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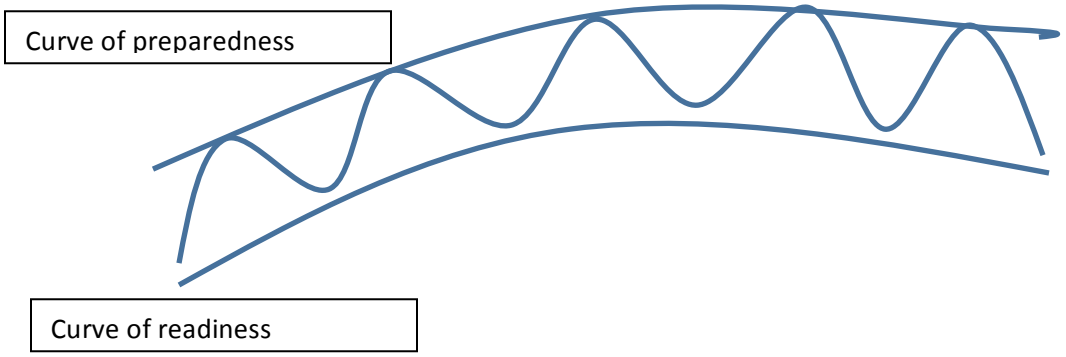
CVASP Seminar 2012

- The USA needs to change their coaching process
    - Too many non-contact/overuse injuries are happening in American sports
- 80% of all sports science comes from the USE
    - However, there is a big discrepancy between the science being produced and the coaching taking place
- Performance



- Curve or preparedness includes
    - Skill
    - Technical preparation
    - Physical preparation
    - Mental preparation
- Curve of readiness
    - Fluctuates wildly compared to preparedness which can lead to inconsistencies in performance
    - **You must know where on the curve of readiness your athletes are at all times**
    - Low readiness = low volume/intensity training
    - High readiness = high volume/intensity training
- Preparedness curve is most important when working with kids because you must **instill** the four key components (listed above) that make up that curve to ensure they attain a level of mastery in their sport skill
- With pro athletes the readiness curve and control of that curve is **most** important**.** Control that curve as this is what makes the athlete consistent for many games. **Keep the fluctuations of that curve to a minimum.** This is the goal of any good coach
- Adjust your program to what the head coach does. **Manage the curve**
- The athlete model (The functional systems of the body):

CNS	State of the ANS	Hormonal System	Cardio-pulmonary System	Metabolic System	Neuromuscular System	Sensory motor system

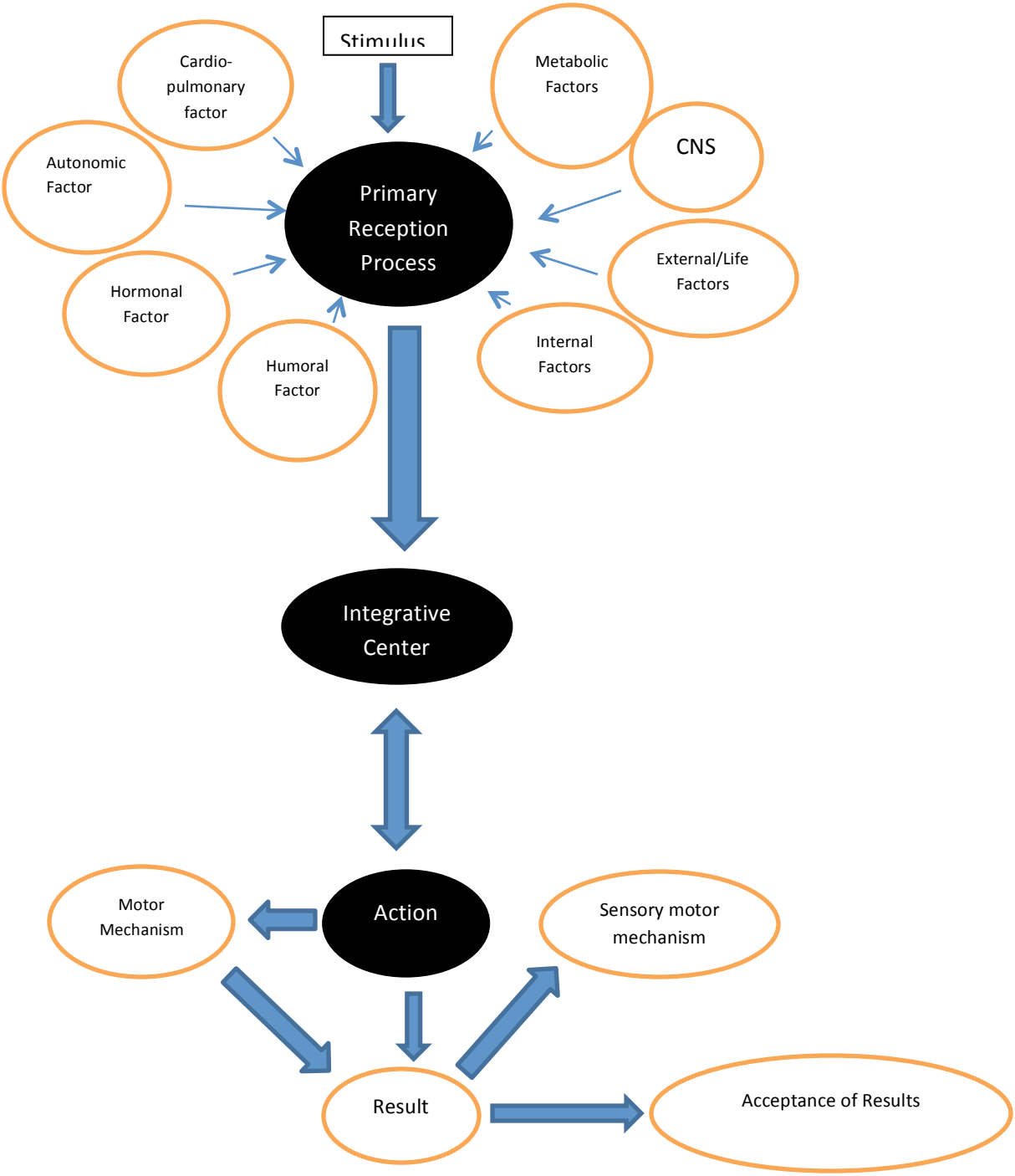
- These systems fluctuate based on training and depend on intensity and time domain of the exercises. This is termed the training effect. During recovery the systems attempt to return to their normal level (**all doing so at different times**)
- Speed, power, strength, etc. are not the goal of training. They are the **product** of training. The goal is to allow the athlete to display their high level of skill and understanding of the game optimally. The best players don't always have the highest strength, speed, or power, but they do have the highest level of skill!
- All great athletes who perform consistently for a long time have the same characteristics regardless of sport
    - Some of these physiological characteristics and biological parameters are:
        - Increased mass of endocrine glands
        - Increased presence of steroidal hormones in muscle cells, equating to faster protein synthesis
        - Hypertrophy of immune cells
        - Much higher oxidative capacity (increased mitochondrial) in fast and slow muscle fibers
        - Sports specific cardiac adaptations
        - Highly parasympathetically dominant
- **Strength and speed and only relevant if the athlete has the skill and ability to display that skill**
- Be yourself. There is no single way to be a coach
    - ***If you read what everyone else has written, if you do what everyone else has done you will get what everyone else has already gotten. <u>You must go beyond everyone!</u>***
- **Building an approach**
    - Evaluation
        - Biological/Physiological
            - Cardiac Capacity
            - Oxidative Capacity
            - Aerobic/Anaerobic Capacity
        - Sport Specific Evaluation
            - We are not responsible for the skill components because we cannot really change this once the athlete is at a higher level
            - Create sport specific test batteries for
                - Power
                - Speed
                - Strength
                - Endurance/Work capacity
    - Create a model of an elite athlete
        - What biological parameters (listed above) make them great?
        - What sport specific parameters make them great?
        - Identify limiting factors by comparing individual parameters and elite parameters
    - **The long term goal is to achieve the necessary adaptations to become elite by using sport specific training**
- Long term goal
    - What is your biological goal?
    - What is your sport specific goal?
- Principles of achieving adaptations
    - To increase hormonal output

        - Max training session
            - Intensity can be measured in terms of:
                - % load
                - % VO2max
                - High velocity movements
            - Hypoxia, hydrogen ions, and lactate all lead to increased hormonal output
            - Can do max work more than 2x/week and usually not more than 1x/week
        - Alternate between sessions of max work and sessions of decreased volume to allow for recovery
        - **Evaluate the game itself as a means of high intensity. The game can be the stimulation itself**
        - Select exercises for these activities that can **transfer** to the sports skill (IE, max bench pressing for a marathoner is not a productive use of time)
    - To increase oxidative capacity
        - Oxidative capacity of myocardium and diaphragm
            - Hypoxic activity
                - **Don't attempt to do this work all the time!**
            - This work will lead to a decrease of mitochondria in skeletal muscle (due to the hypoxic nature of the activity)
            - Follow days of hypoxic training with days of mitochondrial reconstruction (to enhance recovery and restore mitochondrial
            - Mitochondrial reconstruction days
                - Bodybuilding type activities/intensities (Leads to hyperplasia of slow twitch fibers)
                - HRIT can be helpful for very glycolytic individuals (use short work intervals to keep hypoxia and heart rate on the lower end)
                - Uphill treadmill walking (can use some resistance as well) with low frequency of strides → keep hypoxia, heart rate, and lactate down
        - Oxidative capacity of muscle fibers
            - Cardiac development
                - Optimal left ventricle filling
                - 4hrs/day is what may be needed to illicit this adaptation
                - Use sport specific activities to make this work as specific as possible
                - Know and understand the sports demands
- **The training process**
    - Short term goals → Microcycle, mesocyle, block training, etc
        - 2-4wks/long
        - No greater than four weeks of loading
        - Overtraining
            - Extreme overtraining is not solvable by just rest. The individual who is extremely overtrained may never reverse the morphological changes (IE scar tissue of the myocardium, decreased size of the adrenals, etc)

brought about by overtraining or it may take over a year to get yourself back to performance

- The training session
  - Immediate training effect → Changes in the functional systems from training
  - Delayed training effect → Changes in the functional systems over days
- Evaluation #2
  - After the first mesocycle
  - Did you see what you wanted?
  - Monitor everything and try to predict the results you want so that you always get what you are seeking from your training program

- **The Body's Response to Physical Stimuli**



- Is the result sufficient for the challenge?
- The body is constantly checking back in to make sure the result is optimal. If response is poor compensation of systems happens and the body breaks down
- Multiple parameters must be kept under control
- **<u>The stressor you place on an athlete must be proportional to their ability to adapt to it</u>**
- Successful performance is not designed by how many successful sessions you have but by how many unsuccessful sessions you have because one bad session can destroy
    - **Must have a method of monitoring this**
- What is contributing to an athlete's fatigue?
    - Which system is fatigued?
        - This is the only way to train them when fatigued so that you know which systems to stay away from!
- Fatigue → Reserves → Readiness
- Cumulative Training Effect
    - The cumulative effect of everything you do
    - Can be positive or negative
        - Negative Training Effect
            - Focusing on one limiting factor over other systems = failure
                - **Example:** You work to increase 40 meter time but not capacity to sustain it thus the athlete cannot display that faster 40 meter time during a game
        - Positive Training Effect
            - Can only be achieved by improving all limiting factors of that athlete