

Why I Do NOT Train Kids!



Larry “Harris” Taylor, Ph.D.

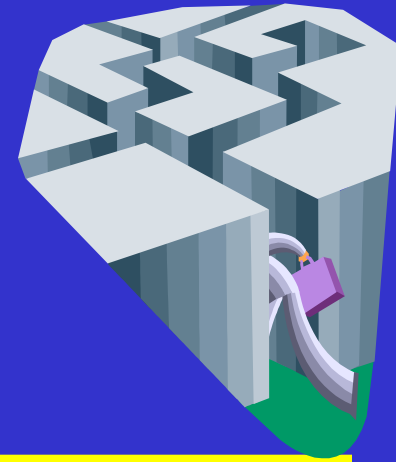
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Biochemist & Scuba Instructor

University of Michigan



Benefit



Risk

Benefit NEVER = ∞

Risk NEVER = 0

Everyone has a different evaluation

**“There is a nation out there
of small people
And
They are **NOT** like us!”**



**Child Psychiatrist
University of Michigan
Private Conversation**

Children do NOT



Act

Think

Emote

Respond

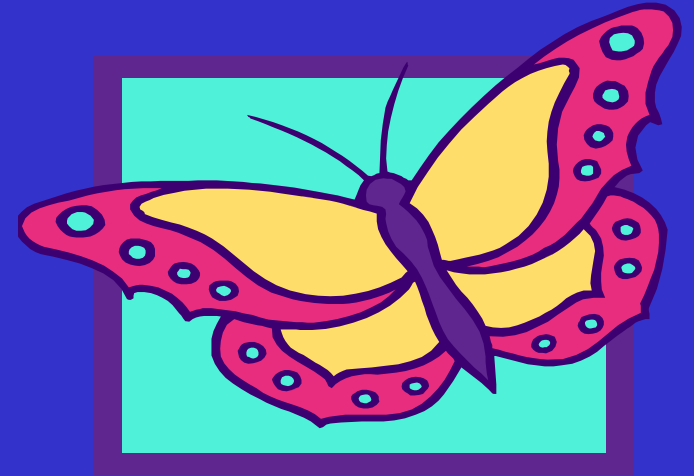
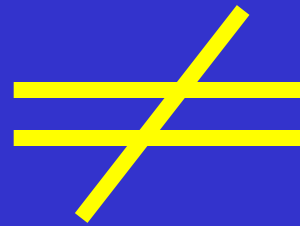
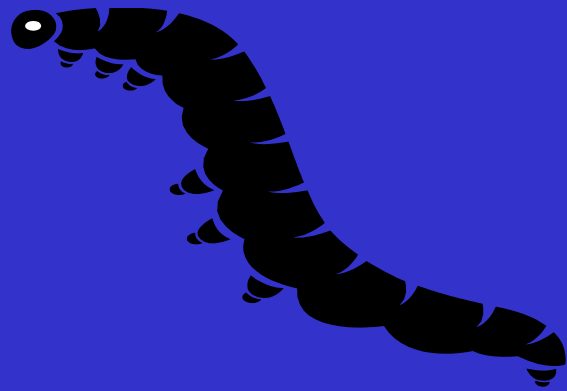
Play



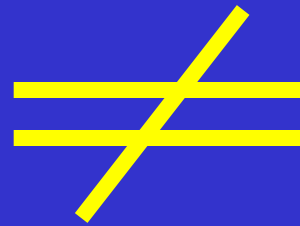
As Adults



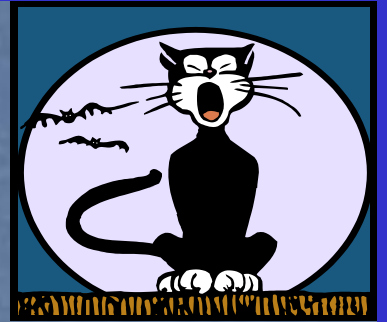
Caterpillars are NOT small butterflies



Children are NOT small adults



Soap Box Warning!



The concept of

Physically

Mentally

Psychologically

MATURE

Youngster

Oxymoron

Economic Predation





**“The
It Won’t Happen to me!
Syndrome”
Somers (1976), U of MI**

Q. Are Divers being informed of risk?

A. No!

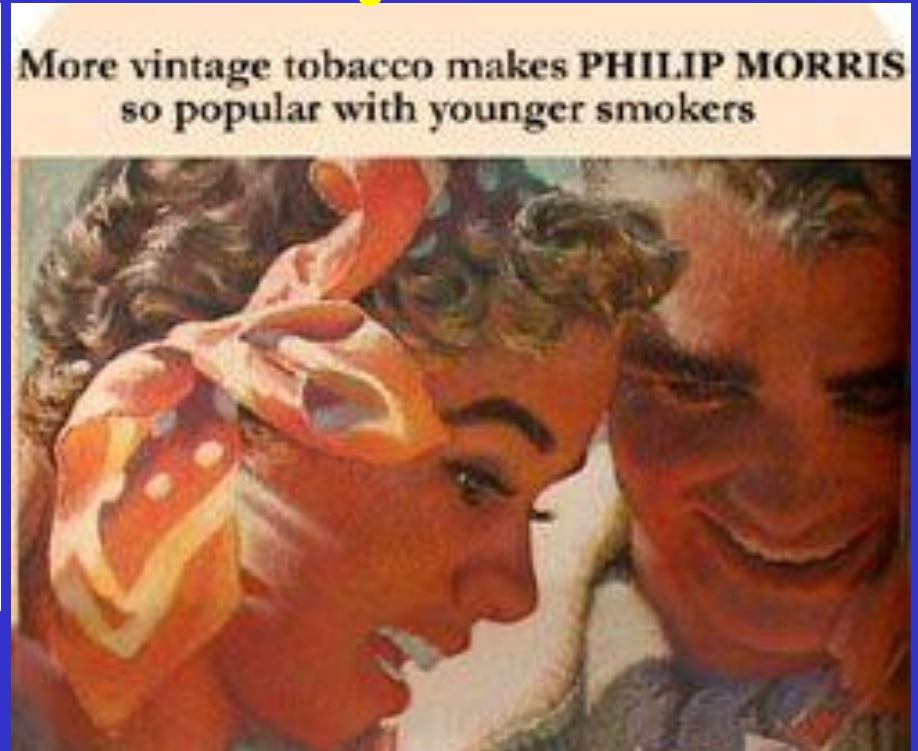
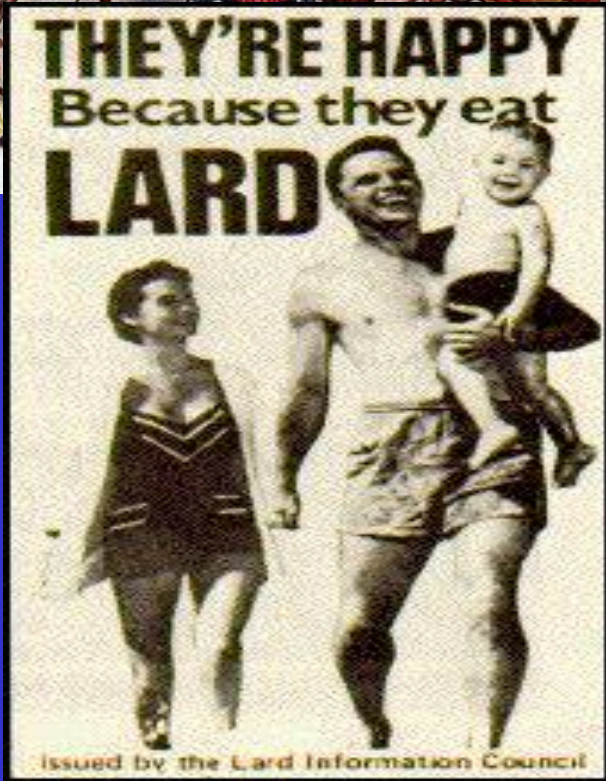
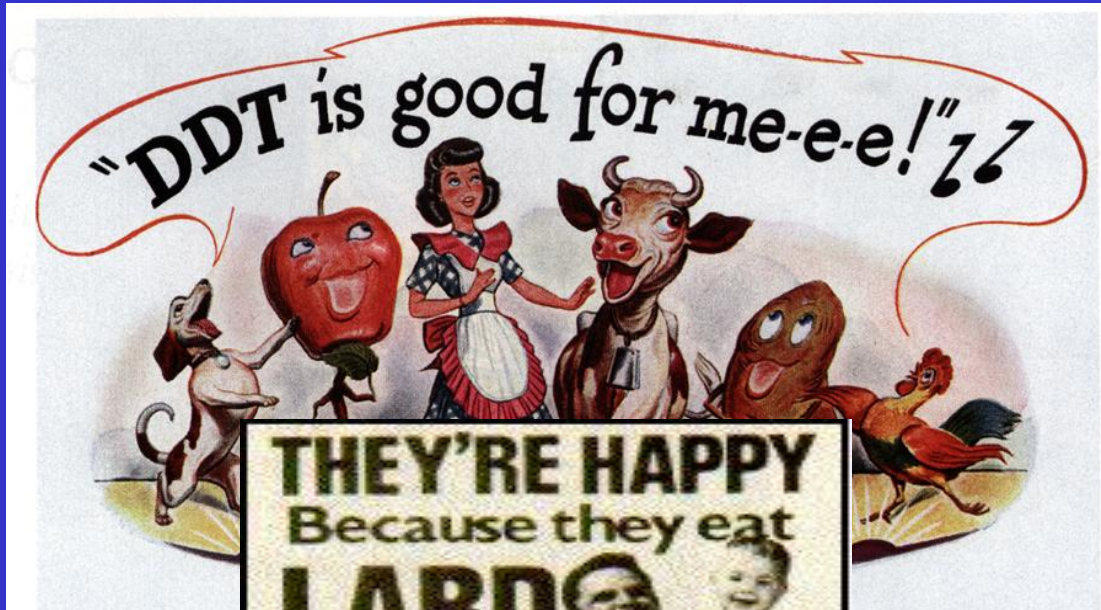
**Morgan (1995), WI Sea Grant
Study Commissioned by NSF**

The Lesson of History



**Decisions based on “need to increase funding”
Often sacrifice
the best interests of the participants**

The Lesson of History



**Denial of risks
can be
Very COSTLY**

End Soap Box Warning





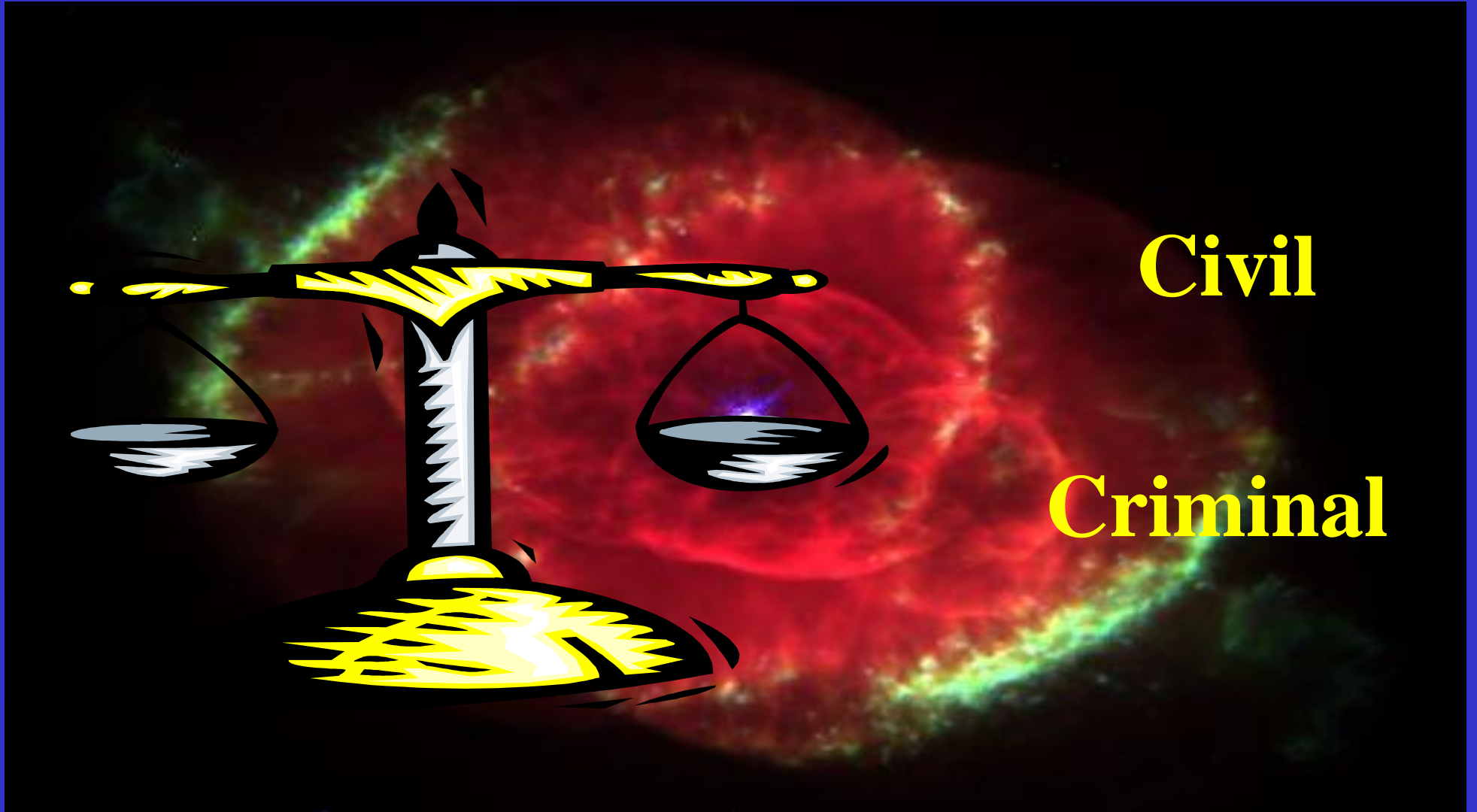
Concerns:

Legal

Risks

Medical

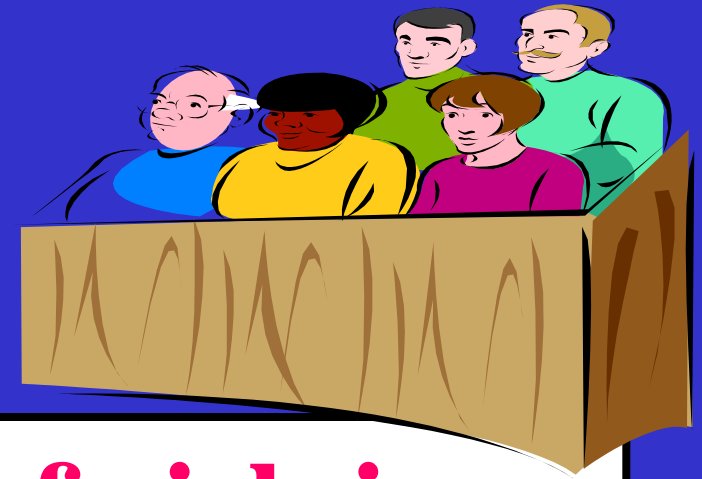
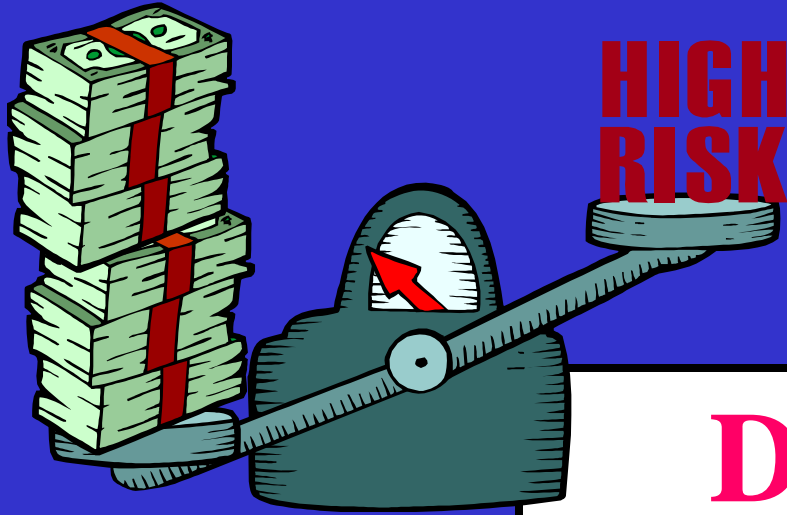
Legal Issues



Civil

Criminal

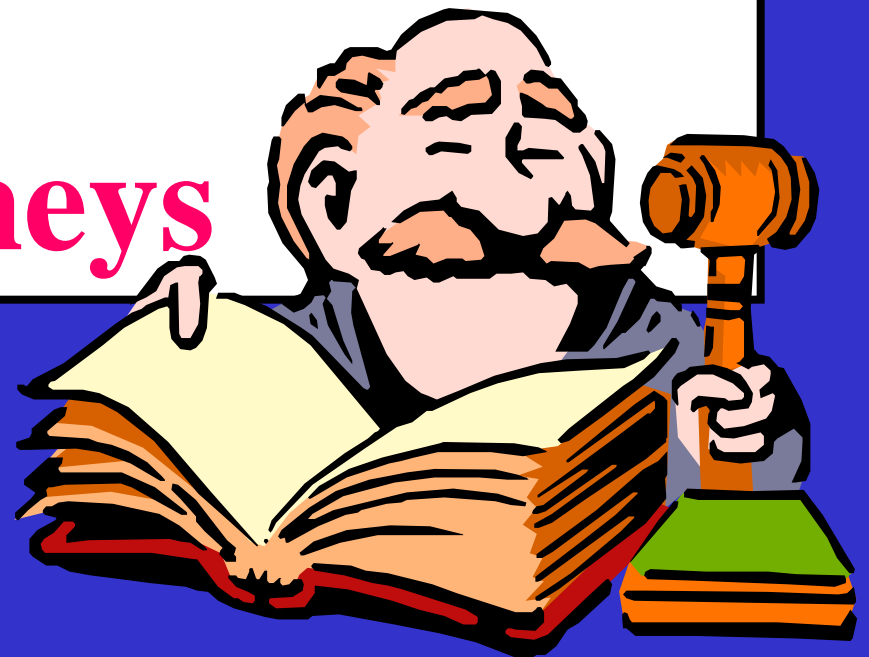
Legal Concerns: Civil



Denial of risk is
NOT a strong defense



Denial of Risk
Declining Standards:
Gift from C-Card Vendors
To
Attorneys



Legal Concerns: Criminal

Some jurisdictions MAY limit activity:

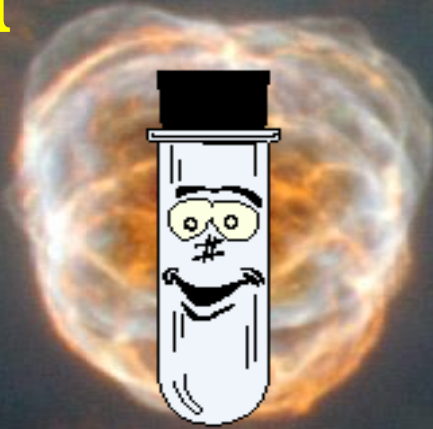
**“It shall be unlawful for any person
17 years of age or younger
to engage in skin or scuba diving
Unless accompanied
by a person 21 years of age or older”**



Ohio DNR

Medical Matters

Psychological



Physiological

“It has NOT been proved that ...”

Insert ANYTHING here

Related to the “Kid’s In Diving” Topic

**No Documented Studies
Demonstrating
Diving Is Harmful to Kids!**



There NEVER will be!

‘cause

**Research that
would answer concerns:**

Costly

Involves Decades

Medically Unethical

Psychology





Personality



SOME post-DCS sport divers

Show

“negative” personality shifts:



Paranoia

Depression

Dysfunctional behavior



**Mostly Anecdotal
Or
Commercial/Deep diving**



**23 recreational divers:
14 (60%) Mood Disorders 1 yr post incident
Sutherland, et. al. (1987)**

Change in personality
SUGGESTS
Change in brain structure

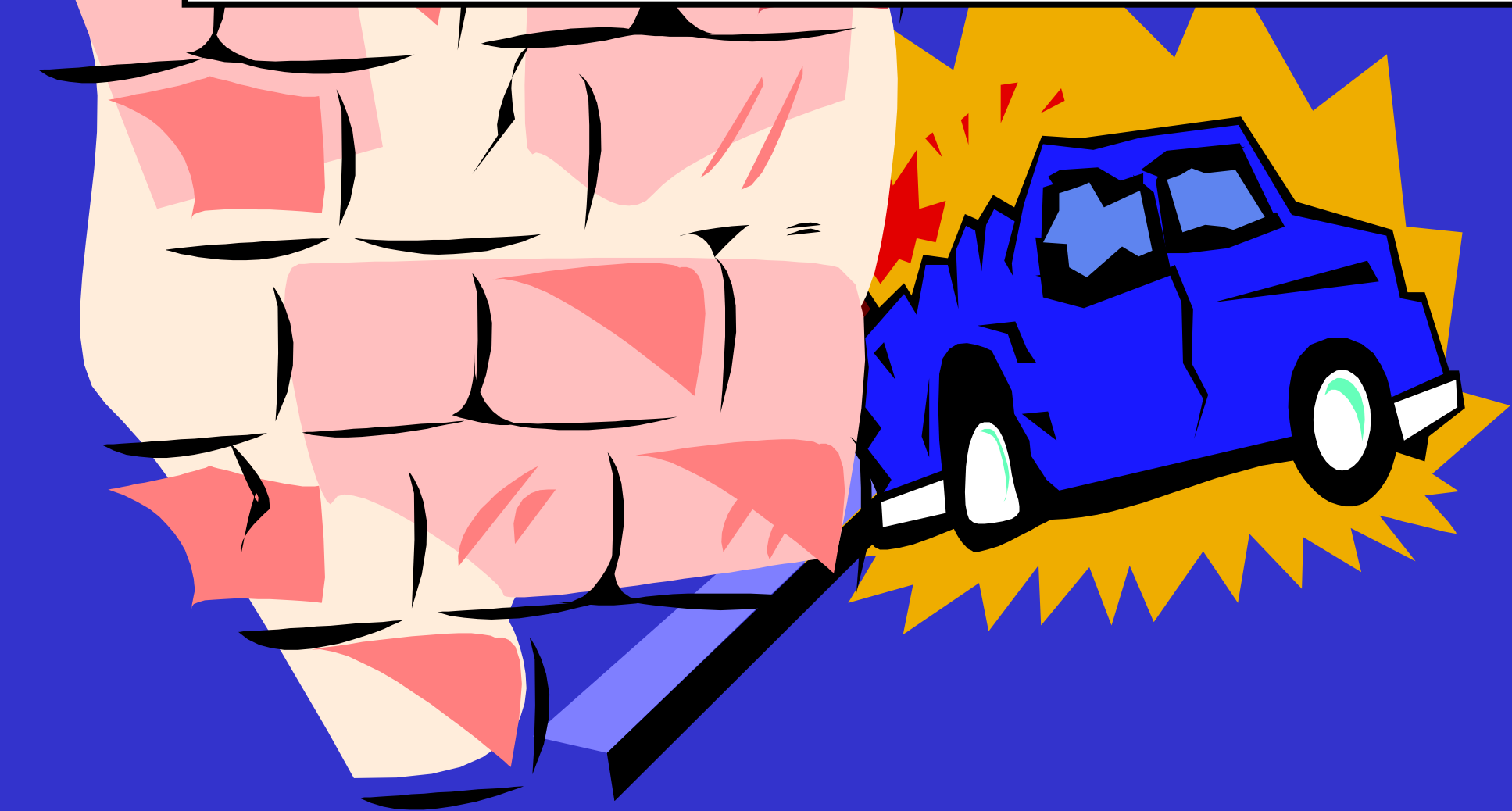


Q. Is this reason to NOT train kids?
A. It is in MY kids

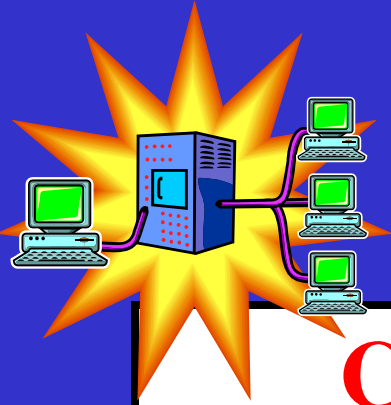


NOT because of history, but
Consequences severe
Unknown dose-response curve
Risk to personality development UNKNOWN

Concrete Thinking



Concrete Thinking



Communication must be specific
Operations limited to defined parameters

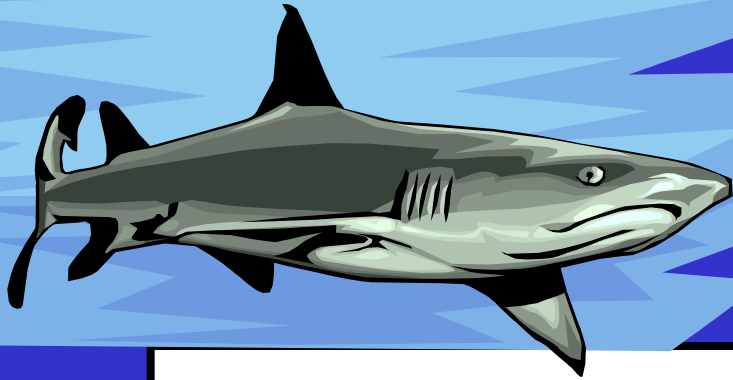
There may be knowledge of fact
Without understanding



Your Computer Has Crashed

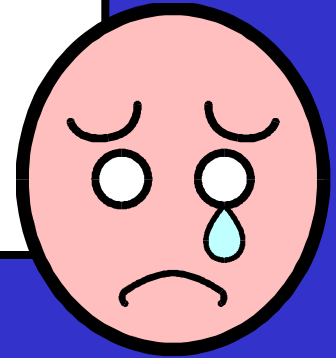
No one can hear *your* scream

Coping



**“The appropriate response
to a life-threatening situation ...
is not to burst into tears”**

Carl Edmonds, MD (1996)





Concrete Thinking

Characteristic of 7 –12 yr olds

Concrete thinkers cannot:

Consider hypothesis

Consider multiple possibilities in scenario

Systematically solve a problem

Use combinatorial logic

Transition Out of Concrete NOT until age 15-17

The Ice & Snow Of Little River



Water 100 ° F Warmer Than The Air

A photograph of a palm frond on a sandy beach. The frond is the central focus, with its many long, thin leaflets radiating from a central point. The background is a sandy beach with some scattered brown debris. The text "Mother Nature Rules!" is overlaid in a bold, yellow, serif font, centered over the frond.

**Mother Nature
Rules!**



**SOMETIMES
the difference
between tragedy and
an awesome day of diving
is the ability to function
beyond the concrete**

Crisis Requires Flexibility



Concrete Thinking

Contraindication to:

Piloting a plane



Scuba Diving



Puberty Onset & Risk

“Adolescents who begin puberty earlier than peers appear *at greater risk* for participating in a variety of health-endangering activities”



Donald Orr & Gary Ingersoll (1995)

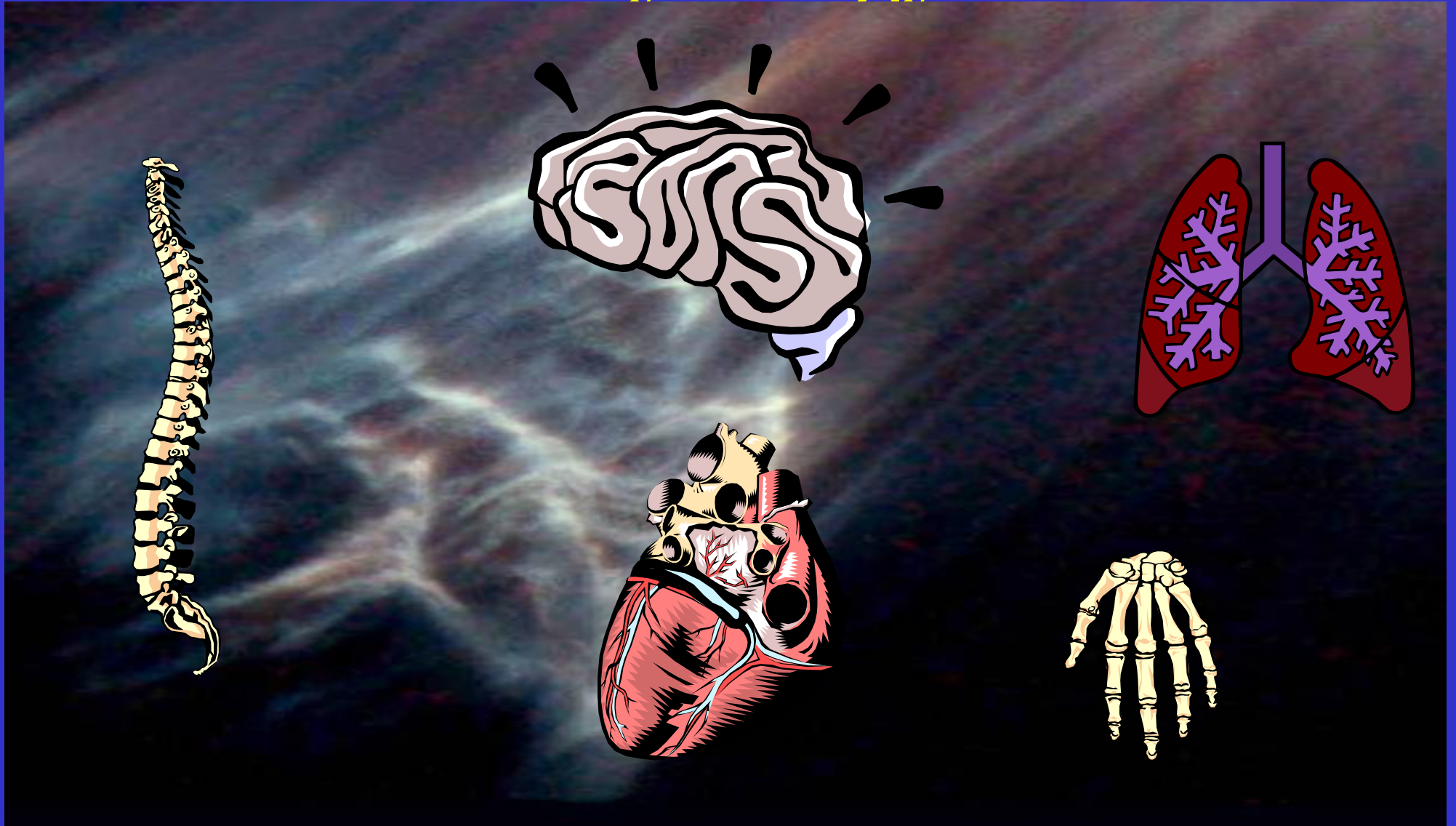
**Commenting on Australian
lowering age of training to 14 years old:**

**“Off loading the responsibility to parents
who have no practical knowledge
of the risks of scuba diving
was a reprehensible act”**

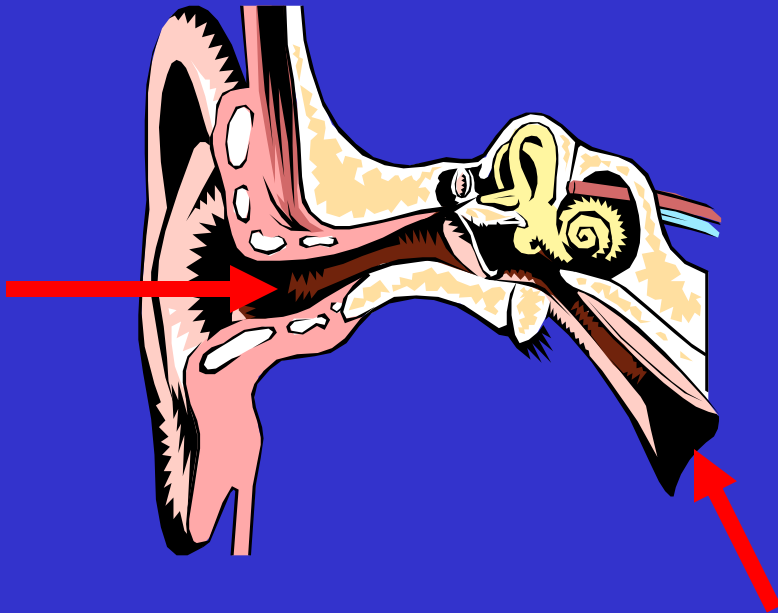


Carl Edmonds, MD (1996)

Physiology



Equalization



Essential to diving

Failure:

Ruptured Ear Drum

Hearing loss

Vertigo

Equalization

**“The (Valsalva) manoeuvre
is difficult
for children to perform”**

S.E. Strangerup, MD. (1998)

Kid



Adult

Equalization

“Only 6 % of children with negative middle ear pressure after flight managed a successful Valsalva”



S.E. Strangerup, MD. (1998)



Equalization



**“a poor ability to equilibrate negative pressure
is a fundamental deficit
of Eustachian tube function”**

(in children under 12 years of age)

**Anita Bylander-Goth, MD, Ph.D.
Cecilia Stenstrom, MD, Ph.D. (1998)**

Concern

Combination

Small, horizontal Eustachian tubes

Equalization difficulty

Poor Instruction

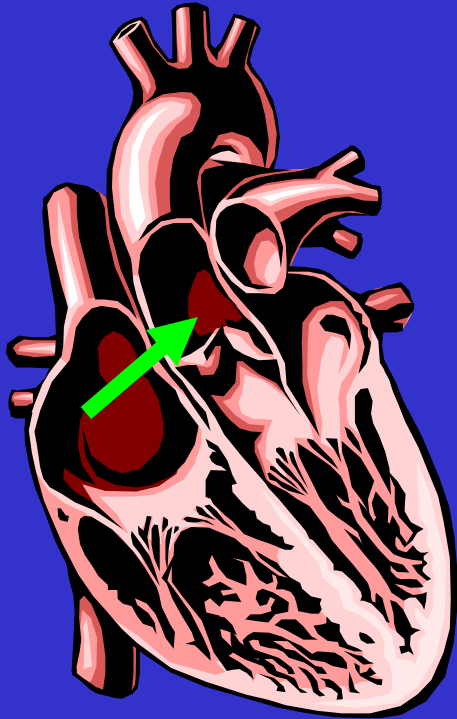
Forceful Valsalva

SUGGESTS

Increased risk for ear barotraumas

PFO's

Present in 10-30 % Adults



Forceful Valsalva

**Bubbles can move thru opening
Into arterial circulation**

APPEARS TO BE

**Correlation between
PFO and cerebral DCS**

Concern

Difficulty equalizing ear pressure

PFO correlation to Cerebral DCS

Young tissue more likely injured

SUGGESTS

Increased risk to CNS damage

Younger at greater risk

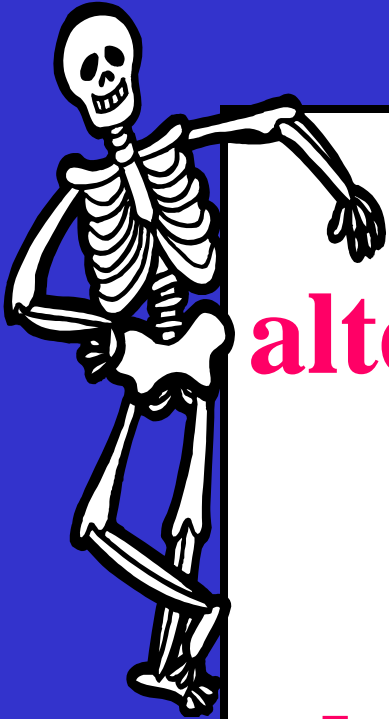


How much Risk?

**Too much for *ME*
To assume!**

**Most likely will be
determined
by a jury**

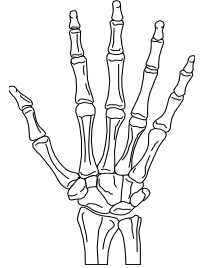
Skeletal System



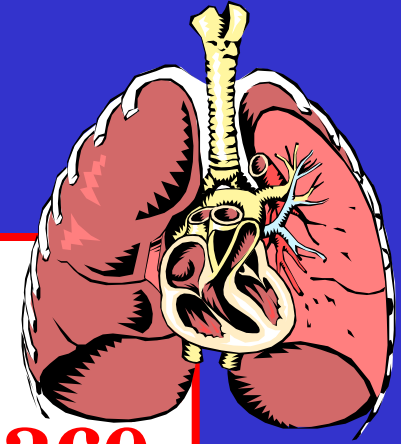
Changes in pO_2
alter skeletal soft tissue formation

CONCERN:

The effect on
developing tissue is unknown



Pulmonary System

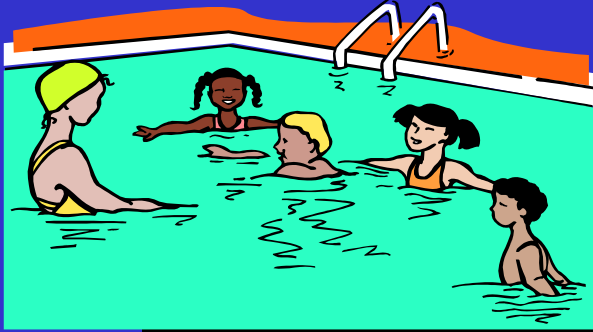


**Air passages narrower
in comparison to cavity space
SUGGESTS
Increased risk to barotraumas**

Children Are Easily Chilled



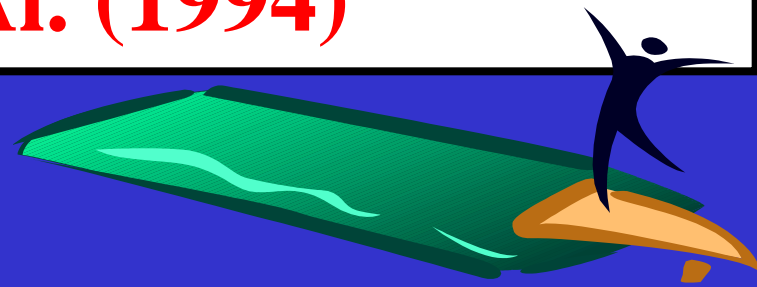
Easily Solved:
Shorter Individual Exposures
Thermal Protection Garments



Chlorinated Pools

**“frequent swimming in “polluted water”
(rivers and chlorinated pools)
before the age of 15 significantly
increased risk of melanoma”**

Nelms, et. Al. (1994)



“Decompression Fatigue”

Divers on Oxygen Enriched Air “Feel Better”

Theory:

**Inert gas movement in and out of cell
is the source of fatigue**

CONCERN

“mechanical stress” on kid cells unknown

Highly Reactive Oxygen Species

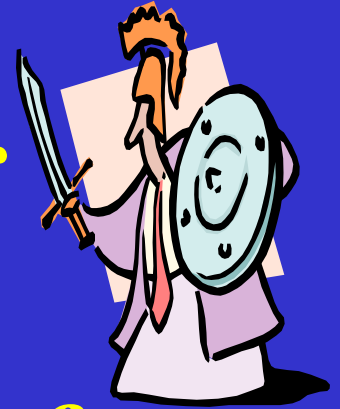
Oxygen



“Bad Stuff”

Increase in pO_2 increases right side of equation

Problems occur whenever



“Bad Stuff” overwhelms body defenses

Concern

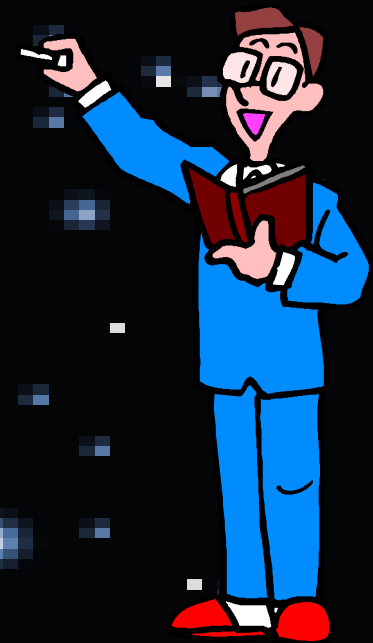
Highly Reactive Oxygen Species:

Powerful mutagens

Profound metabolic mediators

**Effect, if any, on
development is unknown**

Recommendations





SPUMS

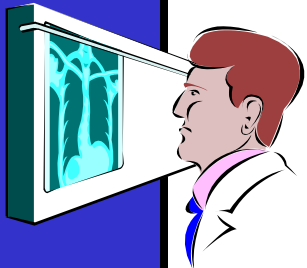
recommendation:

Minimum age

for training = 16



“It is incumbent on physicians performing examinations on adolescent divers to be somewhat overcautious”



Mark Dembert, MD, MPH

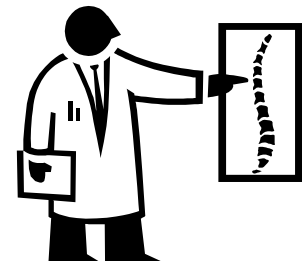
Julian Keith, MD

US Navy Physicians

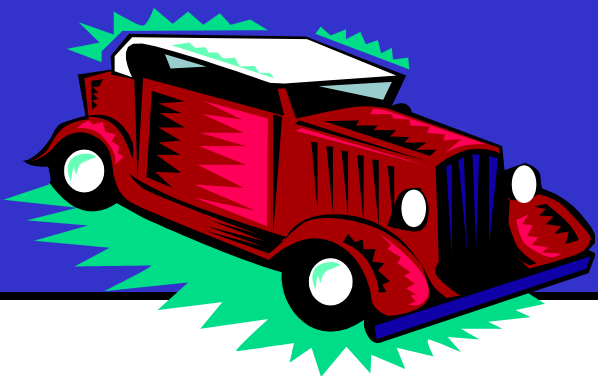
Am J. Diseases of Children (1987)

Recommendations

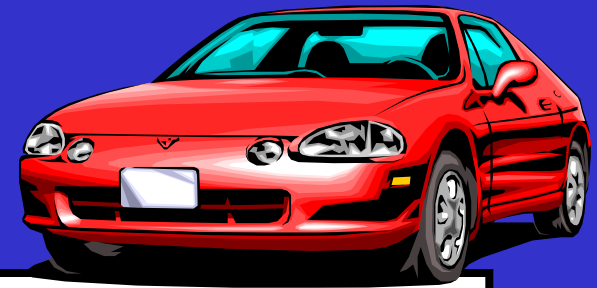
**“Rigorous standards should be applied
to pediatric applicants ...
higher minimum age requirements
(should be) be considered”**



**Dembert & Keith
Scuba Divers and Physicians
Sports Medicine (1986)**

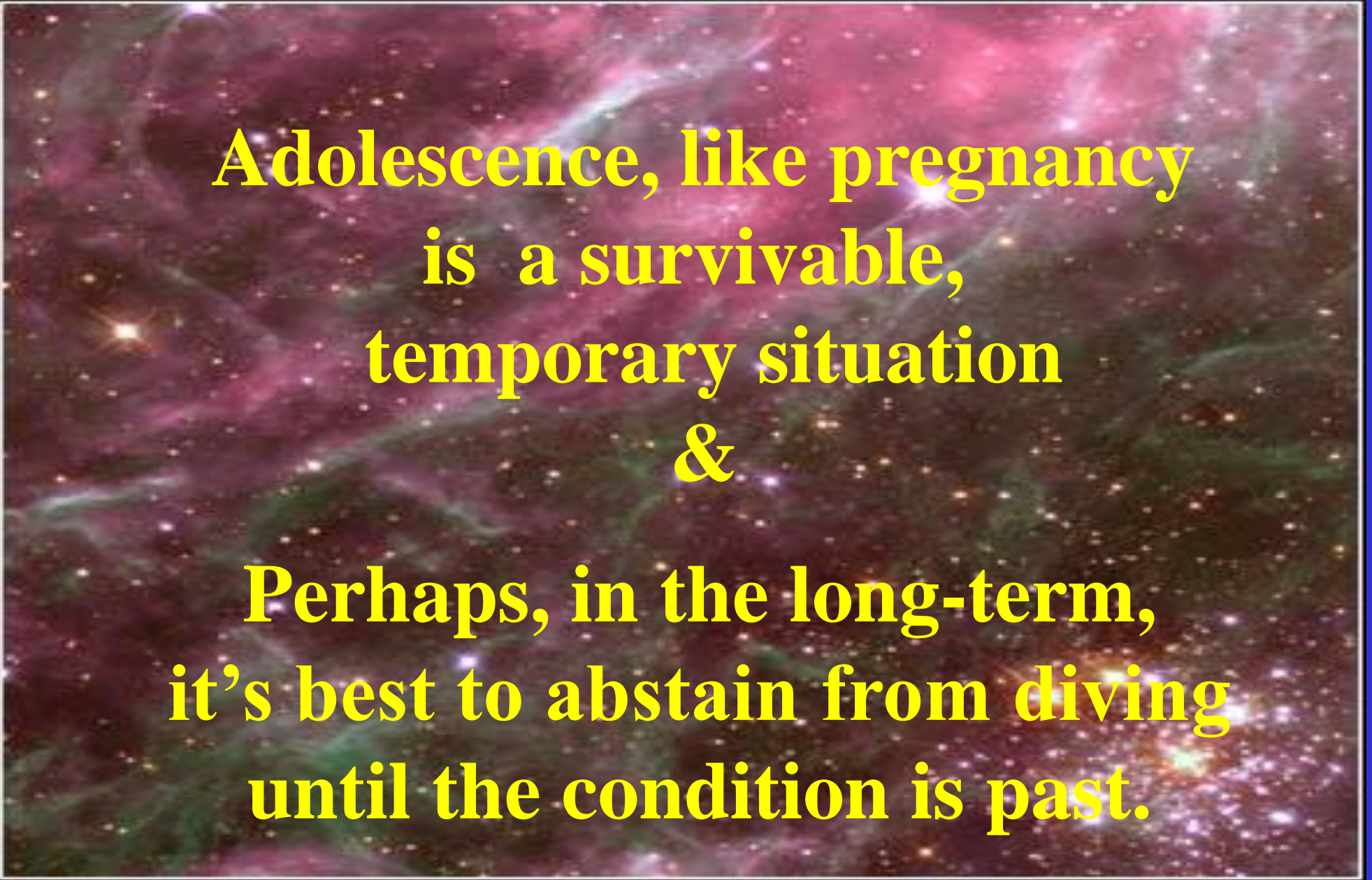


Consider



waiting 'till
child can drive family's
most expensive car to the training site





**Adolescence, like pregnancy
is a survivable,
temporary situation
&**

**Perhaps, in the long-term,
it's best to abstain from diving
until the condition is past.**

Participation



“Primitive Brain”



We are land critters

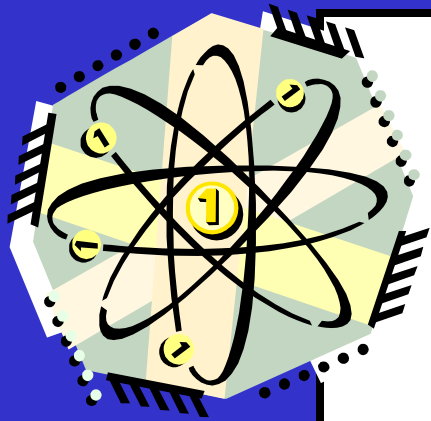
We do NOT breathe water

Primitive brain needs *TIME* to adapt
To water environment



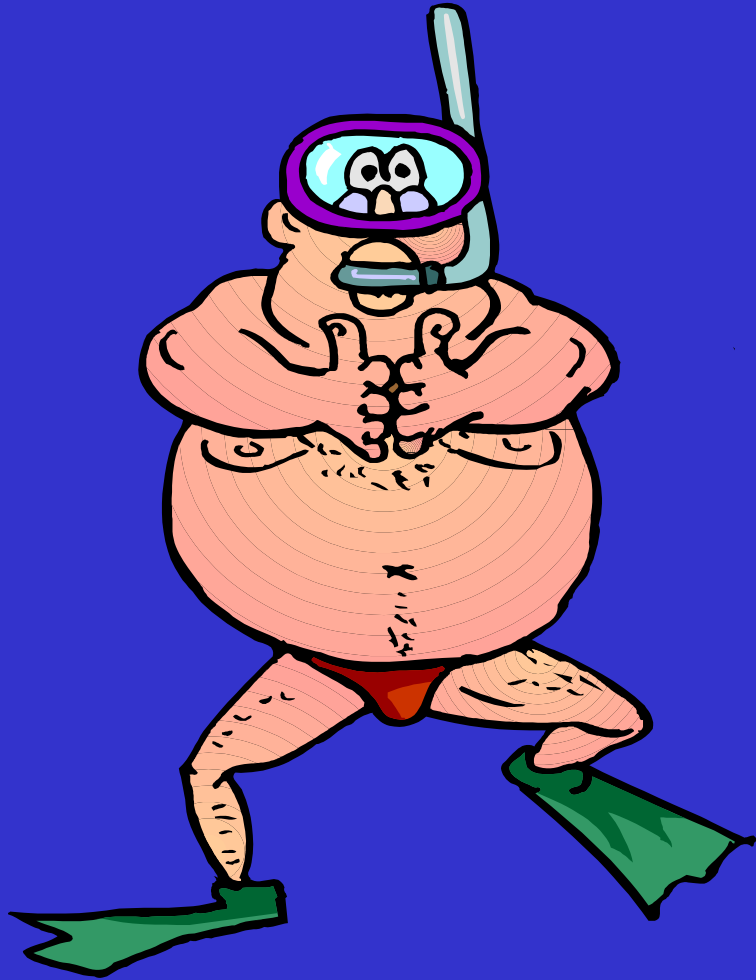
“Quantum Point”

Student exits water with Cheshire Cat grin



Grin reflects:
Comfort
Accomplishment
Mastery of environment
 β -endorphins
 Δ fos (?)

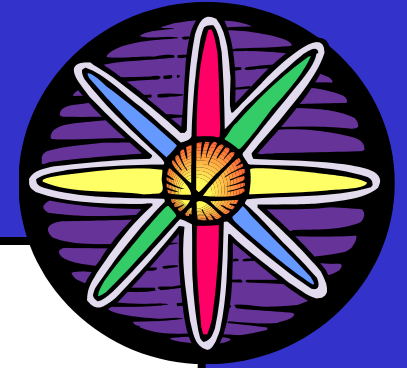




**“I get high
By
Going down”**

Barefoot Man

Quantum Point



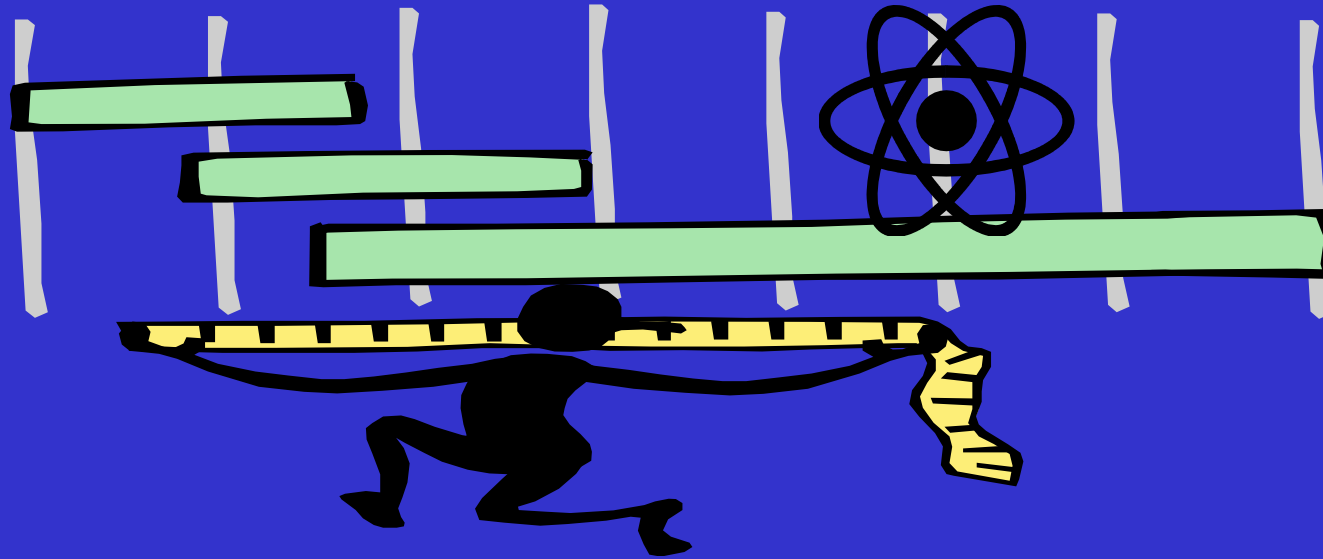
**NEVER
LESS THAN**



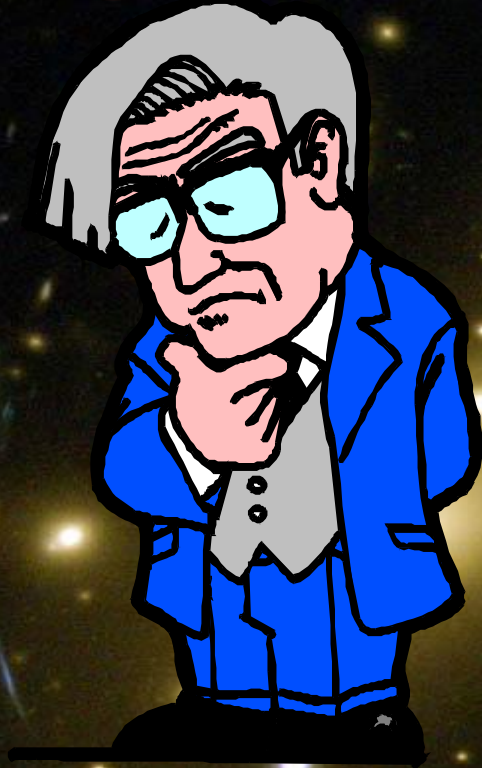
16 hours pool time
100 minutes open water



Adaptation



**The shorter the training,
The further from “quantum point”
The less likely to adapt**



Consider

**Masks, fins snorkel
are the mainstay**

**Child: Swimming & Skin diving
Adolescent: Skin Diving
Young Adult: Scuba**

Let The Endorphins Flow!



**“I have covered too many
father-child double fatalities
to buy into
decreasing the age”
(of scuba training)**

**Jim Caruso, MD
US Navy DMO
DAN Fatality Consultant**

Choose Wisely



The Risk is NEVER zero

**Dive Long
And
Prosper!**



