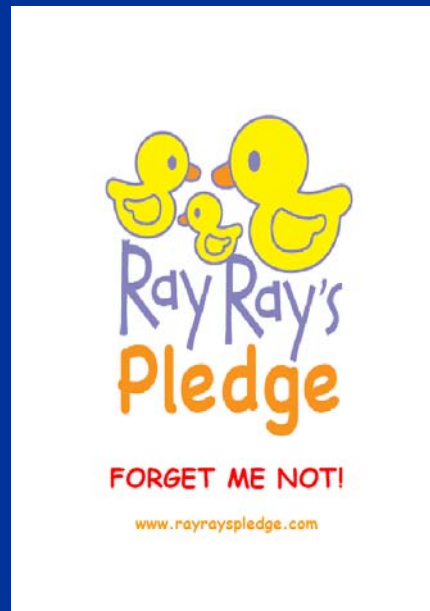


Child Vehicular Heatstroke:

*An Under-Recognized Risk
to Child Passenger Safety*

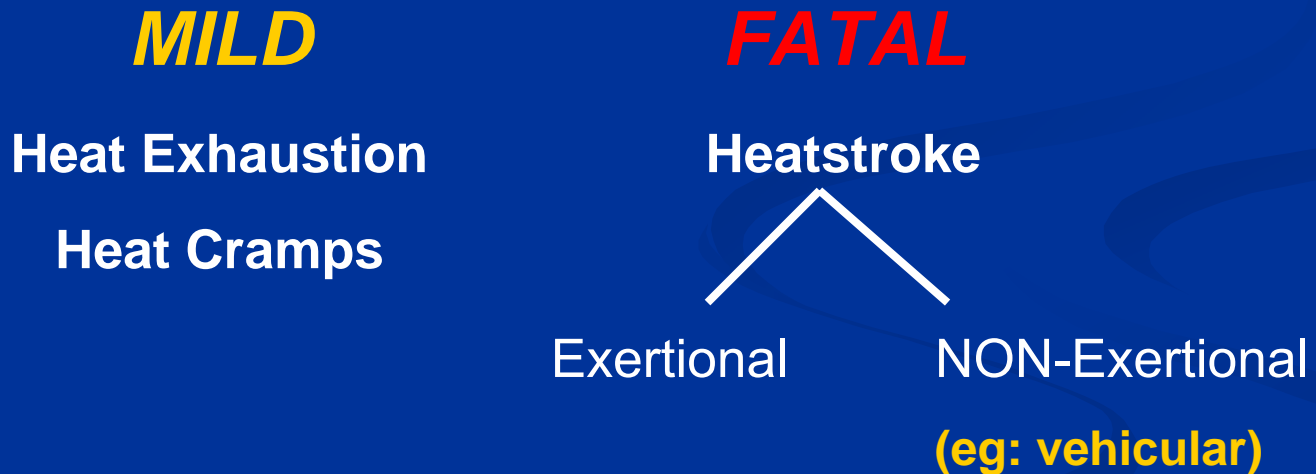


Objectives

- **Provide a brief overview of heat-related illness**
 - Definitions
 - Risk Factors
 - Thermoregulation
- **Discuss treatment strategies**
- **Examine causes of child vehicular heatstroke**
- **Review available resources for prevention**

Overview: Heat-Related Illness

- A spectrum of symptoms due to excessive heat exposure
 - Ranges from mild to fatal:



Heat-Related Illness (cont.)

Type	Symptoms	Signs	Initial treatment
Mild illness (e.g., cramps, exhaustion)	Diarrhea, dizziness, headache, irritability, loss of coordination, nausea/vomiting, syncope, weakness	Core temperature < 104°F (40°C), normal mentation, goose flesh, pallor, tachycardia, hypotension	Move to a cool location, hydration, rest, sodium ingestion
Heat stroke	Confusion, dizziness, hallucination, headache, nausea/vomiting, syncope	Core temperature ≥ 104°F, altered mental status, hot skin with or without perspiration, hypotension, seizure, tachycardia	Initiate on-site cooling, intravenous hydration, transport for emergency care

■ Key initial physical sign to distinguish mild illness vs. **heatstroke**:

- Core temperature:
 - <104°F: mild heat illness
 - ≥104°F: **heatstroke**

Thermoregulation

- **The body's methods to maintain a healthy temperature**
 - **Conduction**
 - Direct transfer of heat from a warmer surface to a cooler surface
 - **Evaporation**
 - Perspiration
 - **Radiation**
 - Absorption or reflection of heat without direct contact
 - Eg: reflection of heat with light-colored clothing
 - **Convection**
 - Exchange of heat with surrounding air

Risk Factors

- Age
 - Young children—especially <4 years
 - Elderly
- Cognitive impairment/mental illness
- Heart and lung diseases
- Obesity
- Impaired mobility
- Poor fitness level
- Sickle cell trait
- Strenuous outdoor activity during hottest daytime hours
- Urban residence living/higher floor residence
- Limited access to air conditioning
- DRUGS!

Heatstroke

- Also known as “hyperthermia”
- Body temperature exceeds 104°F
 - + Body’s thermoregulatory mechanism is overwhelmed and can no longer cool itself
 - + Symptoms:
 - *Central nervous system effects:* disorientation, sluggishness, hallucinations, seizure, loss of consciousness
 - *Other:* hot/dry skin that is flushed but not sweaty, rapid heart rate, other heart rhythm disturbances
- Body temperature >107°F: organs shut down, cellular damage
 - Fatal if not rapidly reversed

Treatment

1. **CALL 911 AND remove child from hot environment**
2. **Ensure airway stability (ABC)/ CPR if needed**
 - Airway
 - Breathing
 - Circulation
3. **Rectal temperature assessment (if available)**
4. **Initiate rapid cooling**
 - Treatment of choice= cold water immersion
 - Remember to remove excess clothing
5. **Intravenous hydration if/ when available**
6. **Transport to ER**

Rapid Cooling Techniques

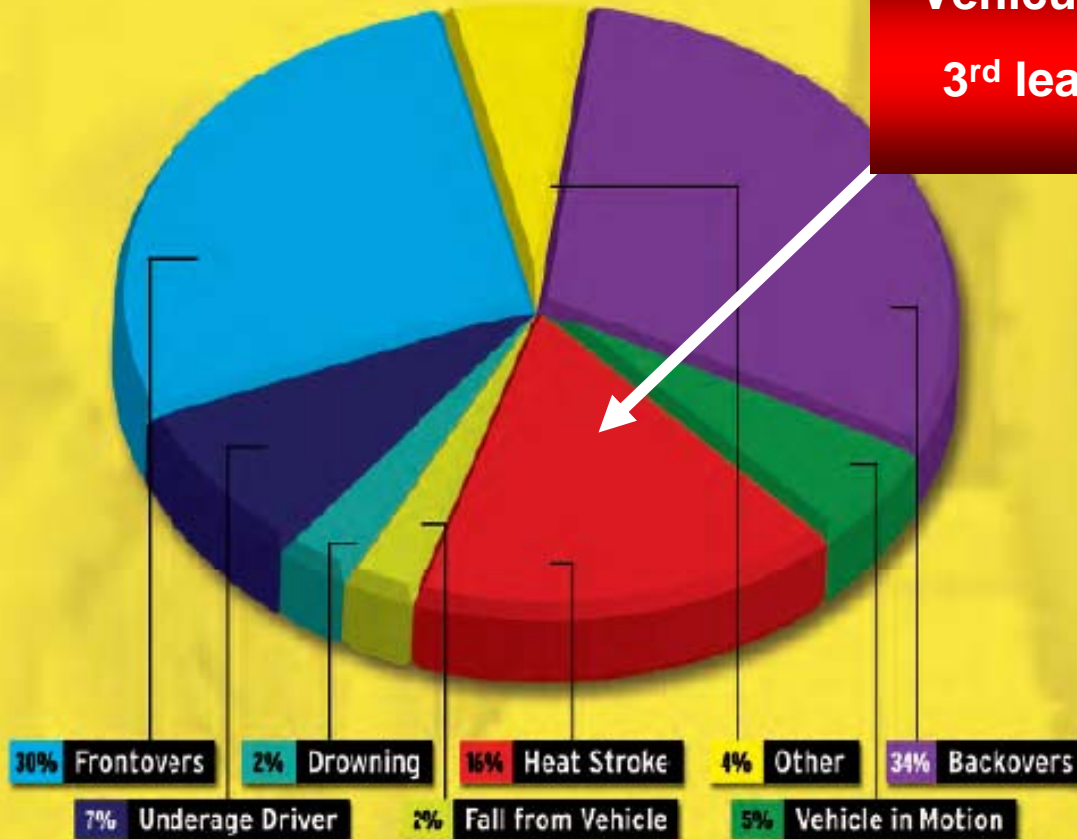
- **Cold water immersion**
 - Gold standard; associated with lowest morbidity and mortality rates
- **Ice pack/ wet towel application**
 - Head/ neck, axilla, groin
- **Evaporative and convective cooling**
 - Rapid air movement with fan while spraying mist of water on body
 - Most common method used

Child Vehicular Heatstroke

- Children are more prone to overheating than adults:
 - Immature thermoregulatory system: less efficient than adults
 - A child's body overheats 3-5 times faster than an adult body
 - Adults more likely to modify behavior based on environment (eg: remove excess clothing, get out of a hot car)

Child Deaths Due to Vehicular Heatstroke: *Why Are We Talking About It?*

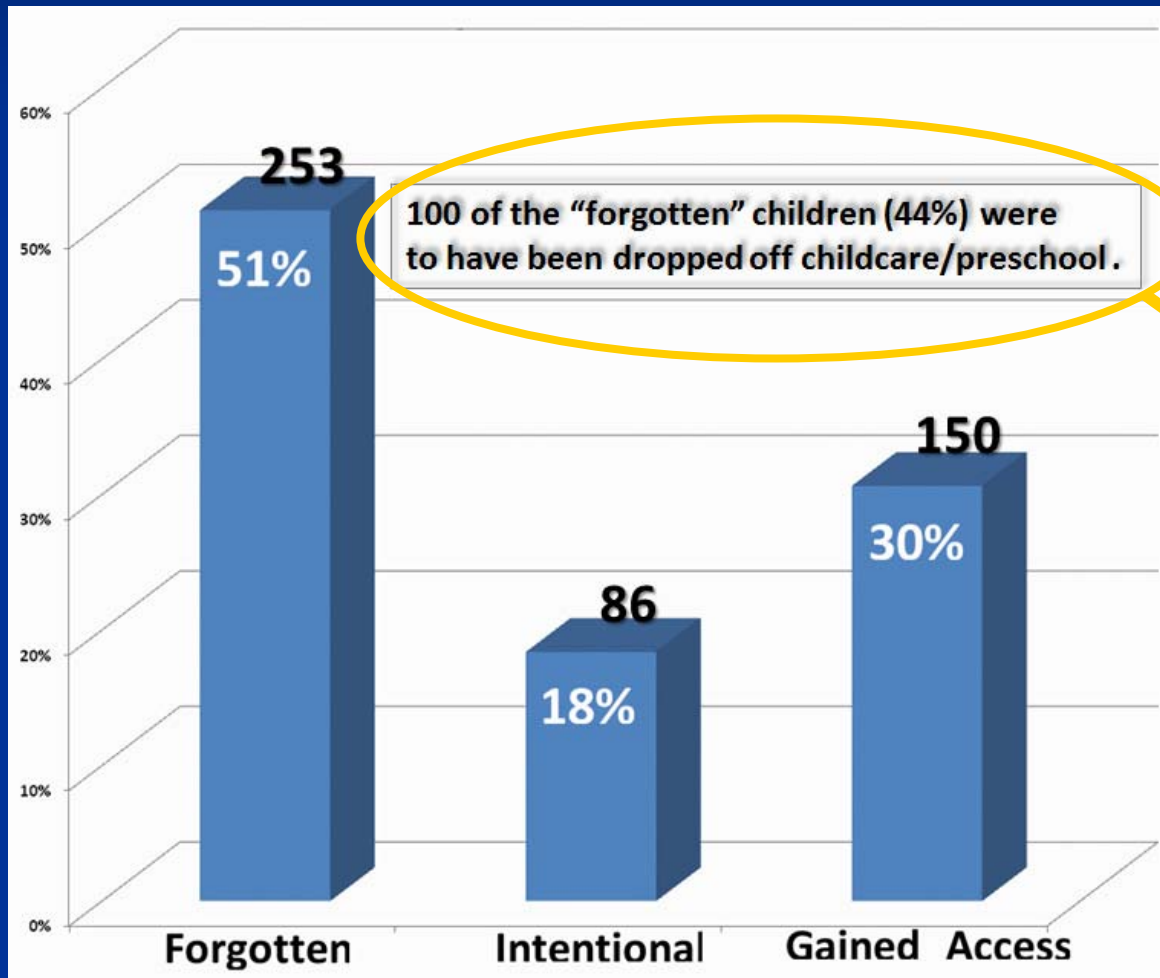
Nontraffic Fatalities Involving Children < 15 Years Old



**Vehicular Heatstroke:
3rd leading cause of
death!**

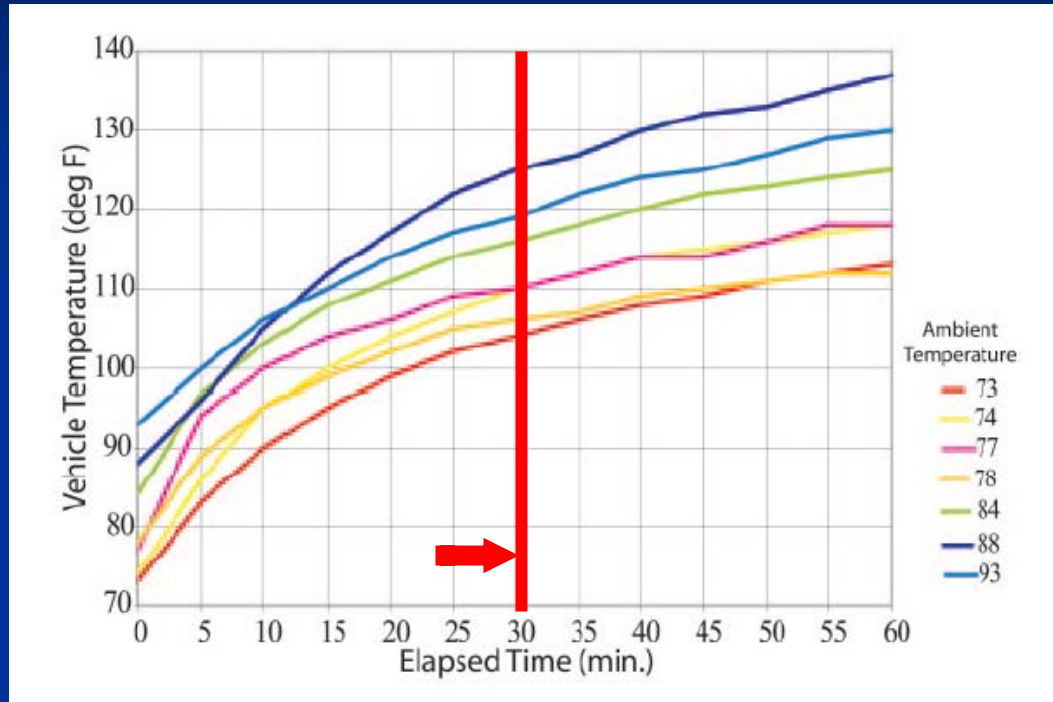
Child Vehicular Heatstroke: Understanding the Cause

Data from 494 child hot car deaths (1998 – 2010)



- More than 1 in 5 heatstroke **DEATHS**
- Kids were supposed to go to **DAYCARE** that morning
- **FORGOTTEN** in the backseat instead
- Whereabouts went unquestioned

Children Left in Vehicles: How Hot? How Fast?



- **Rate of temperature rise in first 20 minutes: 6.25°F/ 5 minutes**
 - Overall rate of temperature rise through 60 minute study: 3.1°/ 5 minutes
- **80% of temperature rise in first 30 minutes**
 - Temperature rise begins within five minutes of shutting off ignition
 - Temperature begins to plateau at 60 minutes

How Hot? How Fast? (cont.)



Car Simulation

http://www.youtube.com/watch?v=b3NFfWlfj24&feature=player_embedded

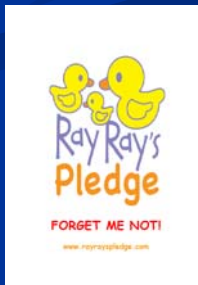
<http://ggweather.com/heat>, Accessed 12/1/11.

Statistics

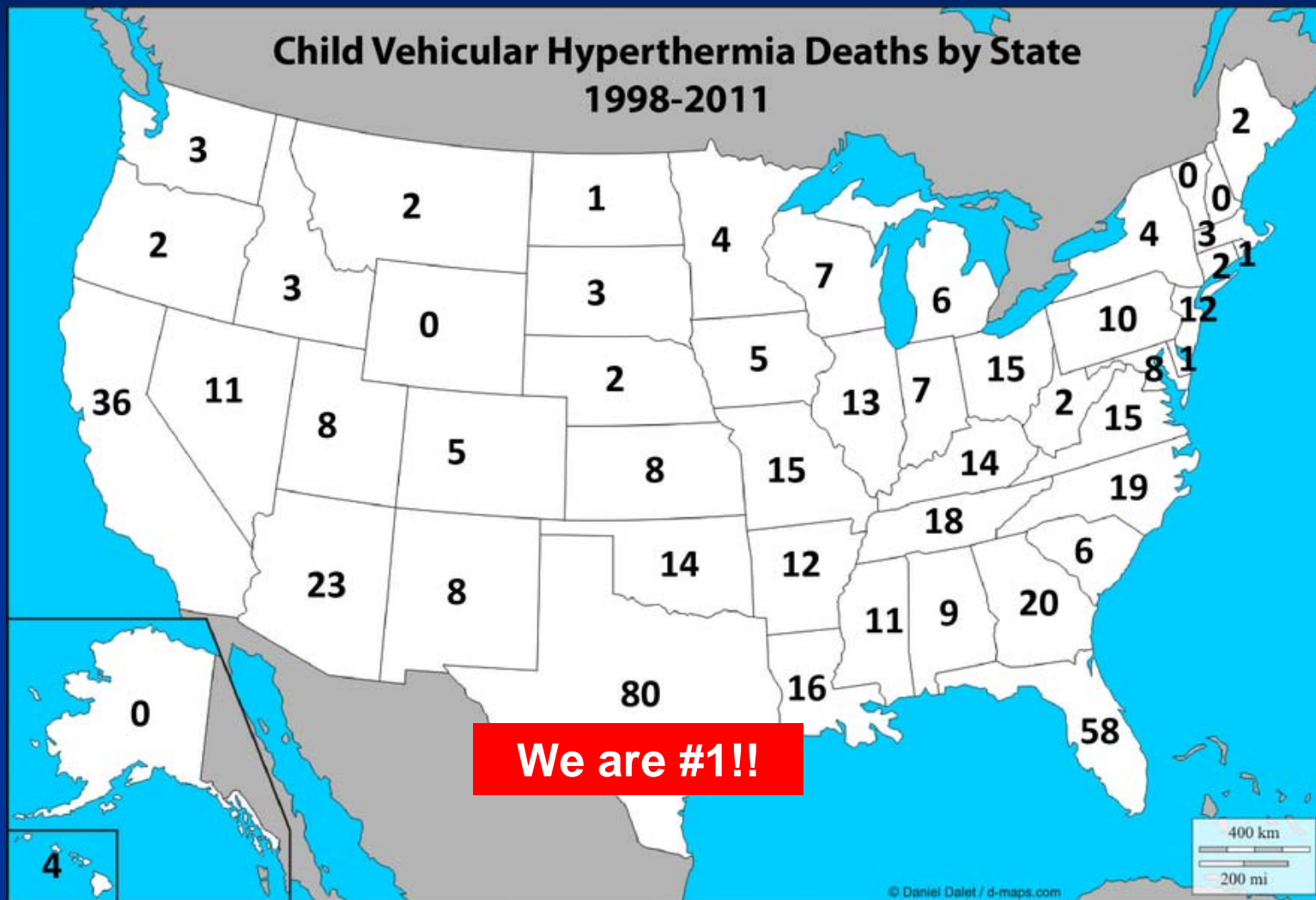
Deaths 2012	5+
Deaths 2011	33+
Deaths 2010	49+
Average # Deaths/ year	38
Deaths 1998 - present	532+

- **No national registry for this cause of death**
 - Data derived from media reports
 - Numbers very likely underestimated
- **Near misses more common than you think!**
 - San Antonio TX Fire/ Rescue 2011:
 - 187 calls to rescue unattended children trapped in cars (April 14 – September 14)
 - Palm Beach Co. FL EMS 2011:
 - 500+ calls to rescue unattended children trapped in cars

<http://ggweather.com/heat>, Accessed 6/18/2012. Moravec E. A Pledge to Remember: www.mysanantonio.com/news/local_news/article/A-pledge-to-remember-2187650.php. Safe Kids USA Hyperthermia Campaign 2012 Launch, Boca Raton FL, April 17, 2012.



Regional Impact



The Lone Star State

- Leads the nation in child hot car deaths
 - 81+ deaths as of June 2012
 - 60% of children “forgotten” by parent
- Nearly **1 in 3 deaths** due to failure to drop child off at daycare
 - TX Past 5 Years: **37%** of deaths due to failure to drop child off at daycare
 - National data: 1 in 5+ deaths



“How Can ANYONE Forget that a Child is in the Backseat??”

“If you’re capable of FORGETTING your CELLPHONE, you are potentially capable of FORGETTING your CHILD”

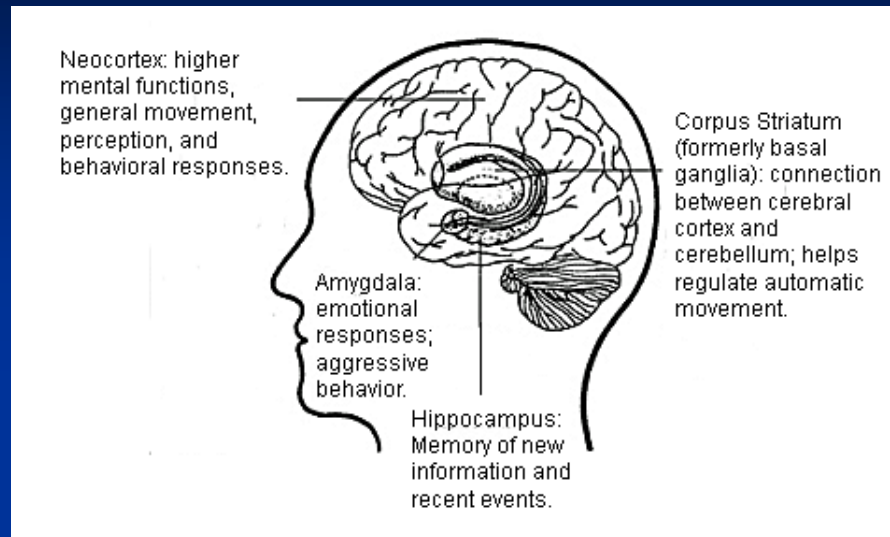


David Diamond, Ph.D., USF

Weingarten G. *Fatal Distraction*. IN: Washington Post 2009. <http://www.pulitzer.org/works/2010-Feature-Writing>.

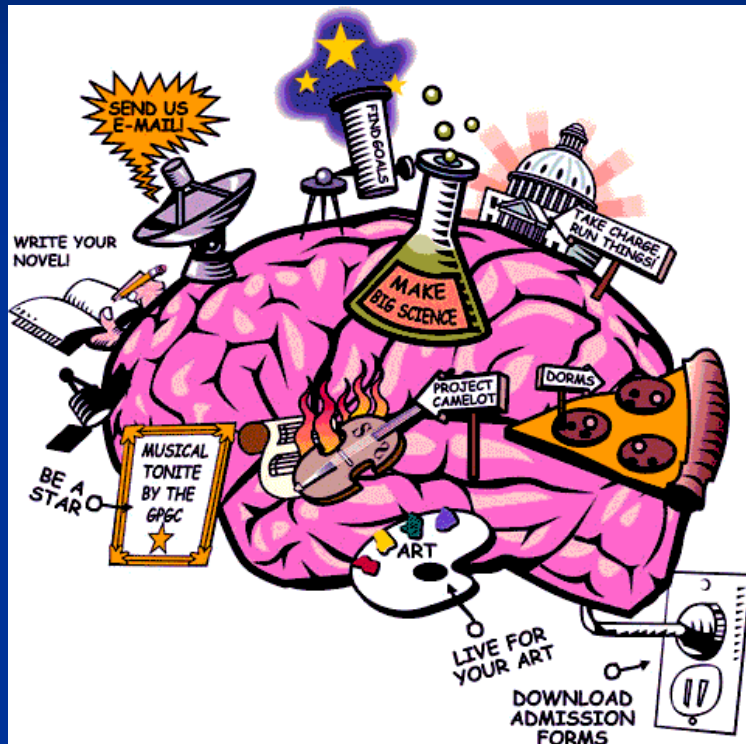


The Human Brain



- **Most advanced memory/ thinking components:**
 - Prefrontal cortex and hippocampus
- **Primitive component:**
 - Basal ganglia (“lizard brain”)
- **STRESS weakens the brain’s higher functioning centers**
 - Overrun by the non-thinking/ non-analytical “lizard brain”

Common Factors Associated with Parents Who Forgot their Children



- Stress
- Emotion
- Lack of sleep
- Change of routine

STOP The Madness!



***Take ACTION Against Child Hot Car Deaths
BEFORE They Occur***

Prevention

- **NEVER** leave a child unattended in a car, not even for a minute!
- Routines and distractions have caused people to mistakenly **FORGET** children in the backseat
 - Place a cell phone, PDA, purse, briefcase, gym bag or something that is needed at your next stop on the floor in front of a child in a backseat. This triggers adults to see children when they open the rear door and reach for their belongings.
 - Set your cell phone or Blackberry reminder to be sure you dropped your child off at daycare
 - Set your computer calendar program, such as Outlook, to ask, “Did you drop off at daycare today?”
 - **Have a plan that if your child is late for daycare that you will be called within a few minutes. Be especially careful if you change your routine for dropping off little kids at day care.**

Prevention: Ray Ray's Pledge

- Targets the more than 1 in 5 child hot car deaths that occur because the child was not dropped off at DAYCARE that morning; FORGOTTEN in the BACKSEAT instead
 1. Parents commit: to communicate all planned absences to the daycare teacher
 2. Daycare teacher commits: to call if a child has not arrived by his/her usual arrival time and a planned absence has not already been communicated
- **ONE PHONE CALL CAN SAVE A CHILD'S LIFE!**
- **Take the Pledge ONLINE:**
 - www.rayrayspledge.com



Ray Ray's Pledge: *Taking ACTION Against Heatstroke!*

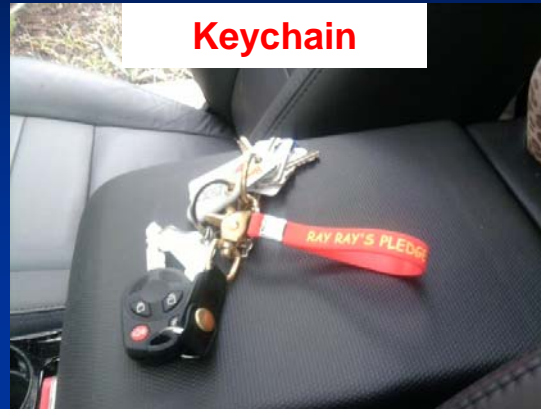
- **Ongoing expansion to communities nationwide**
 - Numerous sites in 8 states to date
 - Provision of educational and reminder tools
 - Parents and childcare providers
 - Launch of Operation Maya MOO
 - Medical Outreach and Optimization
- **Social media and web-based awareness:**
 - www.facebook.com/rayraycavaliero
 - www.rayrayspledge.com
- **Partnership with Suddenly Safe 'N Secure Child Carseat ALARM Systems**
 - Provides additional safety net to daily child transport routines

RRP Reminder Tools*

Bracelet



Keychain



Car Door Magnets



Info Postcards



*All reminder tools are available free of charge upon request from www.rayrayspledge.com courtesy of generous sponsors and donations.

SSNSS Child Car Alarms



**Child Bracelet and
Keychain Receiver**



**Carseat Alarm (installed) and
Keychain Receiver**



**Carseat Alarm and
Keychain Receiver**

Educational Resources

Taking ACTION Against Heatstroke!

- <http://ggweather.com/heat>
- www.safekids.org/nlyca
- www.rayrayspledge.com
- www.suddenlysafensecuresystems.com
- www.facebook.com/rayraycavaliero
- www.safercar.gov/heatstroke
- www.nws.noaa.gov/os/heat/
- www.youtube.com/watch?v=b3NFfWIfj24&feature=player_embedded
- www.kidsandcars.org/heatstroke.html

Thank You!



Sophia Rayne "Ray Ray" Cavaliero
5.15.10 - 5.25.11

FORGET ME NOT!