

ARIZONA  
TELEMEDICINE  
PROGRAM



# Improving Access to Quality Medical Care Webinar Series

**Farshad Shirazi, MS, MD, PhD**

**Stephen Klotz, MD**

*Presented by*

**Southwest Telehealth Resource Center,  
Arizona Telemedicine Program  
& Arizona Poison and Drug  
Information Center**

**The Arizona Telemedicine Program, Southwest Telehealth Resource Center and the Arizona Poison and Drug Information Center** welcome you to this free webinar. The practice & delivery of healthcare is changing, with an emphasis on **improving quality, safety, efficiency, & access to care.**

**Telemedicine can help you achieve these goals!**

# Webinar Tips & Notes

- When you joined the webinar your phone &/or computer microphone was muted
- Time is reserved at the end for Q&A, please use the **Chat function** to ask questions
- Please fill out the post-webinar survey
- Webinar is being recorded
- Recordings will be posted on the ATP website
  - <http://telemedicine.arizona.edu/webinars/previous>



# Desert Expertise

## TeleToxicology Consultation: Cases and Treatment



**Farshad Shirazi, MS, MD, PhD**  
Associate Professor of  
Medical Toxicology,  
Emergency Medicine  
Pharmacology and Pharmacy  
Practice



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Professor of Medicine and  
Community and Family  
Medicine

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Poison Center  
&  
Telemedicine

*Mazda Shirazi MS, MD, PhD , FACMT, FACEP*  
*Medical director of Arizona Poison & Drug Information*  
*Center*

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**1-800-222-1222**

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# Poison Centers: personnel

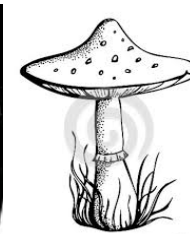
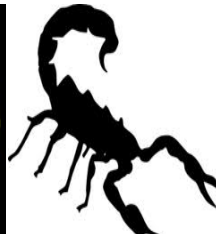
- *Physicians- Toxicologist, Pharmacologist*
- *Pharmacist- Poison Information specialist*
- *Teratologists*
- *Backed by consultants in mycology, herpetology, entomology, pediatrics, infectious disease, pain, nephrology, etc.*



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# Type of consults you will benefit from:

- Early recognition of snake bites and neurotoxic scorpion stings.
- Identification of toxidromes associated with exposure (serotonin syndrome).
- Recognition of skin exposures to corrosives, hydrocarbons, chemicals.
- Identification of Mushrooms
- Identification of insects
- Identification of plants

# Type of consults you will benefit from:

- Assistance with undifferentiated exposures.
- Assessment of appropriateness of transfer vs care at your hospital.
- Assistance with transfer to appropriate facility.
- Assessment of appropriateness of expensive antivenom use & antidotes.
- Assistance with inpatient care.



# TeleToxicology Consult 1

- Snake bite to the left hand
- HPI: 75-year-old male with past medical history of type 2 diabetes mellitus and CAD status post CABG in 1978, brought into the ED from Benson hospital
- Bitten on left fifth digit while gardening; severe pain and swelling shortly thereafter.
- Presented to Benson hospital, where he received a large amount of morphine.
- Transferred to BUMC South campus ICU.



# TeleToxicology Consult 1 (Continued)

- Past Medical History:
  - DM
  - CAD s/p CABG (1980)
- Past Surgical History: None
- Family History: Noncontributory
- Medications: Carvedilol, Gabapentin, Atorvastatin, & Metformin
- Social History:
  - Non-smoker
  - No EtoH use
  - No illicit drug use
  - Previous snake bite in Mexico, received Wyeth Antivenin
  - No allergies

# Pertinent Review of Systems

- CONSTITUTIONAL: No reported fever, chills
- RESPIRATORY: No cough, shortness of breath
- CARDIOVASCULAR: No chest pain, syncope, DOE, orthopnea
- GASTROINTESTINAL: **Non-Bloody Vomiting**, denies abdominal pain or diarrhea.
- GENITOURINARY: No dysuria, hematuria,.
- NEUROLOGIC: Denies HA, no seizures.
- HEME: No bleeding or bruising.
- MSK: **+ Left hand swelling and pain**

# Pertinent Physical Examination

## Vitals

T: 36.8 °C , HR: 97 , RR: 18 , BP: 116/70 , SpO2: 94%

## Exam:

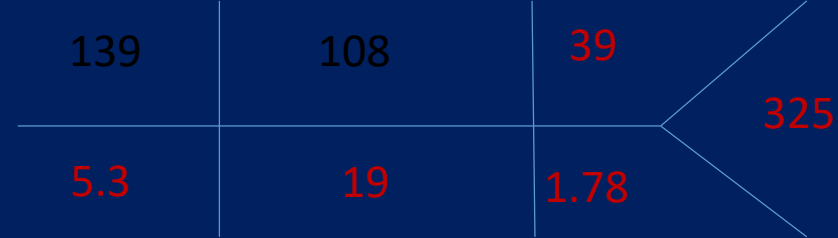
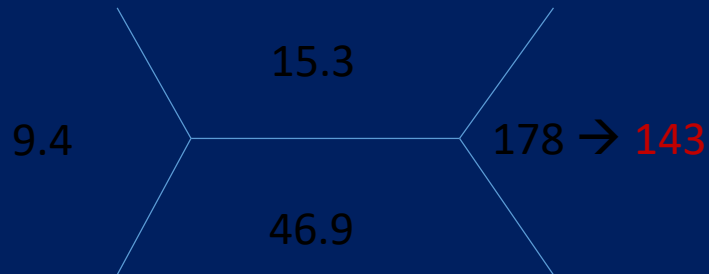
General: Alert and oriented x 3.

Musculoskeletal: Confluent circumferential erythema over the fifth digit of the left hand with 2 puncture wounds to the dorsum of the finger. Erythema travels proximally to about the ulnar styloid. Patient is able to move hand and extensor and flexor compartments of the fifth digit.

Neurologic: Awake, alert, and oriented X3



# Laboratory and Imaging



Troponin 0.05 → 0.22 → 0.65 → 0.57  
BNP: 409  
CK: 456 → 254

PT: 12.6 → 13  
PTT: 26.6  
INR: 1.1 → 1.2  
D-Dimer: 2,655  
Fibrinogen: 444 (<465)

XR Hand Lt: Soft tissue edema about the left hand **w/o** acute osseous abnormality, radiopaque foreign body, or soft tissue gas. Findings of erosive OA and possible inflammatory arthropathy.



03-31109481 TOMBERLIN, BARNEY  
DOB: 24-Feb-1942 77 Years Male White

14-Jul-2019 2:09:40

Banner Tucson (520)  
Tucson South Campus (874)  
HOUSE (55)

HR 64  
PR 224  
QRSD 114  
QT 428  
QTc 507

Oper: 299239  
Acct#: 03-41408865  
Room: 2S 2071  
URN: 10061698

-- AXIS --  
P 42  
QRS 32  
T 193

Account #: 03-41408865  
Order #: 15313505805  
Enc ID: 484217764  
Reason: ACS

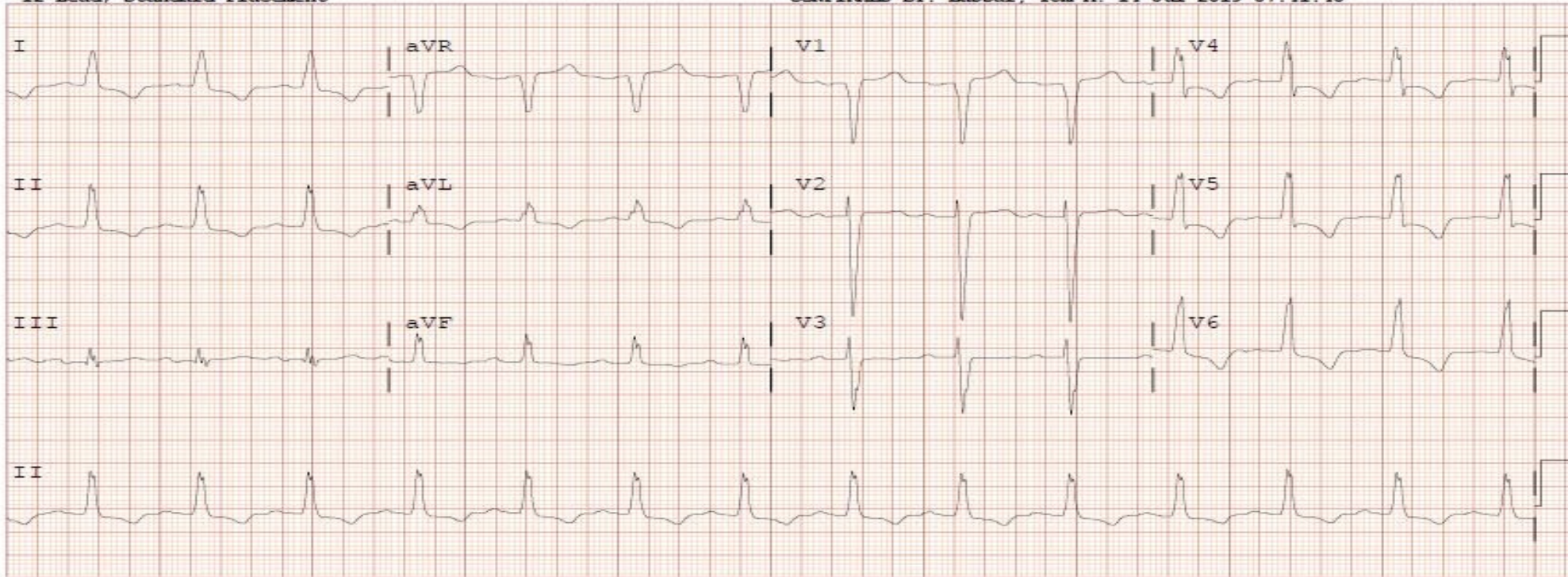
- ABNORMAL ECG -

Edited  
Previous Study: 13-Jul-2019 11:42:03 - Abnormal Unconfirmed

Requested By: ALI IMRAN

12 Lead; Standard Placement

CONFIRMED BY: Lassar, Tom A. 14-Jul-2019 07:41:40



Device: 15014560 Speed: 25 mm/sec Limb: 10 mm/mV Chest: 10 mm/mV F 60~ 0.05-150 Hz PH090A CL P?



# Questions for Listeners

1. Should this snakebite victim receive anti-venom upon arrival at the ER?

- Yes or No

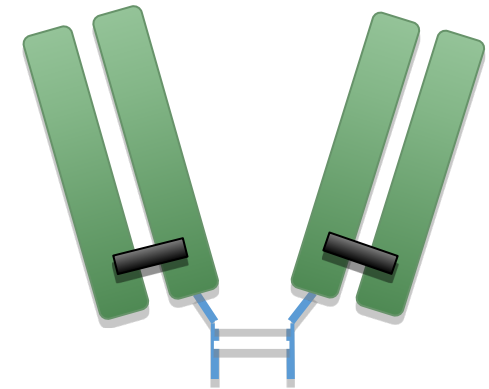
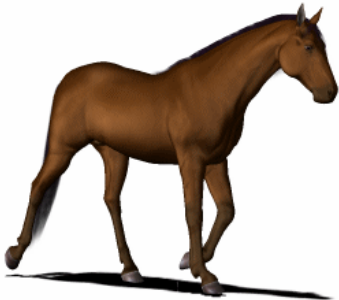
# Hospital Course

- Admitted to ICU under close observation
  - Initially given 10 vials of Anavip in Benson Hospital. Given 4 additional vials of Anavip due to low Platelets at BUMC South
  - Tetanus vaccination not needed – done in last 5 years.
  - Toxicology discharge recommendations:
    - Labs as per Rattlesnake bite, i.e, in 2-3 days, 5-7 days, 10-14 days.
    - Avoid NSAIDs and ice
    - Aspirin continued despite coagulopathy risk.
- Cardiology consulted:
- Troponin elevation due to demand Ischemia
  - ICD consideration in 3 months.
  - Discharged home after 24 hours of observation.



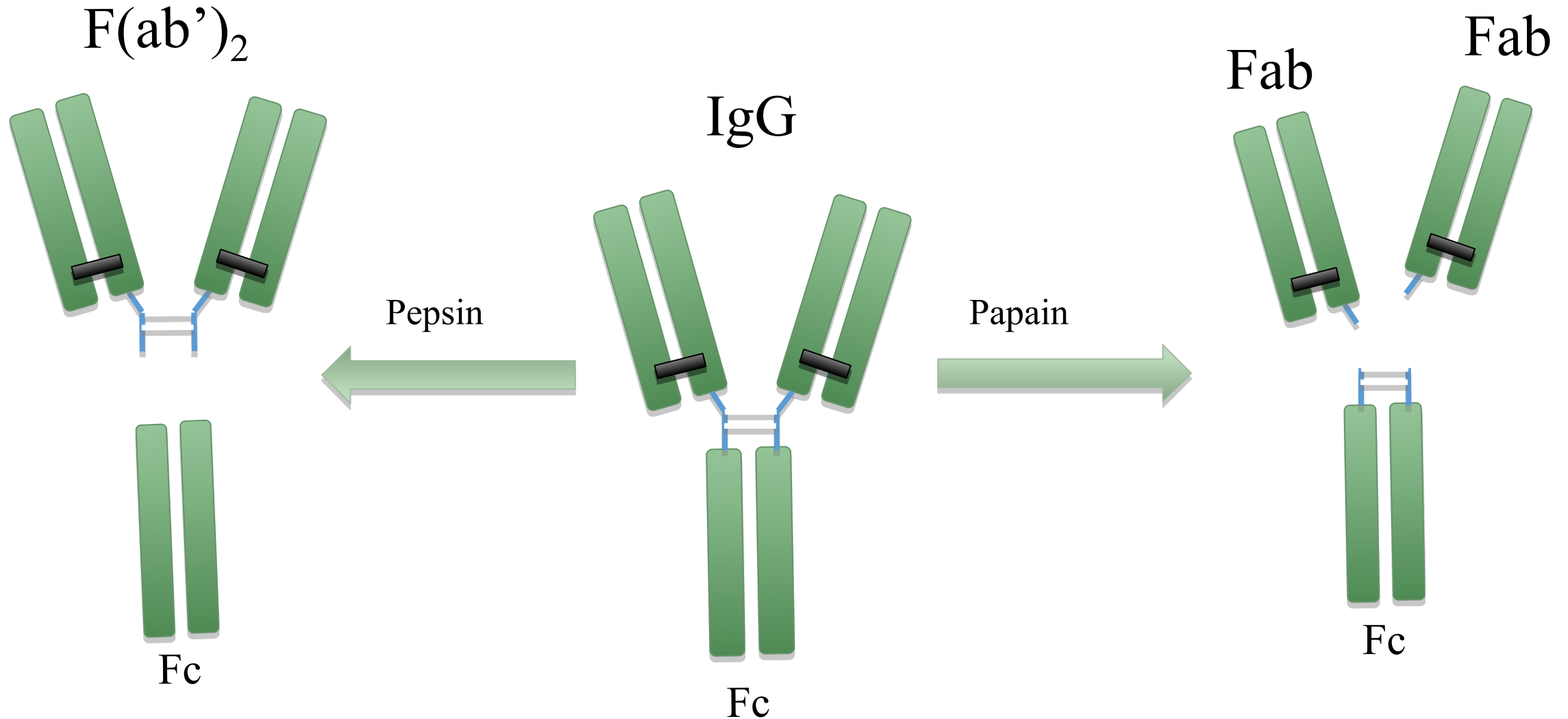
# Anavip<sup>®</sup>

- Crotalidae Immune F(ab')<sub>2</sub> (Equine)<sup>4</sup>
  - FDA Approved in May 6, 2015
  - Source: Horses
  - B. asper, C. durissus (*now C. simus*)<sup>5</sup>



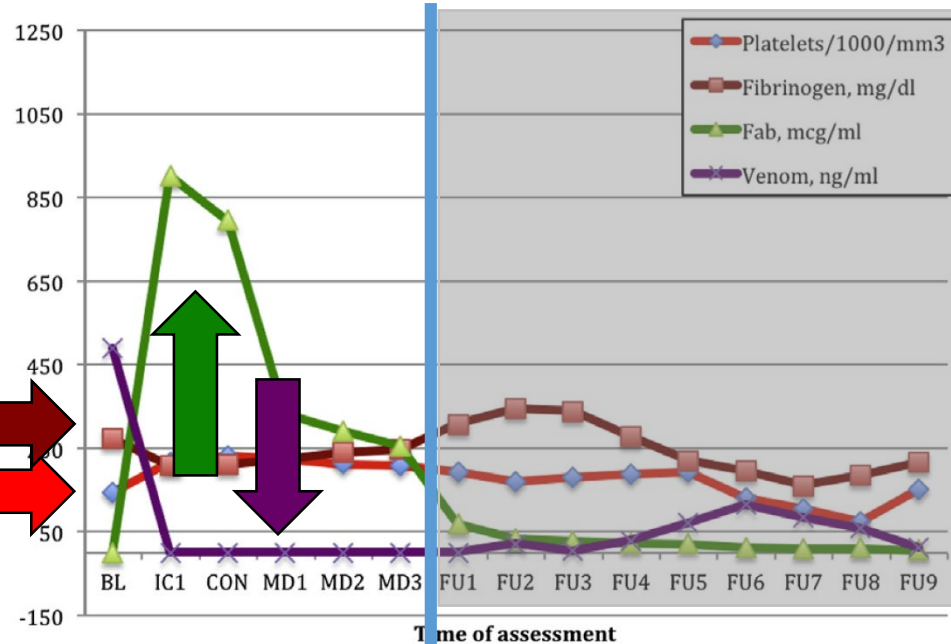
100 kDa

# Graphic History of Antivenom Molecules<sup>7</sup>



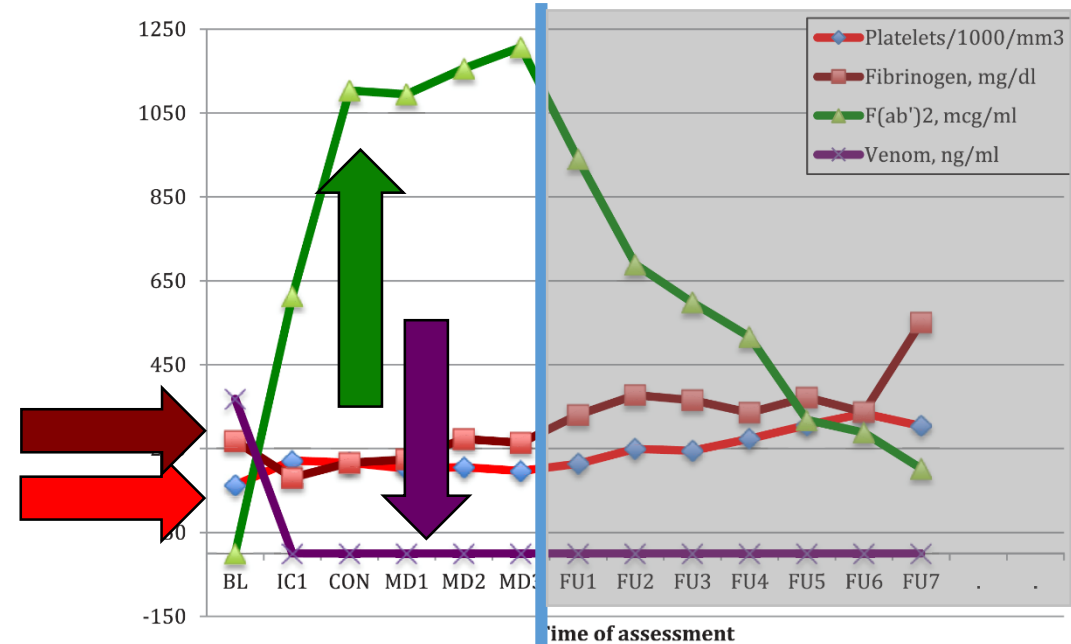
# Results<sup>6</sup>

## Fab



HOSPITAL

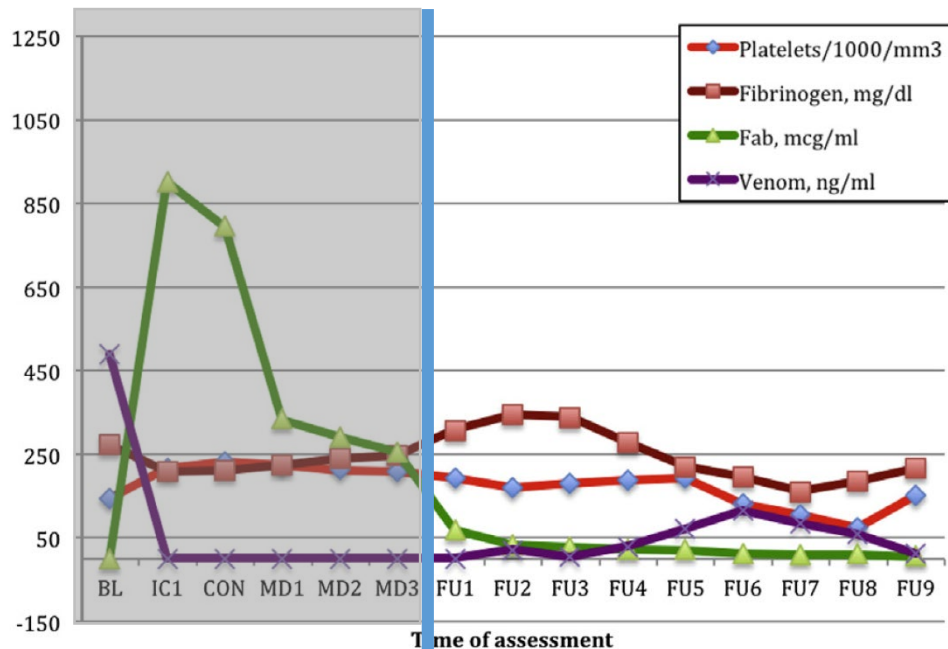
## Anavip



HOSPITAL

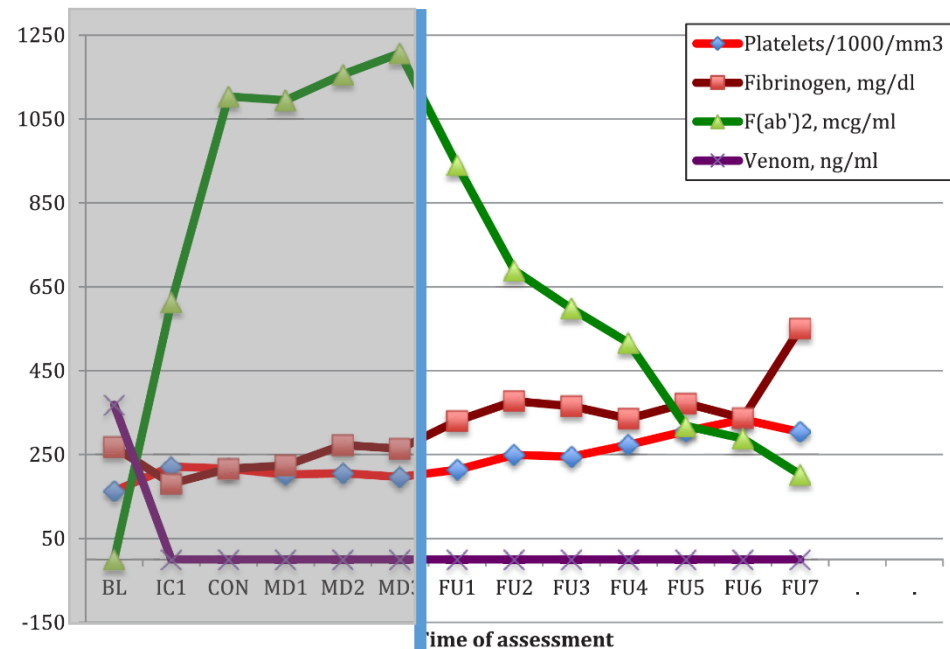
# Results<sup>6</sup>

## Fab



FOLLOW UP

## Anavip



FOLLOW UP

# Question for Listeners

2. Do “dry bites” require anti-venom?

Yes or No

# Snake Oral Flora

- Fang swabs and venom cultures

- *Clostridium* species
- *Pseudomonas aeruginosa*
- *Proteus* species
- Coagulase-negative *staphylococci*
- *Bacteroides fragilis*
- *Salmonella* species
- *Aerobacter* species

Original Articles

## **The Aerobic and Anaerobic Flora of Rattlesnake Fangs and Venom**

*Therapeutic Implications*

Lt Col Edgar O. Ledbetter MC, USAF & A. Earline Kutscher BA, MASCP

Pages 770-778 | Received 14 Apr 1969, Accepted 29 Apr 1969, Published online: 29 Apr 2013

## **Bacteriology of Rattlesnake Venom and Implications for Therapy**

Ellie J. C. Goldstein ✉, Diane M. Citron, Henry Gonzalez, Findlay E. Russell, Sydney M. Finegold

*The Journal of Infectious Diseases*, Volume 140, Issue 5, 1 December 1979, Pages 818–821,

In study of over 2700 bites in Arizona, 27 individuals had an infection

\*The majority of infections had no microorganisms isolated because cultures did not support growth or cultures were not done.

Microbiology\*

<i>Escherichia coli</i>	2
Group A streptococci	2
Methicillin-resistant <i>Staphylococcus aureus</i>	2

Polymicrobial ( <i>E. coli</i> , <i>Bacteroides fragilis</i> )	1
<i>Salmonella</i> sp.	1
<i>Enterococcus</i> sp.	1

**CLINICAL RESEARCH STUDY**

THE AMERICAN  
JOURNAL of  
MEDICINE®

## Prophylactic Antibiotics Are Not Needed Following Rattlesnake Bites



Jessica A. August, MD,<sup>a</sup> Keith J. Boesen, PharmD, CSPI,<sup>b</sup> Nicholas B. Hurst, MD,<sup>b,c</sup> F. Mazda Shirazi, MD,<sup>b</sup> Stephen A. Klotz, MD<sup>a</sup>

<sup>a</sup>Division of Infectious Diseases, Department of Medicine; <sup>b</sup>Department of Emergency Medicine; <sup>c</sup>Arizona Poison and Drug Information Center, University of Arizona, Tucson.

# Conclusions

- Microbiological associations:
  - 2 of the isolated bacteria appeared to be of part of the oral microbiota of rattlesnakes, all others, likely human origin
  - 3 infections occurred 4 weeks or more after the bite and suggesting that they were a consequence of wound care rather than the bite
- Clinical conclusion:
  - “Diagnosis” of cellulitis in most cases really represents the local effects of venom



# Wound manipulation

- Associated with increased infection risk
- Examples in our study
  - Hunting knife → necrotizing fasciitis caused by a group A Streptococcus
  - Bitten while tending a campfire → soft tissue infection 5 days after the bite



# In summary

- After a venomous snakebite, check the coagulation studies
- Is it a “dry bite”?
- Longer acting antivenom is now available and is effective: Anavip
- Bite wounds, if venom is injected are red, swollen, painful and warm—all cardinal signs of infection—however infections are rare and prophylactic antibiotics unnecessary. Infections do occur in victims who manipulate the wound

# TeleToxicology Consult 2: “Killer Bees”

- A 71-year old man was gardening in his back yard in St. David, Arizona and accidentally struck a migrating swarm of honeybees in a Palo Verde tree with the handle of his hoe.
- Overwhelmed by the attack he was slow to enter his home where his wife called 911.
- He arrived at the hospital in a great deal of pain; his eyes were swollen shut and his face and arms were erythematous.



# TeleToxicology Consult 2 (continued)

- One hour later in the Emergency Room his vitals were as follows: 150/90 BP; pulse 132; RR 14 and Temperature 37.2 degrees C.
- Multiple stingers were present all over the torso (he had been wearing a loose T-shirt). The stingers were removed and over 950 stings were noted.



# TeleToxicology Consult 2 (Hospital Course)

The patient was admitted to a non-ICU bed for observation.

All initial laboratory values drawn in the Emergency Room were within normal limits.

The following morning, labs were redrawn and the following was found: the CBC was normal and the WBC was normal; creatinine was normal; troponin, 0.20 (nl: <0.05); CK MB, 405 (nl: )PT 14 seconds (nl:11-13.5 seconds); INR 1.2 (nl: 1.0)

Platelets 135,000 (nl: >150,000).



# With “killer bee” stings there are two potentially dangerous outcomes:

- Anaphylaxis
  - The only cause of death in our study from 1 sting
  - ~9% or 30 people had anaphylaxis
  - “Biphasic” anaphylaxis may occur in massive sting victims
- Toxic effects of massive bee sting (>50 stings)
  - ~3% or 9 people had toxic effects of stings
    - Rhabdomyolysis
    - Acute renal injury
    - Elevated LFTs
    - Elevated troponin
    - Coagulopathy



# What are the recommendations after massive bee attack?

- How many stings qualify as massive attack?
- Length of observation
- What labs are recommended and when?
- Besides on the skin, where else are honeybee stingers and bees found?
- What procedures are needed to remove the bees from the body?



Eyelid of a German shepherd killed by massive bee attack.

# What other measures must be taken for victims of massive stinging?

- Bronchoscopy
- Ophthalmology consult
- Check the ear canals and oropharynx





# *Honeybee stings in Arizona in the Era of Africanized Bees.* Rahimian, Shirazi, Schmidt, Klotz, American Journal of Medicine, 2019

Outcome of Sting	Number of individuals (Stings)
Death	1 (1 sting)
Major effect	3 (in ICUs with 1,120,300 stings)
Moderate effect	32 (6 hospitalized with 35,50,200,300,950 stings; 1 unknown number of stings)
Minor effect	110
Not followed (managed on site)	140
Unable to follow and unknown	35



Medical outcome of bee sting; 321 calls to Arizona Poison and Drug Information Center; 30 month study



# Systemic clinical signs and symptoms of allergy/anaphylaxis following bee sting (N=321 victims; 30 months; Arizona)

Clinical Sign/Symptom	Number of victims (% of total)
Pruritus	43 (13.4%)
Hives	19 (5.9%)
Vomiting	10 (3.1%)
Tachycardia	9 (2.8%)
Dizziness	6 (1.9%)
Acidosis	5 (1.6%)
Hypotension	5 (1.6%)
Rhabdomyolysis	3 (<1%)
Troponin elevation	2 (<1%)



# ”Killer Bees”

- Africanized bees = “killer bees”; from Africa, escaped in Brazil 1956
- 1990 Hidalgo, TX
- 1993 Arizona, New Mexico
- Now the “killer bee” is only feral honeybee found in Arizona, except in the north with high elevations and cold climate
- Looks like its European counterpart, but social behavior is different
- Out “competes” European honeybee both in reproduction, foraging and defense mechanisms
- Since arrival in Arizona at least 11 deaths of citizens at the sites of attack by colonies
- Climbers, hikers at risk
- A hazard for pets as well



# Question for Listeners

- Victims of massive bee attacks should have laboratory values obtained hours to days after the attack in order to detect toxic effects of bee venom.
- True or False

# Africanized='Killer Bees' are dangerous

Date	Gender of Victim/Age	Where in Arizona/	Activity when attacked
Oct 1995	Female/88	Apache Jct.	Outside home
2004	Male		Climbing
Sept 2011	Male/65	Yavapai	Working on home
Oct 2012	Male/19	Tucson	Climbing
May 2013	Male		Climbing
Oct 2014	Male/32	Douglas	Gardening
May 2016	Male/23	Apache Jct.	Hiking; 1000 stings
July 2017	Male	Yavapai	Working on road
Aug 2017	Male	Wickenburg	Landscaping
April 2019	Male/51	Yuma	Trying to remove bees from couch

- Summary
- Several climbers fell to death while attacked
- Climbers should be forewarned
- Using loud, moving vehicles may promote attack (backhoe with 2 victims)

Lethal massive bee attacks in Arizona since 1993

# In summary

- Health care workers should count the number of stings as the number correspond generally to the severity of outcome.
- Hospitalize massive bee sting victims for observation and..
- Repeat laboratory studies as the toxic effect of bee stings, predominately due to mellitin, occur after hours and days whereas, anaphylaxis occurs within minutes of the attack.

# Question for Listeners

- In massive bee attacks, “biphasic anaphylaxis” may occur hours to days after initial anaphylaxis due the persistence of venom.
- True or False

# TeleToxicology Service Availability

- 24x7x365
- Throughout Arizona except Maricopa County



# How to Access TeleToxicology Services

1. Download and install Zoom Video Conferencing software onto your mobile device
  - Search for “Zoom” in your device’s App Store
2. Test your Zoom connection by joining a Zoom Test meeting at <https://zoom.us/test>
  - For technical support contact the Arizona Telemedicine Program Helpdesk at 520-626-6978
3. Call Arizona Poison and Drug Information Center 520-626-6016
  - Ask for a toxicology consult and provide your mobile number or email to receive the Zoom meeting link
  - Toxicologist will send you a Zoom meeting link
    - Click on the link to launch Zoom and join the video meeting

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<https://www.surveymonkey.com/r/SWTRCWebinar>

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