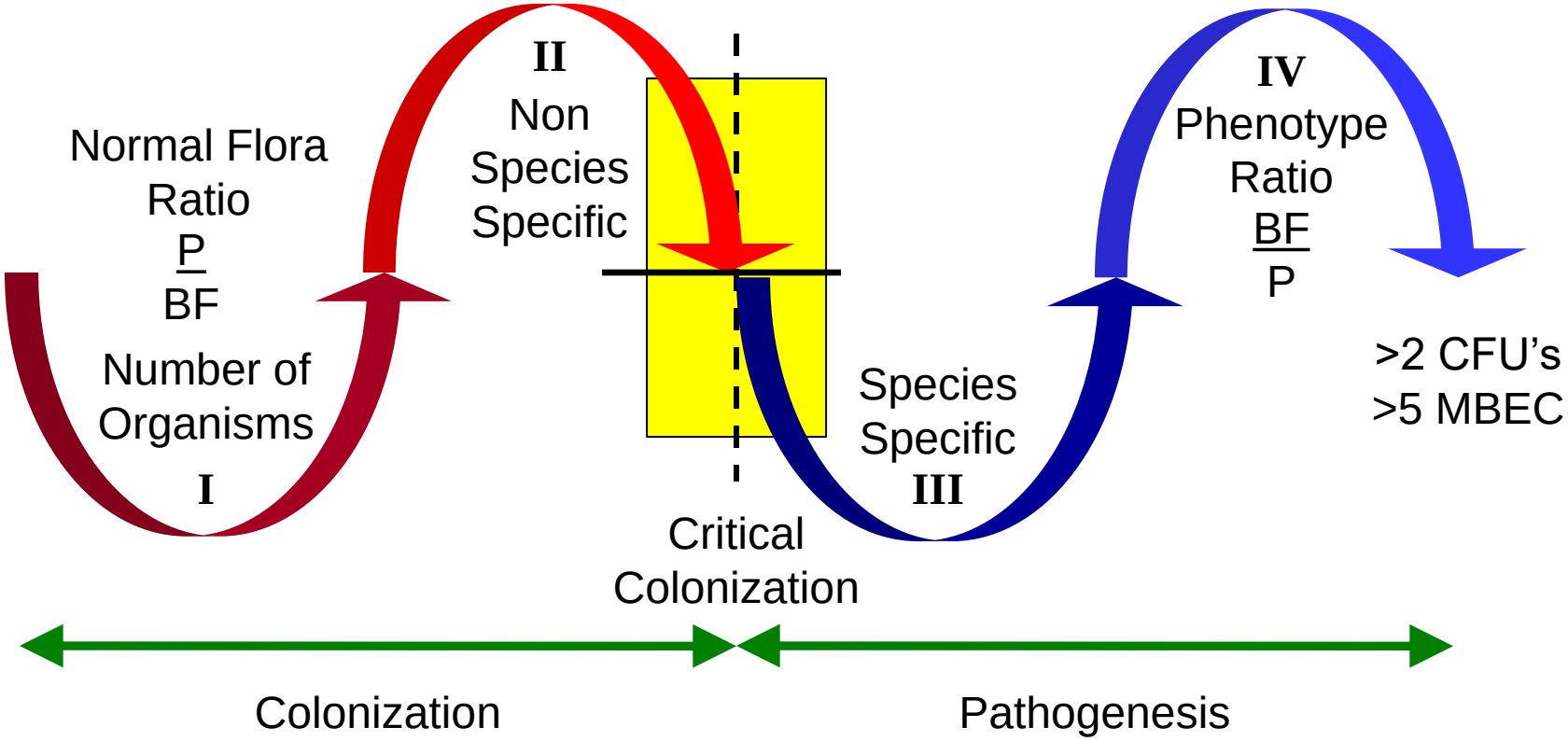
Stage III
Integrated

Stage IV
Angiogenisis

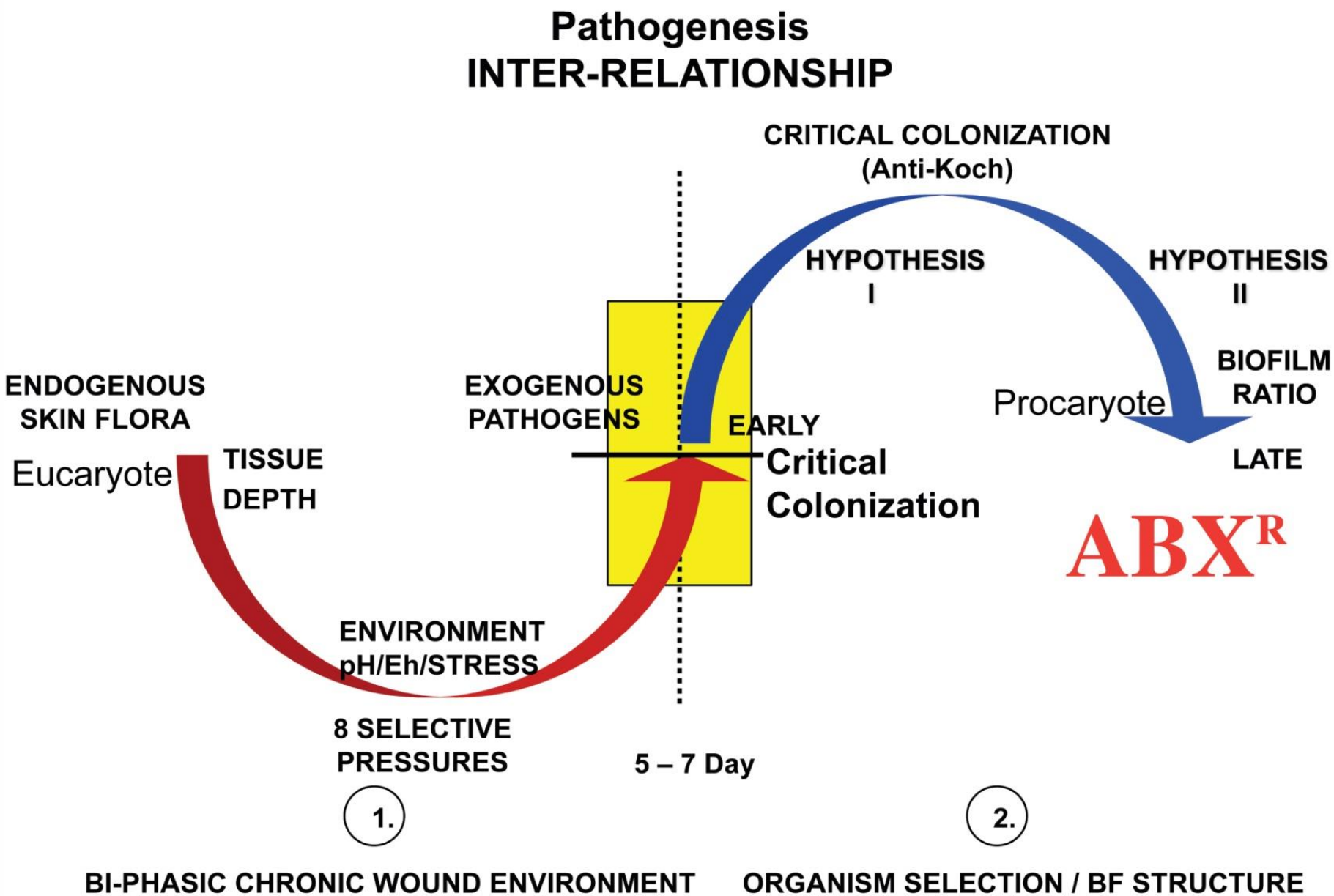


BIOFILM STRUCTURE

CHRONIC WOUND PATHOGENSIS
BIOFILM:PLANKTONIC PHENOTYPE

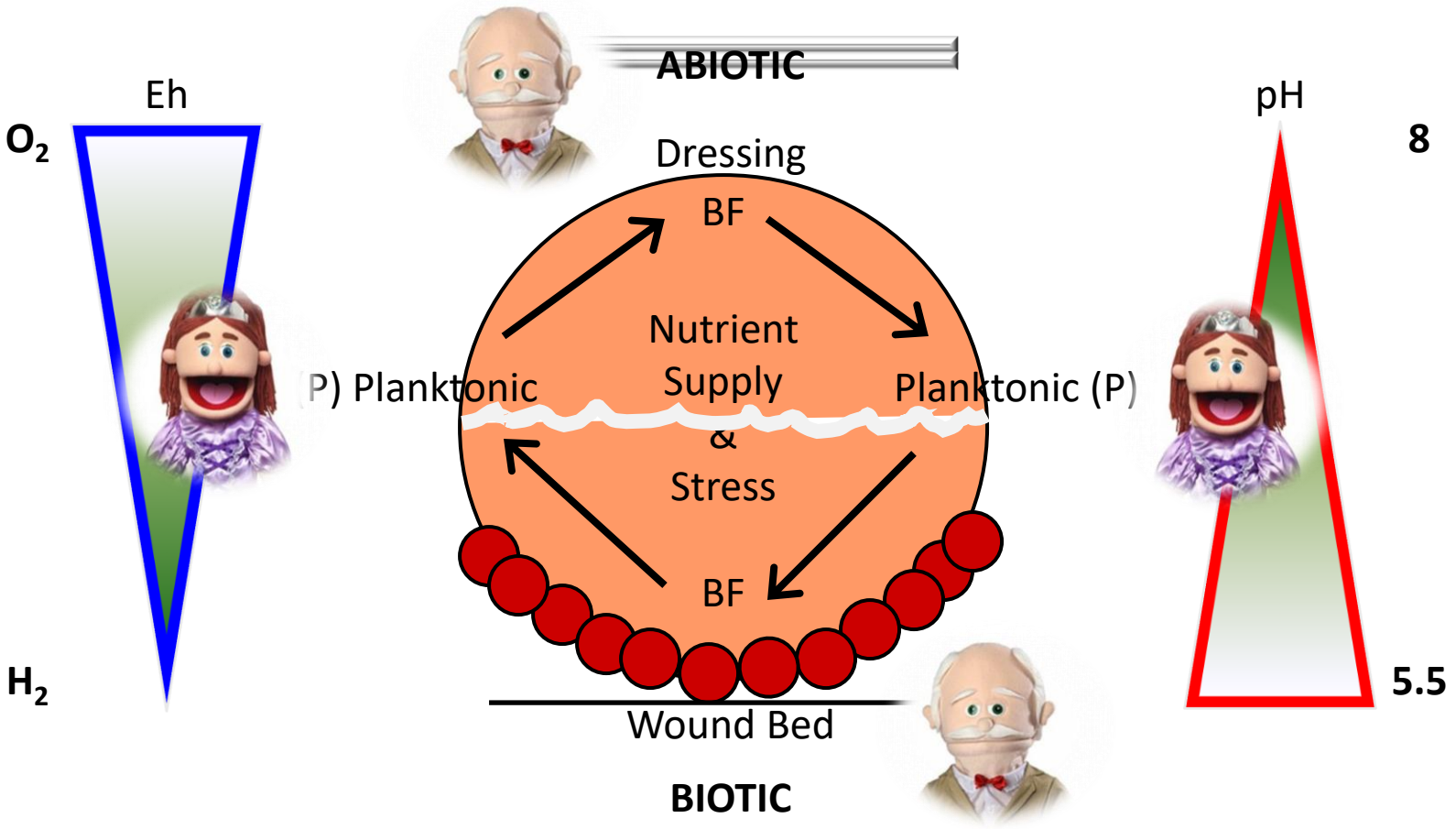


P “DISRUPTION/RECONSTRUCTION”



Separating Biofilm (BF) and Planktonic (P) Transmission

"Ping-Pong" Pathogenesis

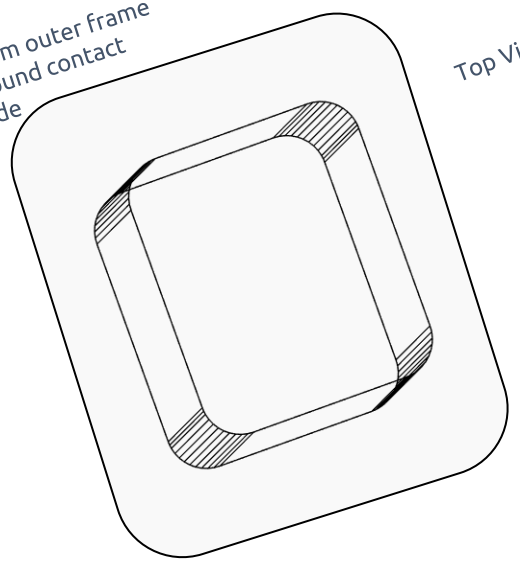


Intellectually Designed Gauzes (I-IV)
4 Es with Education (www.globalbugs.com)

1. Ecologically Sound (Patient)
2. Environmentally Friendly (Globe)
3. Engineered Intelligently (X-Y-Z)
4. Economically Feasible ($$$)

S=Synbiotic (Pre/Probiotic)
M=Mixed Species Biofilm
ar = 0 antibiotic tolerance
T=Therapy recognizing
Antibiotic stewardship

SMarT I.Foam Window Frame Dressing With Silicone Boarder

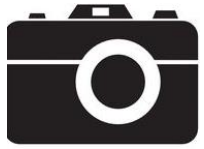


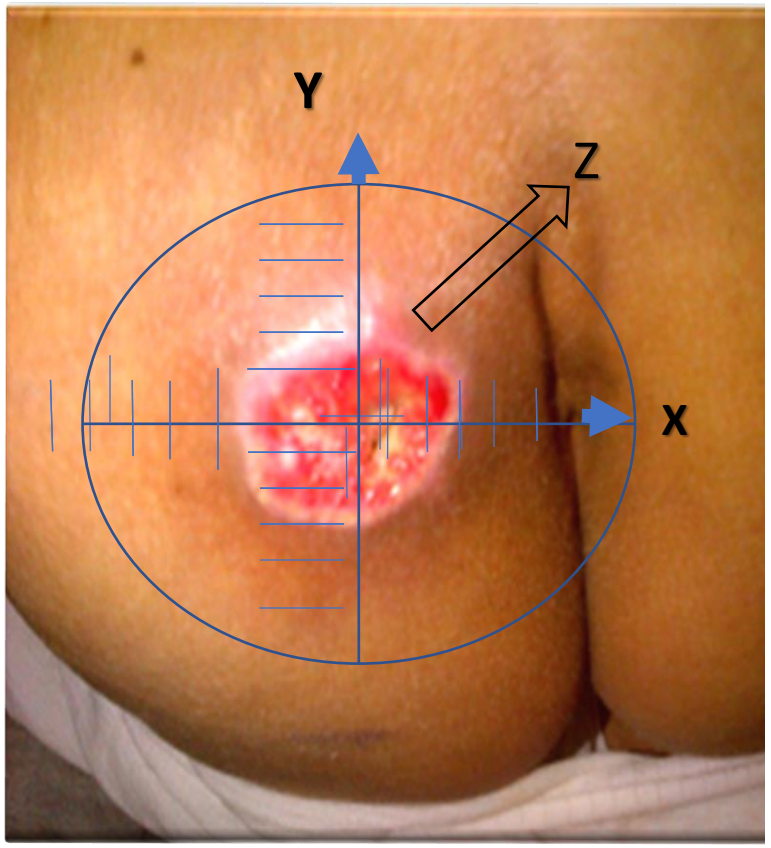
5 probiotic pools: composition ranged from 3-11 microbes

.www.globalbugs.com

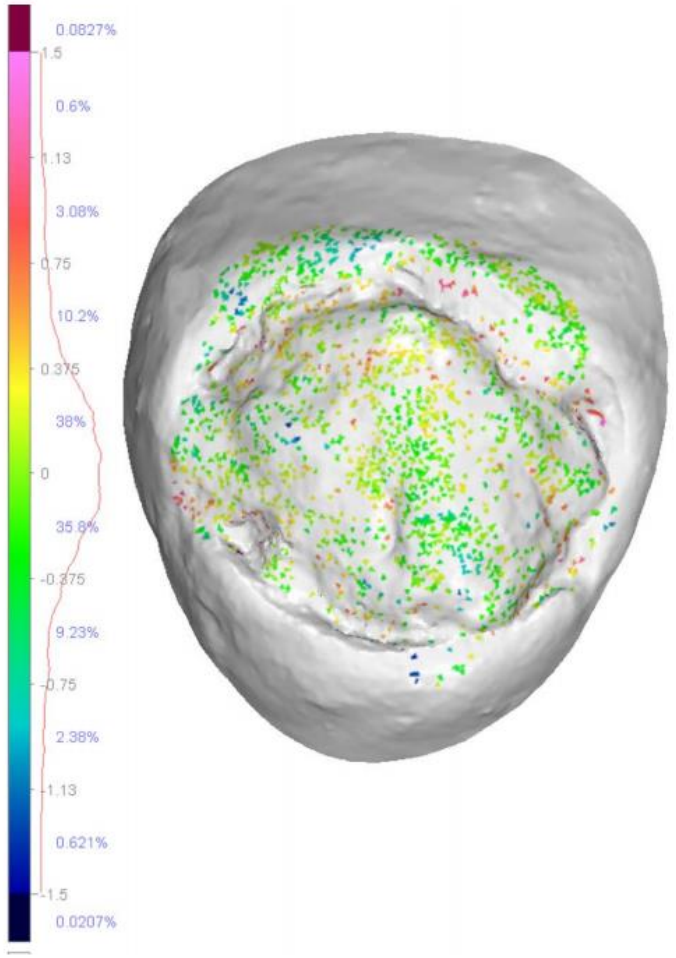
SMarT EST IV

Three Dimensional Assessment of Skin Wounds Creating Volumetric (X, Y, Z) Dimensions for 3 D Printing (Bio Bandage)

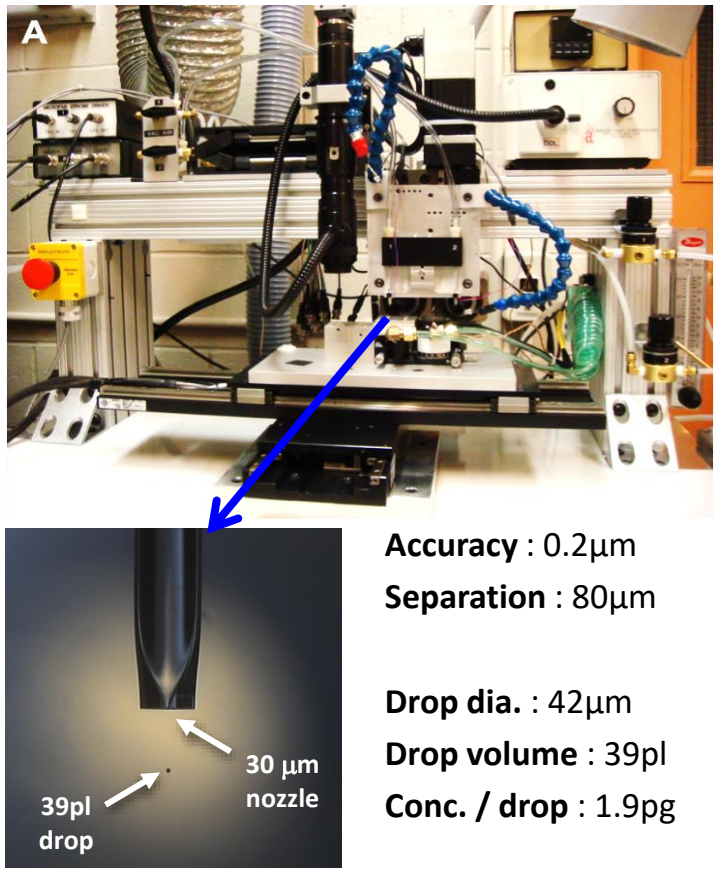




IEEE TRANSACTIONS ON MEDICAL IMAGING, VOL. 28, NO.

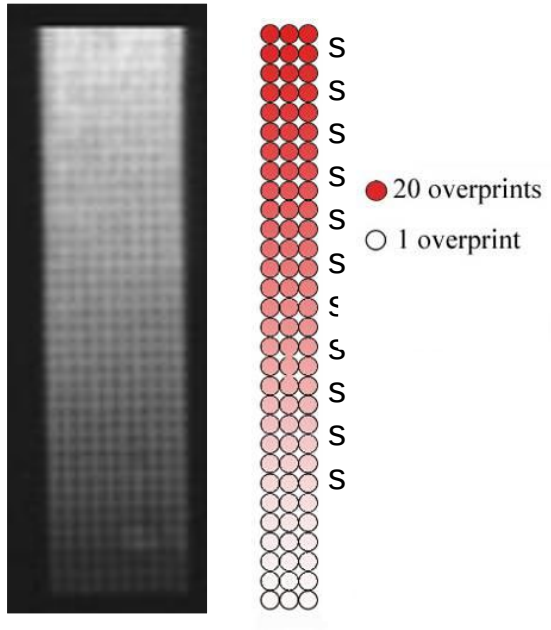


SMarT EST IV . WOUND CONTOUR Inkjet-Based Bioprinting with gradient concentrations (and BioSensors)



Accuracy : 0.2µm
Separation : 80µm

Drop dia. : 42µm
Drop volume : 39pl
Conc. / drop : 1.9pg



Concentration-modulated using an overprinting strategy