

Introducer

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Niann-Tzyy Dai, MD. PhD.

Current Position:

Director of Burn Centre, Tri-Service General Hospital
Assistant professor, National Defense Medical Center

Education:

MD. School of Medicine,
National Defense Medical Center, Taiwan

PhD. Skin Tissue Engineering, Aston Pharmacy School, Aston
University, U.K.



三軍總醫院

Tri-Service General Hospital



National Defense
Medical Center



Tri-Service General Hospital

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➤ The Tri-Service General Hospital, originally the 801 Army General Hospital, was established in 1946, with total 1300 beds service

➤ Currently, the Tri-Service General Hospital (TSGH) is a teaching hospital under the jurisdiction of the National Defense Medical Center that provides clinical treatment to military servicemen on active duty, patients with medical insurance, and the general public, while it also conducts training and research

➤ For many years it has been rated by the Department of Health as a first rate teaching hospital on the level of a medical center

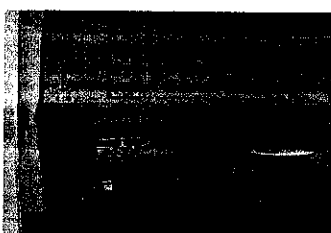


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Tri-Service General Hospital- Burn Center

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Department	Bed	Bed	Total bed
Critical care region	Single ICU Bed	6	14
	For serious burns, microsurgery, finger/limb replantation and cardiovascular surgery		
Moderate care region	Double Bed	8	
	For moderate burns, postburn scar and plastic surgery		

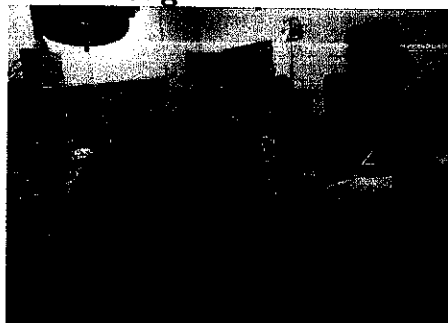


Tri-Service General Hospital- Burn Center

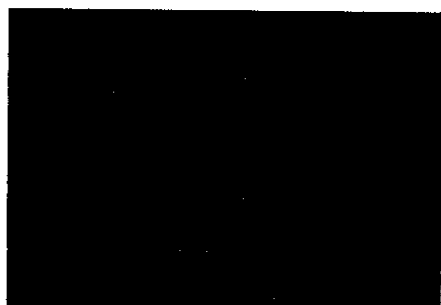
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- Establish the first human cadaveric skin inventory in Taiwan. It has also passed the GTP certificate authority by the Department of Health, Taiwan, R.O.C.

Operation room for skin harvesting



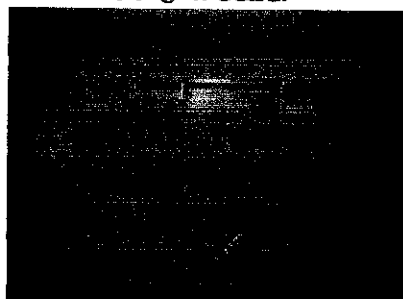
Cadaveric skin



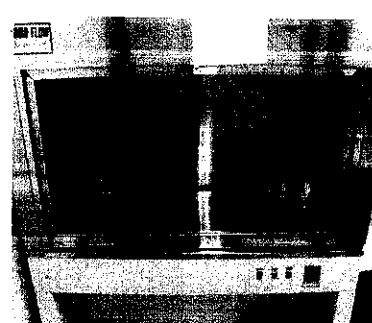
Dress changing room



150°C freezer



Laminar air-flow unit



Sterilized processing room

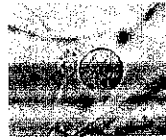


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Chitin and Chitosan

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- Chitin is the second most abundant biopolymer after cellulose
- Chitin was found in crustaceans (such as crabs, lobsters, shellfish and shrimp), the indigestible outer skeleton of insects and the material from which the cell walls of the mycelial fungi are made, radulas of mollusks, and the beaks of cephalopods (including squid and octopuses)



- Chitosan can be produced by its source, Chitin

Properties of Chitosan to be an ideal biomaterials

Nontoxic

Biodegradable

Anti-microbial

Wound Healing

Biocompatibility

Ref: Chitosan preparations for wounds and burns: antimicrobial and wound-healing effects, Expert Rev Anti Infect Ther. 2011 July; 9(7): 857-879.

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Widely Use of Chitosan

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Agriculture

- Inhibit mycete growth at seeds
- Enhance resistance against diseases



Food processing

- Filler
- Thickener
- Stabilizer



Health care food

- Reduce ingestion of fat and cholesterol
- Improve digestion



Chemicals

- Ultra filtration
- Reverse Osmosis
- Leather wrinkle free, anti-shrinkage



Chitosan

Medical



- Hemostatic product
- Wound healing
- Surgical suture
- Drug carrier



Environment

- Absorb heavy metal in water and dust
- As a material to decompose plastics



Cloth

- The fabric with the following functions: anti-bacteria, odor removal, anti-allergy

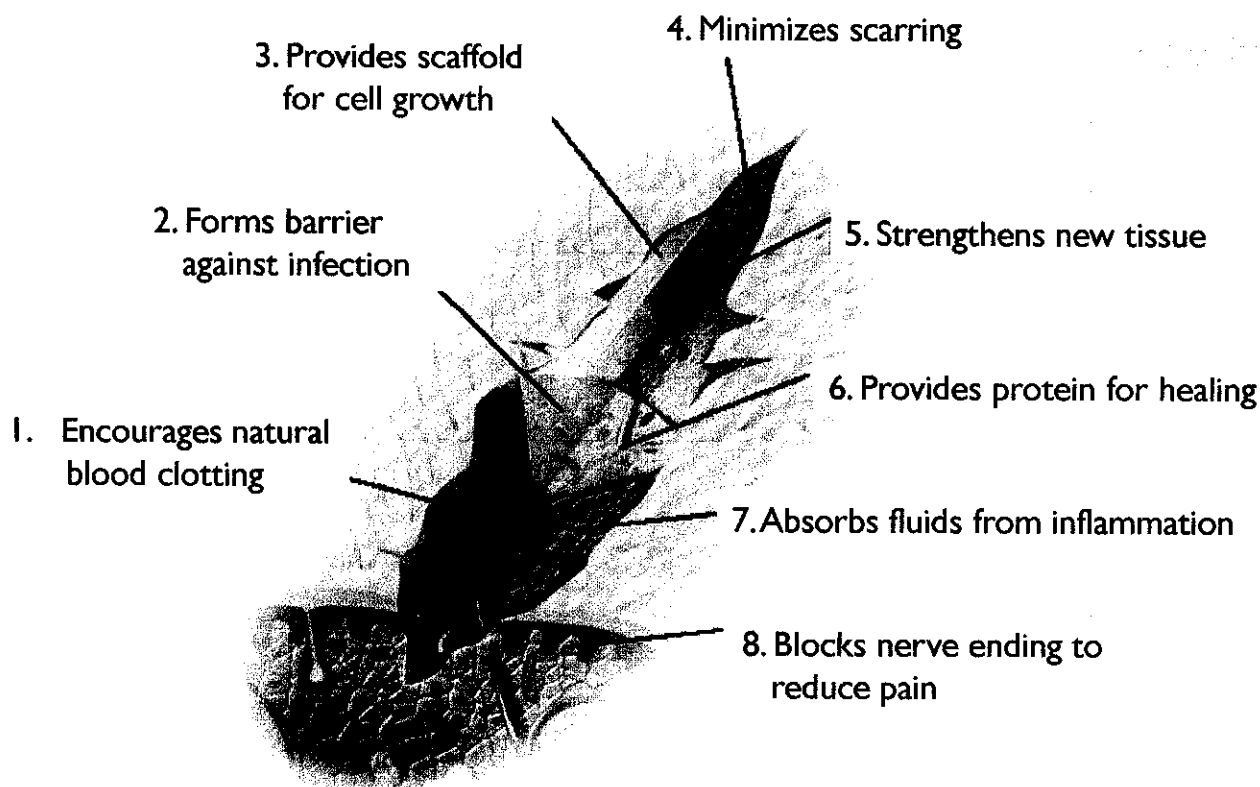
Cosmetics

- Humectant, antistatic agent, tackifier
- Oral health products

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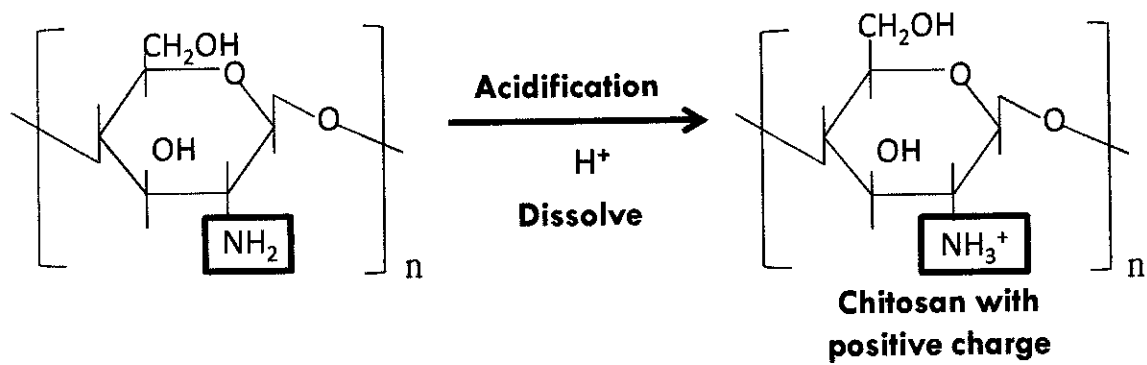
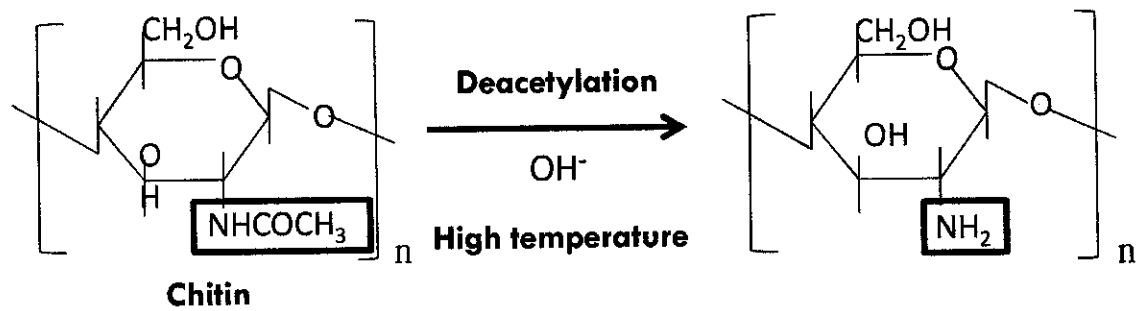
Chitosan Roles in Hemostasis and Wound Healing

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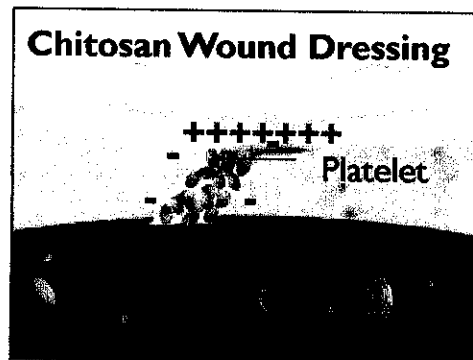
Neutral Chitin -> Positive Charge Chitosan



Hemostasis Mechanism triggered by Chitosan

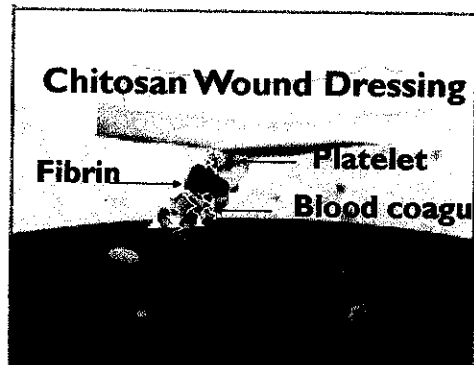
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(1)

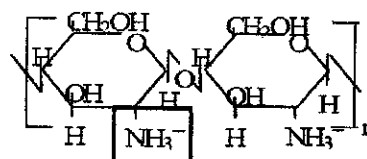


- Wound Dressing with chitosan cation ($-\text{NH}_3^+$) can accelerate blood coagulation by attracting negatively-charged platelets (Thrombin, Serotonin, ADP, and PF4 would be released from platelets.)

(2)



- Blood platelets and coagulation factors are activated. It promotes the formation of reticular fibrin and blood clot.



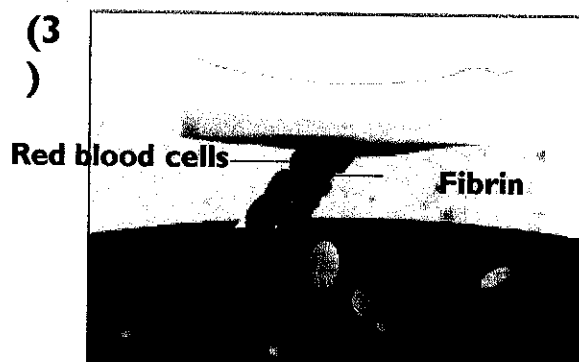
Chitosan

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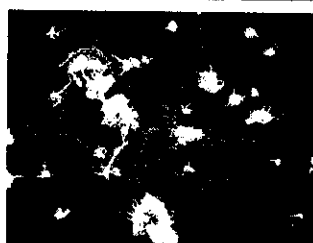
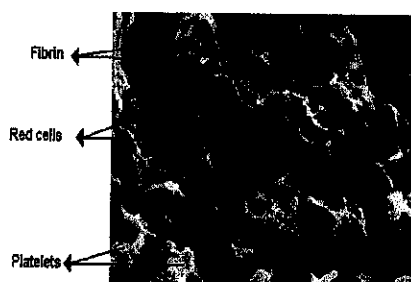
Hemostasis Mechanism triggered by Chitosan

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(3)



- The channel between cutaneous puncture wound and blood vessel wall are blocked by blood clot.



- Blood platelets accumulate and complete stable coagulation
- After coagulation, the fibrinolytic response is activated to stop the coagulation reaction and degrade the unnecessary blood clot
- Scanning electron micrographs of platelets adhered and activated on chitosan

Applications of Chitosan Wound Dressing by Military

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The number of serious injured troops dying, has dropped from 24 percent to just 13 percent (used in Iraq and Afghanistan war)



UK's Surgeon General - Daily Mirror 2007

Prawns save lives

Miracle bandages made from crushed prawns have nearly halved the death rate among seriously wounded troops.

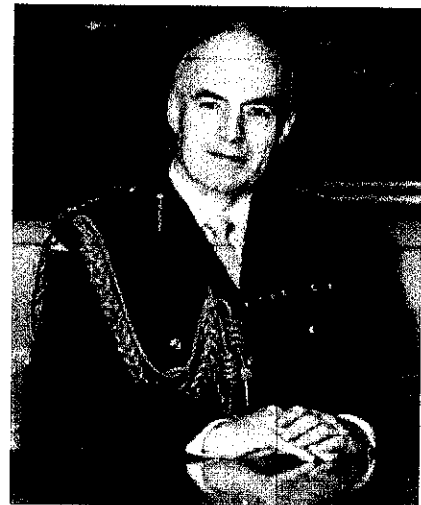
The HemCon bandages, used in Iraq and Afghanistan, contain bits of crushed prawn shell.

They help clots to develop instantly and prevent potentially fatal blood loss.

The number of seriously injured troops dying has dropped from 24 per cent to just 13 per cent.

The Surgeon General, Lieutenant General Louis Lillywhite, said: "They have resulted in a survival rate that's better than anybody has ever achieved."

The technology is so advanced that field hospitals can treat severe trauma casualties better than many NHS hospitals



LIEUTENANT GENERAL LILLYWHITE
MBE QHS MB MSc MFOM psc

Ref: Hemcon

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Introduction of Chitosan Hemostasis Dressing

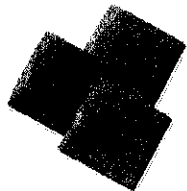
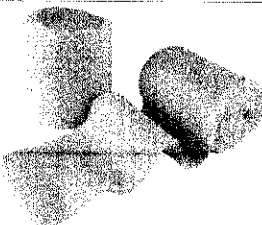
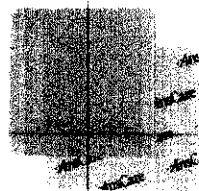
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- Tri-Service General Hospital and Burn Center Introduction
- Chitosan- A good biomaterial for hemostasis and wound care
- Hemostasis Mechanism triggered by Chitosan
- Applications of Chitosan Wound Dressing
- **AnsCare ChitoClot Wound Dressing Series**
 - Clinical use of AnsCare ChitoClot Pad
 - Clinical trial of AnsCare ChitoClot Gauze
 - Applications of AnsCare ChitoClot Gauze

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Product Forms of ChitoClot Wound Dressing Series

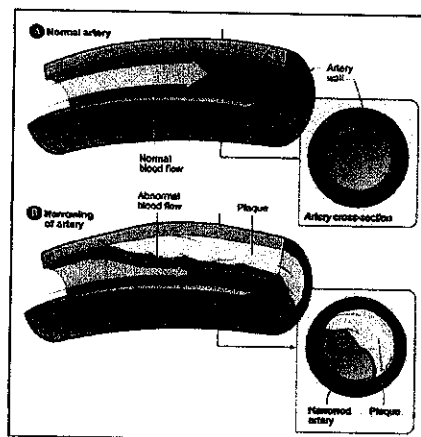
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Product Form	Pad	Gauze	Bandage
Picture			
Function	Stop Artery bleeding	Stop large area bleeding	Stop minor bleeding
Use of Product	1. Cardiology 2. Neurology 3. Oncology 4. Intervention	1. Emergency Dept. 2. Burn Dept. 3. Dermatology Dept. 4. Military	1. Family use 2. Sports 3. Outdoor activities

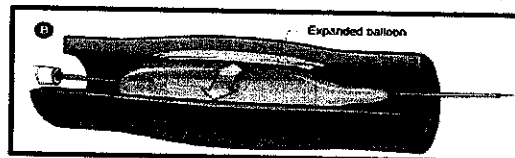
Coronary Heart Disease & Coronary Angioplasty

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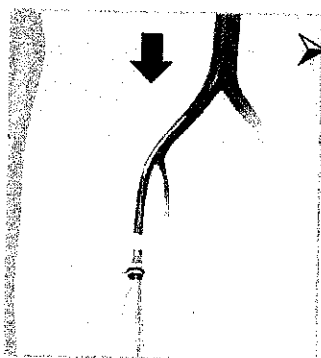
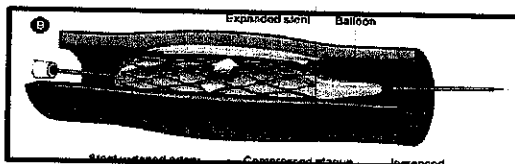
Coronary heart disease (CHD), also called coronary artery disease, is the 1st killer of both men and women in the United States.



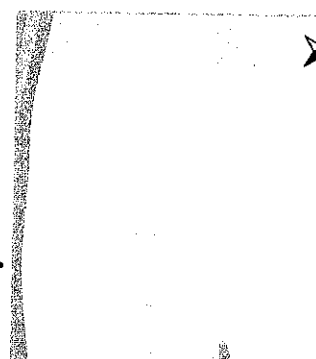
Coronary Balloon Angioplasty



Coronary Stent Placement



After the procedure, doctor removes the balloon catheter, guiding catheter, guidewire and sheath.



Stop bleeding when remove the instrument from access site

National Heart Lung and Blood Institute (US)

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Clinical follow-up of chitosan dressings in congenital heart disease intervention

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Clinical trial purpose:

To compare the stop bleeding time and restraint time after radial artery transcatheter intervention between AnsCare Wound Dressing and plain gauze

Procedure:

Stop the bleeding with AnsCare Wound Dressing and plain gauze respectively to the patient who has processed intervention. Calculate the stop bleeding time and restraint time

Result:

AnsCare Wound Dressing shortens the stop bleeding time and restraint time to $\frac{1}{2}$ compared to plain gauze

		Chitosan	Control	
	组别(n=50例)	壳聚糖组	对照组	P值
<u>Stop bleeding time (min)</u>	止血操作时间(min)	9.5±6.2	18.4±5.1	<0.001
<u>Restraint time (hr)</u>	肢体制动时间(h)	10.2±4.6	24.7±5.8	<0.001



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Ref Chinese Journal of Cardiovascular Medicine, December 2010, Vol. 15, No. 6

Introduction of Chitosan Hemostasis Dressing

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- Applications of Chitosan Wound Dressing
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- Clinical use of AnsCare ChitoClot Pad
- **Clinical trial of AnsCare ChitoClot Gauze**
- Applications of AnsCare ChitoClot Gauze

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Clinical Trial -AnsCare ChitoClot Gauze

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Introduction



- **Evaluation Model:**

Observe the hemostatic time and performance on different time point at 5min, 5+1 min (6 min), 5+2 (7 min), and longer period observation at donor site at 17th, 27th, 37th min.

- **Index Score Criteria:** (10min, 20 min and 30 min after 7 min)

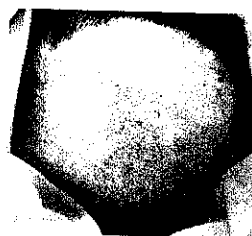
Data analysis by index score as below,

Hemostasis time	Fastest	Faster	Normal	Slower	Slowest
Absorbed blood volume on dressing	Least bleeding	Less bleeding	Normal	More bleeding	Most bleeding
Score	5	4	3	2	1

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Donor Site Experiment Procedure

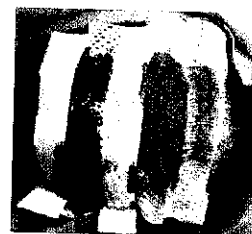
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Before skin harvesting



After skin harvesting



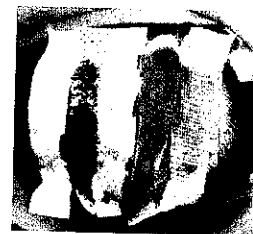
Cover with dressing (start point)



After 5 mins



Remove the dressings
(5th min)



Cover with new dressing



After 1 min



Remove the dressings
(6th min)



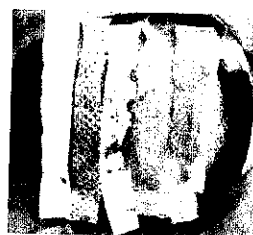
Dressing Covering
for 1 min



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Donor Site Experiment Procedure

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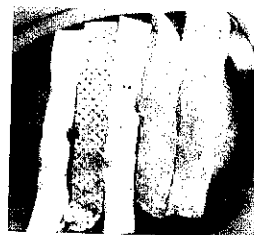
After 1 min



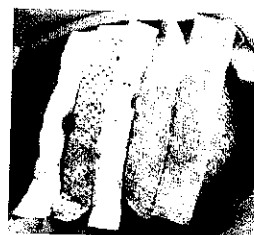
Remove the dressings
(7th min)



Dressing Covering
for 10 mins (17th min)



Dressing Covering
for 10 mins (27th min)



Dressing Covering
for 10 mins (37th min)



Remove the dressings

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Surgical Procedure – Recipient site



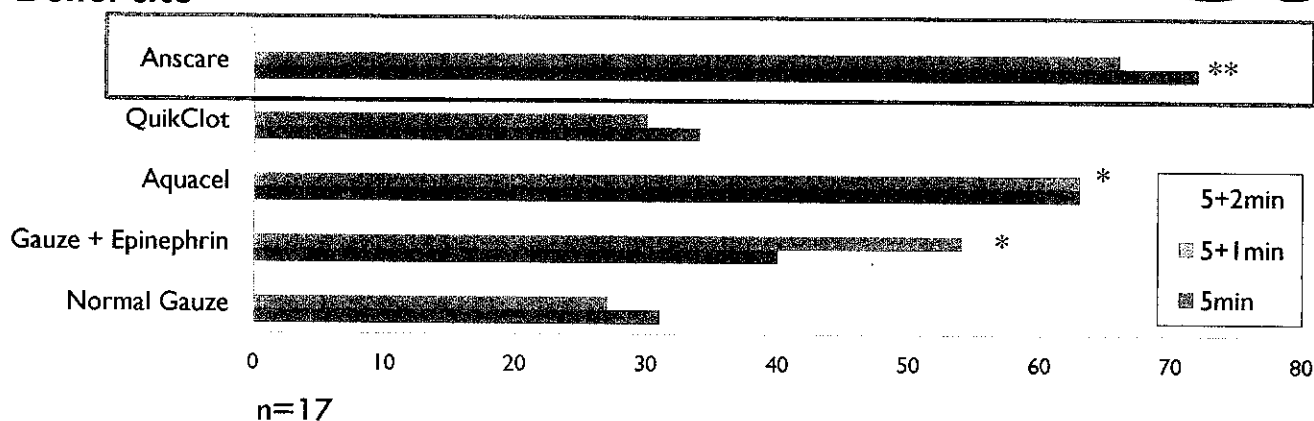
Dressing Covering for 5 mins



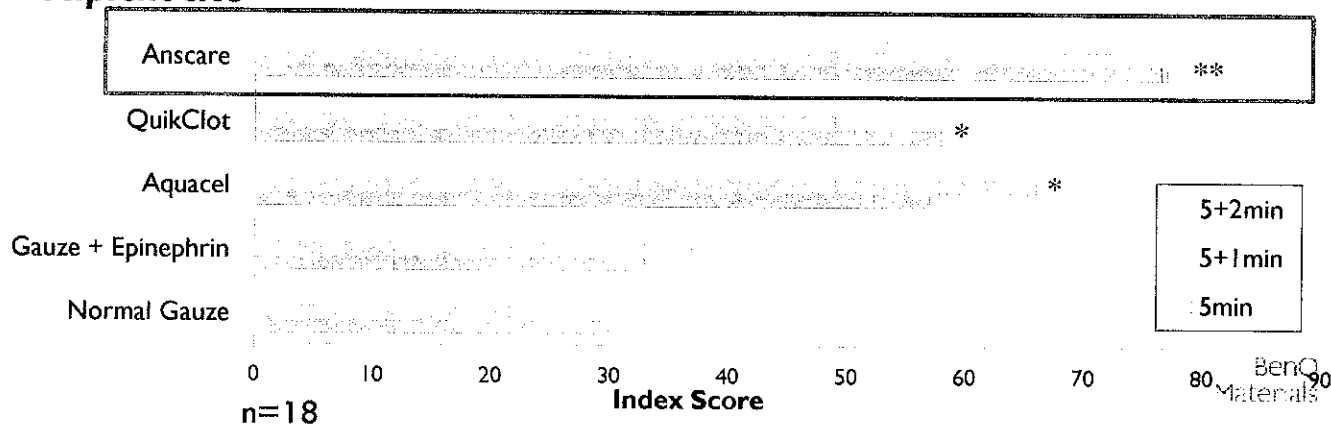
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Hemostatic Result

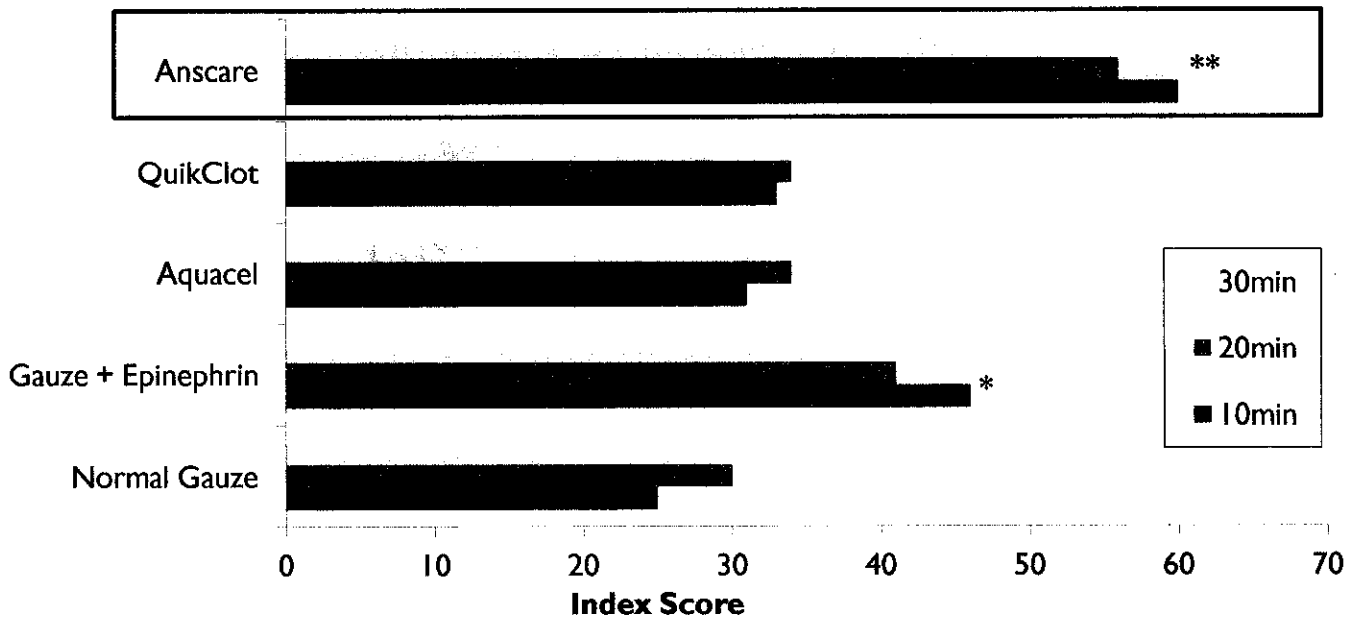
Donor site



Recipient site



Long-time Observation at Donor Site



- **AnsCare Wound Dressing (Chitosan) provided long-period bleeding-control ability, compare with other dressings.**

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Conclusions



- **AnsCare Wound Dressing (Chitosan) performed most efficient hemostatic ability in experimental groups.**
- **Epinephrine is widely used for bleeding-stop. The result showed epinephrine provided good bleeding control at donor site, which happens minor bleeding oozing mainly. However, at recipient site, epinephrine worked worse. New chitosan hemostatic dressing has better bleeding-control ability on moderate bleeding wound.**
- **AnsCare Wound Dressing (Chitosan) has best hemostasis effect among the experiment group compared to plain gauze control (long-time of 10min, 20min and 30min)**

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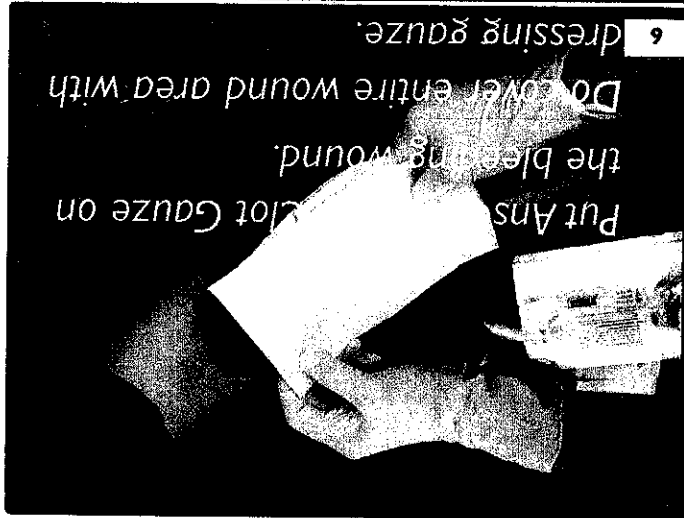
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Application

- EMS
- Military Medics
- Natural Disaster
- Factory & School
- Sport First Aid
- Gunshot, penetration, cuts, laceration, rupture







Your good partner in Hemostasis



- **Help to stop bleeding start from 30 seconds**
- **Shorten 50% of the stop bleeding time**
- **Effective process to increase survival rate**



Emergency Medical Technician
(EMT)



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