ACETYLCHOLINESTERASE (ChE) Testing For Handlers

Why is Testing Useful?

- ChE shows pesticide exposures.
- ChE looks at exposure over time.
- The test is widely available.
- A blood sample all that is needed.

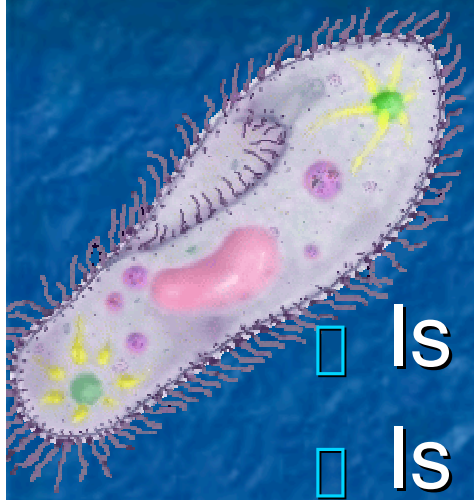
BUT!

- You need a baseline test.
- You need good lab methods.
- The sample must be handled right.
- It matters when the sample is taken.
- The test must be interpreted by a MD.

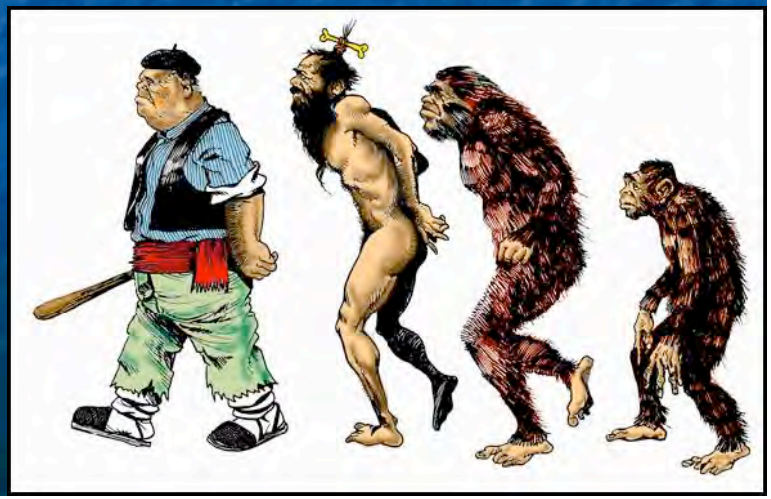
Objectives

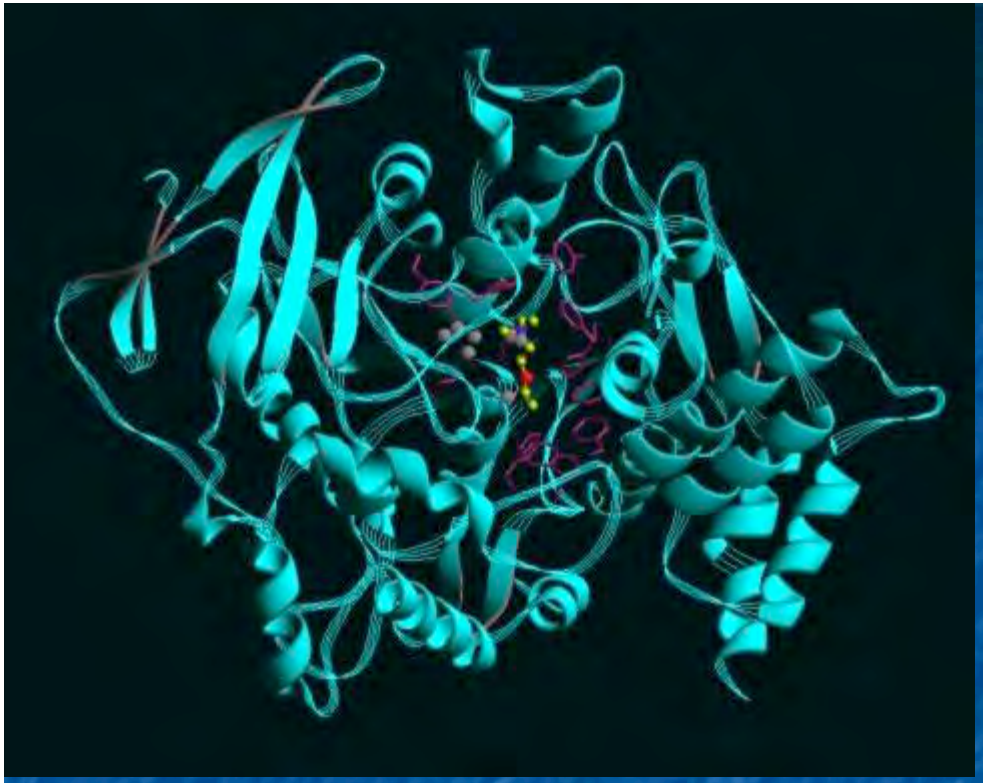
To understand the basics of ChE
and pesticides that inhibit the action of ChE.

Biology of ChE



- Is present in tiny animals and big.
- Is a very fast enzyme (chemical).
- Is found everywhere in the human body.
- Plays a critical role.





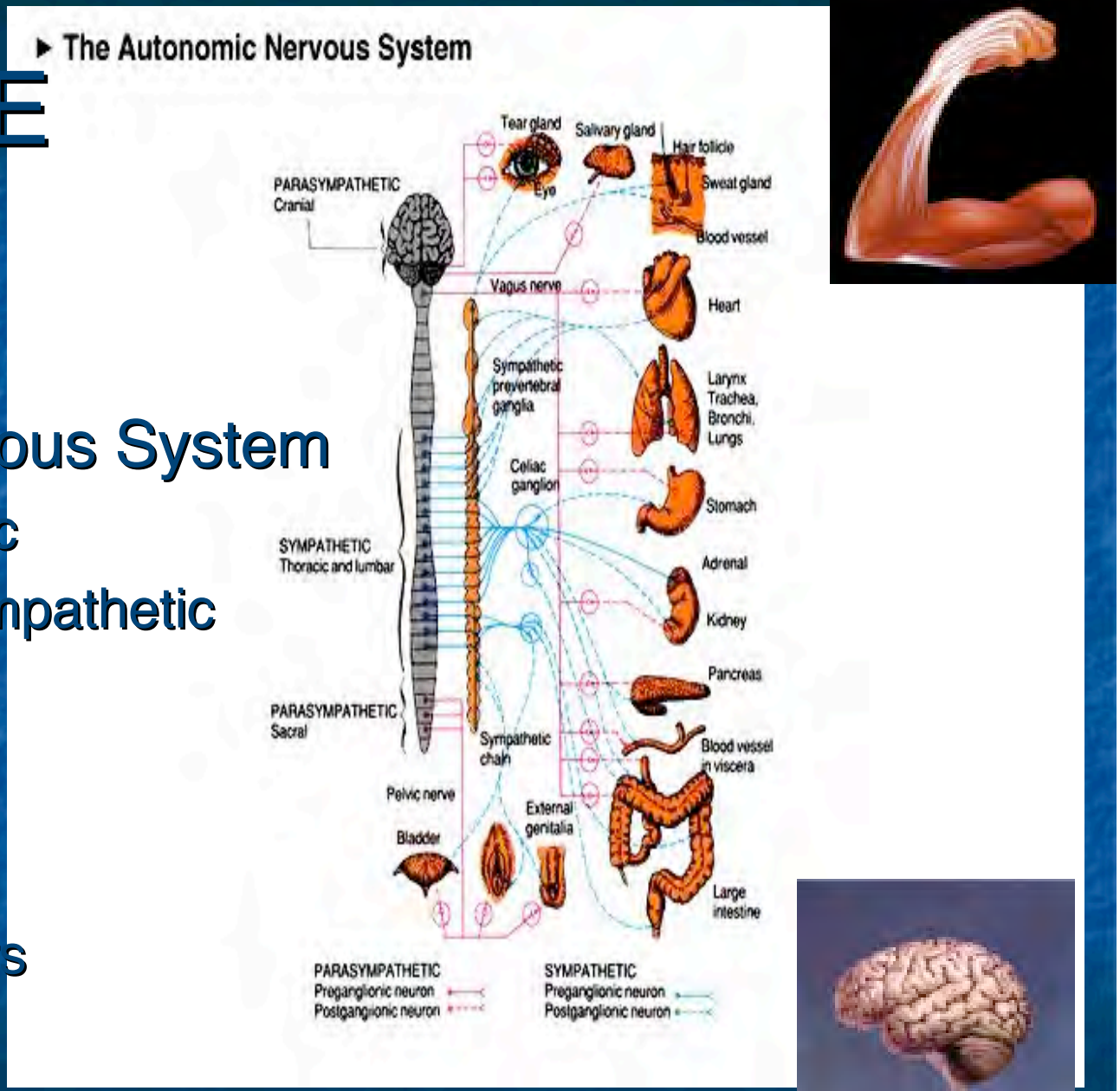
What ChE Looks Like!

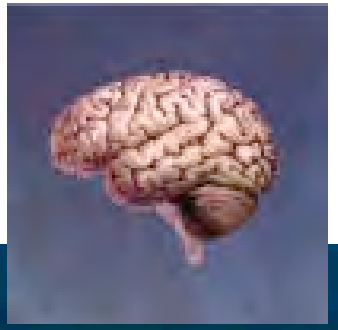
An “enzyme” (special kind of chemical) with a special active part. (see the red spot?)

- It is produced in tissues and blood.
- It is present in all the nerves in your body, at the “synapse”.
- It turns off a key chemical that is found in the space where one nerve connects with another.

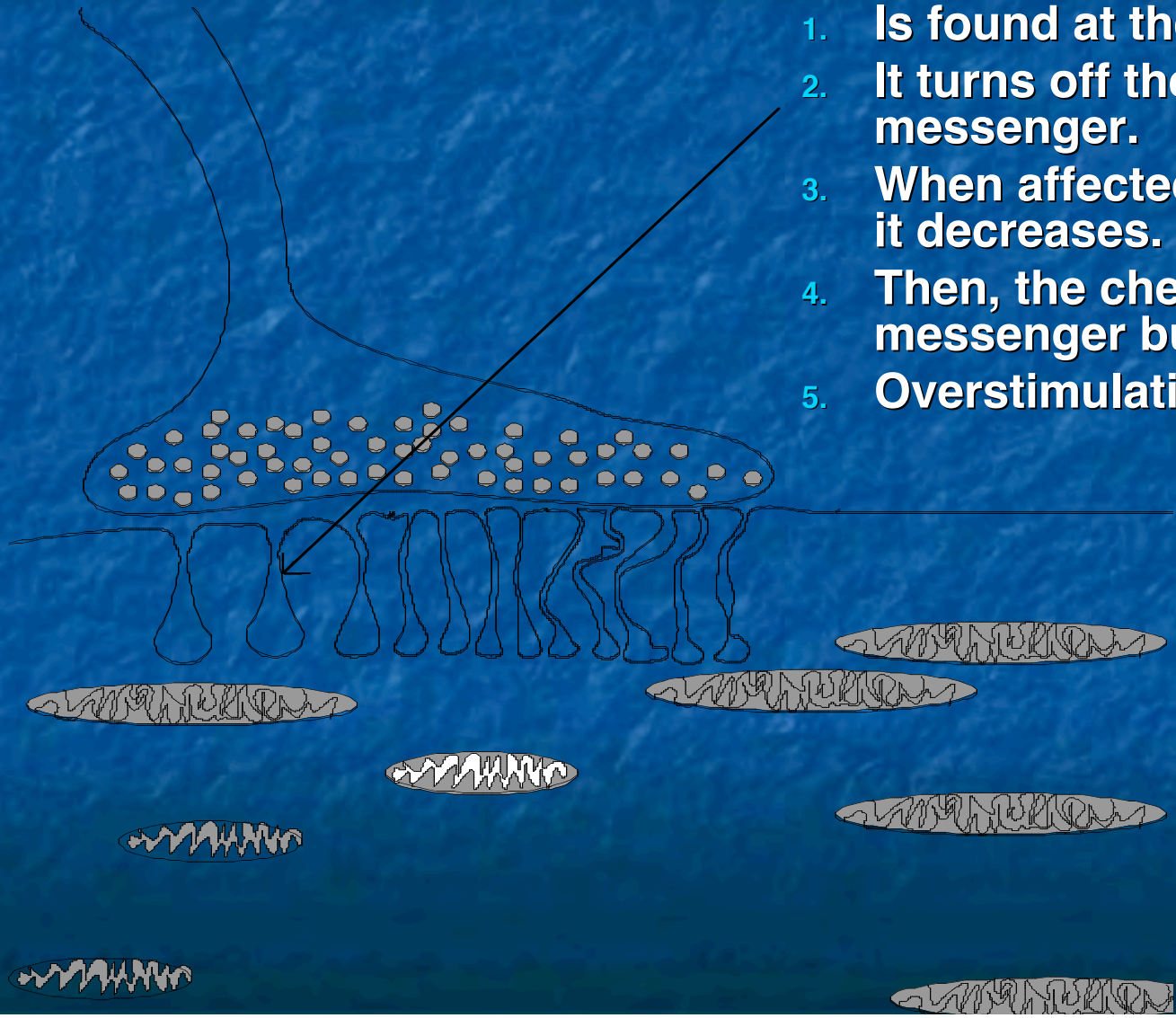
Where ChE Acts:

- Autonomic Nervous System
  - Parasympathetic
  - Presynaptic Sympathetic
- PNS
  - Skeletal muscle
- CNS
  - Memory & others





How ChE Acts



1. Is found at the synapse.
2. It turns off the chemical messenger.
3. When affected by pesticide, it decreases.
4. Then, the chemical messenger builds.
5. Overstimulation results.

Two Kinds of ChE in the Body. The ChE Test Measures Both.

- Plasma ChE (PChE)
  - Floats freely in plasma
  - Made by the liver.
- RBC ChE (AChE)
  - Bound to red blood cells
  - Made when red blood cells are made.

Plasma ChE (PChE)

- Is sensitive to most ChE inhibitor pesticides.
- Recovers rapidly after pesticide exposure (is made fresh again).
- May be affected by liver disease.

Red Blood Cell ChE (AChE)

- Is slower to be affected by Che inhibitor pesticides.
- Is slower to recover after pesticide exposure.
- May be affected by low red blood cell count (anemia).

ChE and Medicines

- Some medicines are like tiny pesticides! They inhibit ChE. Then, the nerves are more stimulated.
- These medicines are used to treat:
  - Alzheimer's Disease
  - Myasthenia Gravis
  - Glaucoma
  - And to prevent damage from Nerve Gas Attacks

Pesticides That Inhibit ChE

- Organophosphates
  - Inhibit irreversibly.
  - ChE must be replaced by the body.
- Carbamates
  - Inhibit temporarily.
  - Reversal is rapid and related to exposure.
  - ChE soon reactivates and is ready to go.

Toxicity of ChE Inhibitors

Mild cases:

tiredness, weakness, dizziness, nausea and blurred vision

Moderate cases:

headache, sweating, tearing, drooling, vomiting, tunnel vision, and twitching

Severe cases:

abdominal cramps, urinating, diarrhea, muscular tremors, staggering gait, pinpoint pupils, hypotension (abnormally low blood pressure), slow heartbeat, breathing difficulty, and possibly death

Extoxnet http://ace.ace.orst.edu/info/extoxnet/

When To Do Testing?

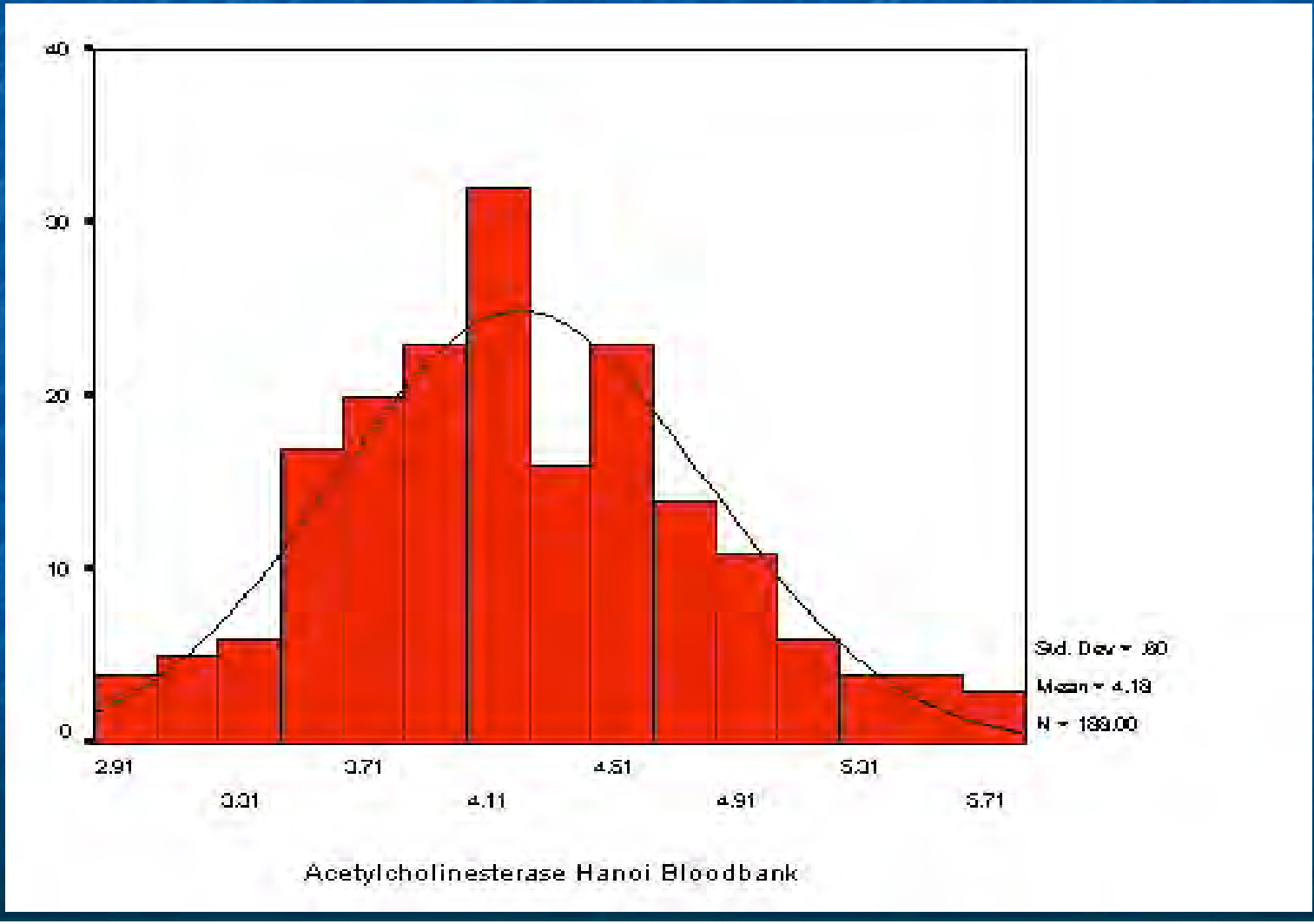
Class I and II Carbamates & Organophosphates

DANGER or WARNING ON THE LABEL

Threshold: 50 hrs in 30 days

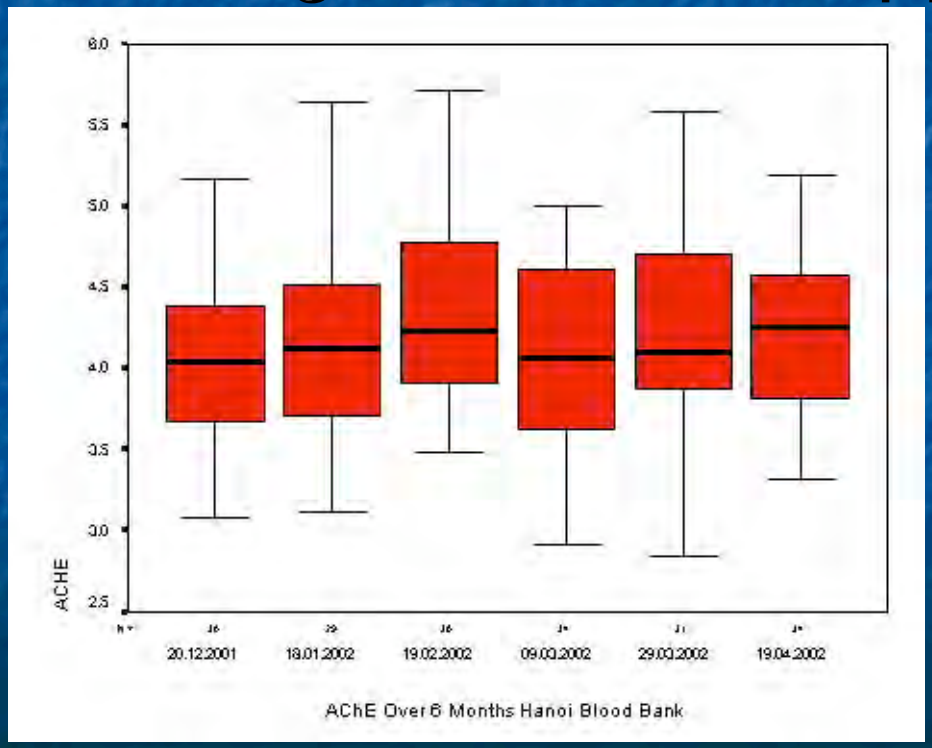
Why Do We Get A Baseline Test?

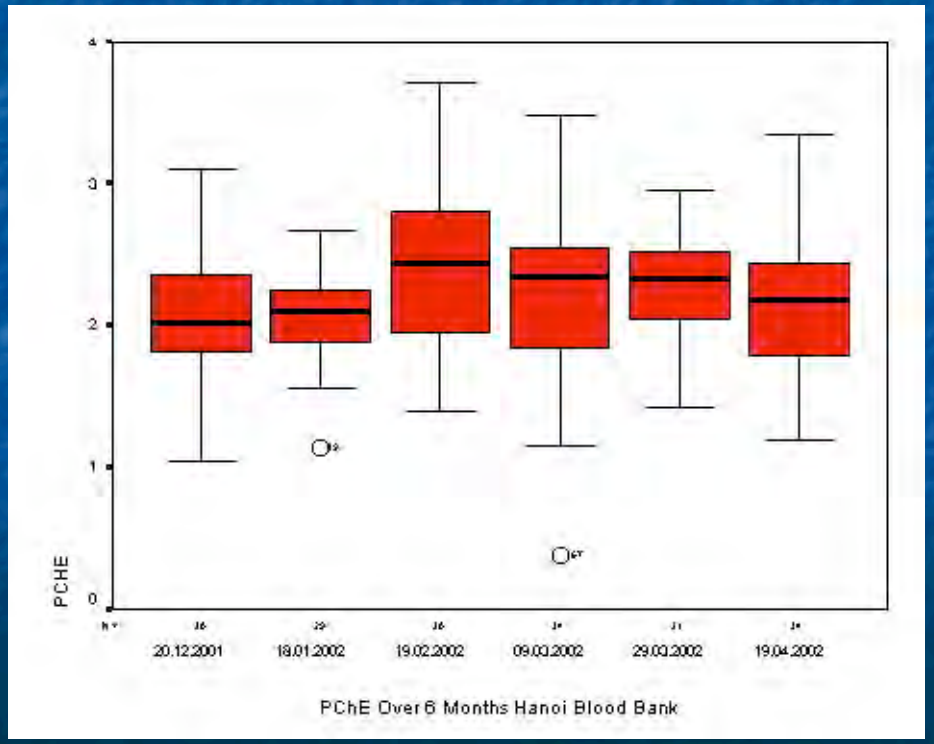
- Normal Range of ChE activity



Variation, Month to Month

- Relatively Stable in the Population
- Large difference: upper and lower limits





Baselines

- Obtain before exposure.
  - 30 days since last handling
- Maintain records for future comparison.
- If it is abnormally low,
  - Recheck, average or discard.
- More tests are better than less
  - What does “regression to the mean” mean?

How Often to Test?

- Retest with the same laboratory, same methods
- Retesting every 30 days
  - When to do follow-up?
    - Rules state within 3 days of reaching threshold
  - Why are you testing?
    - To evaluate work exposure
    - To prevent future exposure
  - Decrease frequency with experience

How to Interpret Results

- 20% Depression- Evaluate
- 30% AChE- Remove and Evaluate
- 40% PChE- Remove and Evaluate

- If removed,
  - when AChE and PChE return to 20% or less depressed, return to handling pesticides

Medical Removal

- What else can they do?
- Thinning? Probably not in sprayed orchards*
- Know the operation
- General work

*Engel and Keifer 1998, Keifer, Miller, Fenske 1995 Schnieder et al 1991)

Return to Work

- Return to regular duty
  - When both PChE
  - and AChE get to 20% or less depresed.
- File a Claim?
  - If worker is sick, yes

BUILDING INFORMED CONSENT FOR PESTICIDE HANDLERS IN WASHINGTON

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Informed Consent 1- Definition

Is Informed Consent a Form or a Process?

http://eduserv.hscer.washington.edu/bioethics/topics/consent.html

Informed Consent 1- Definition

- Both! But mostly a process (Belmont Report 1979)
- Process is informed by pt's legal rights and MD's ethical duties
  - Information exchange
  - Comprehension
  - Voluntary choice

Informed Consent 1- Definition

Research vs. Treatment

- Different
  - *Intent-* care decision vs. conflict of interest
  - *Forms-* information dictates short/ “basic” vs. long/comprehensive

Informed Consent 1- Summary

Pesticide Handlers Need

- appropriate information
- understandable language

Informed Consent 2- Elements

What Are The Elements of Informed Consent?

Informed Consent 2- Elements

- Both federal and state law apply
- *Research*- 21 CFR Food and Drugs, 45 CFR Public Welfare
- *Treatment*- RCW 7.70.050 proof of breach of duty, RCW 7.70.060 contents of consent form

Informed Consent 2- Elements

- Understandable language
- Nature and character of the treatment
- Anticipated results
- Alternative treatments
- Risks and benefits

Informed Consent 2- Elements

- *Reasonable patient standard-* What would the average patient need to know to be an informed participant ?
- *To do-* Provide the best care and respect the patient as a person.

Informed Consent 2- Caveat

- *Vulnerability to coercion= limited autonomy*
  - *By employee status*
  - *By minority status, language, literacy*

Thus, special considerations apply

Informed Consent 2- Summary

Pesticide Handlers Need

- appropriate information
- understandable language
- alternatives, risks and benefits
- not to be pressured to participate.

Informed Consent 3- Cultural Competence

What Is Culturally Competent Informed Consent?

http://www.georgetown.edu/research/gucdc/nccc/documents/Policy_Brief_1_2003.pdf

Informed Consent 3- Cultural Competence- Definition

Cultural competence

- Delivers care effectively across cultures
- Identifies unique needs of individuals
- Matches services to these needs
- Determines practice by culturally preferred choices

Informed Consent 3- Cultural Competence-How To

- Beliefs- “believe”
- Attitudes- “feel”
- Knowledge- “know”
- Language- “speak”
- Traditions- “practice”

Informed Consent 3- Cultural Competence- Why?

- *Diversity increasing-* 40% non-white by 2030 in US population
- *Disparities for minorities in health care-* increased poverty, cancer, obesity, diabetes; decreased preventive care, immunizations; mental health care

Informed Consent 3- Cultural Competence- Why?

- *Outcomes are improved-* HgbA1c, patient satisfaction
- *Law mandates non-discrimination*: legislation, regulation, accreditation
- *Malpractice risk-decreased* with improved communication

Informed Consent 3- Summary

Pesticide Handlers Need

- appropriate information
- understandable language
- alternatives, risks and benefits
- not to be pressured to participate
- a manner that is culturally competent

Informed Consent 4

How Do You Make A Culturally Competent Informed Consent Process For Handlers?

Informed Consent 4- Methods

1. Focus groups to study issues of cultural competence 2. Test-Retest to evaluate product

- Confidential, in Spanish, with simultaneous English translation and transcription
- Iterative process— “Plan, Do, Study, Act”, each iteration is different
- Test-Retest Ongoing

Informed Consent 4- Findings

- *Beliefs*- law is on their side, employer should care for employees
- *Attitude*- worry about getting sick from pesticides, fear blood and needles, mistrust unexplained changes, afraid to take time off work to get tested

Informed Consent 4- Findings

- *Knowledge*- very little known about blood tests, ChE test, but know that pesticides are toxic, safety gear is important, employers sometimes scrimp on safety

Informed Consent 4- Findings

- *Language*- English is a barrier to care, many handlers can't read, recorded information and consent is better
- *Tradition*- important role of wives and social institutions for decision making and dissemination of information

Informed Consent 5- How To Do It

How Do I Get Informed Consent From Pesticide Handlers In My Office?

Informed Consent 5- Caveat

What Does The Rule Say?

- Requires "Declination Statement" only after receiving training about pesticides and discussing risks and benefits with MD or LHCP (WAC 296-307-14820)

Informed Consent 5- Tools

Consent Form

- 5th grade reading level
- Incorporates culturally appropriate knowledge
- Addresses specific attitudes
- Will be available on audiotape

Informed Consent 5- Tools

Information Novella- "Jorge"

- Culturally-appropriate format
- Incorporates culturally appropriate beliefs, attitudes, knowledge, language
- Will be available on audiotape
- Circulated to wives, community

Informed Consent 5- Tools

Context for consent

- No job, benefit, seniority loss for participation
- Testing done on company time
- Information spread to community by radio, church-centered events, strategic information postings e.g. Laundromat

Informed Consent 5- Process

- Pt. reviews Novella, audiotape
- Short Q&A discussion in Spanish
- Pt. signs consent or declination
- Discussion Leader/ Impartial Witness co-signs the form
- Cc: chart and patient. Declination sent to employer

Conclusion

Building Informed Consent For Pesticide Handlers in Washington State Is A Process That Includes:

- Legal, ethical, cultural components
- Participation by health care team, handler, employer, community
- Specific tools you can use in Spanish
- Please See a Copy of the Consent Form!