

Stress protocols

Dr Roger Garsia
MBBS PhD FRACP FRCPA

Approaching stress and stress response research - Key issues

- The rationale for the study
- Appropriate choice of animal species
- Information about effect of the stress
 - Of this type
 - Of this duration
 - On this animal species / age / sex
- Generalisability of the findings
- Potential value of the findings
- Alternative approaches

A truism ?

- Stress protocols in animals cause stress to those assessing them

Stress Perception → Response

- Innate perception of threat
- Learned from experience
- Higher order – learned from others' experience
- RESPONSE
 - Psychological
 - Physiological
 - Brain neurotransmitters
 - Nerves (sympathetic/ parasympathetic)
 - Heart rate
 - Sweating
 - Piloerection
 - Dilated pupils
 - Hormones (adrenal medulla, adrenal corticosteroids)
- In man "excitement" AKA "pumped" and "stress" are physiologically similar

Acute vs chronic stress

- Severe stress may have impact on brain neurotransmitter levels beyond 48 hours after the exposure to the stress
- Chronic stress can have similar (> 48 hour) impact beyond the end of the stress
- Habituation (desensitising) can occur with chronic stressful stimuli

Chronic stress

- Induces excess cortisol state
- Impact on cerebral neurotransmitters
- Behavioural disturbance
 - Appetite
 - Grooming
 - Sleep
 - Mating
 - Complex behaviours – respect for social order
 - Cohabitation
 - Susceptibility to self-rewarding behaviours

Late effects of stress

- Weight
- Coat
- Skin integrity
- Bone density
- Fecundity
- Litter size
- Litter survival
- Longevity

Chronic stress

- Food deprivation
- Water deprivation
- Day/night reversal
- Cold water swim
- Confinement in small space
- Co-housing with aggressive same sex
- Co-housing with aggressive opposite sex
- Exposure to cold air
- Mild Noxious stimuli .. Toe compression

Stress protocols have a potential role in study of many diseases

- Psychological / psychiatric especially depression/ anxiety / addiction
- Pain syndromes
- Rehabilitation from injury
- Blood pressure disorders
- Sudden death / cardiac dysfunction
- Adrenal and other endocrine gland disorders
- Diabetes / response to low BSL
- Immunological disorders
- Gastrointestinal disorders
- Learning disorders

Minimising severity of stress

- Duration
- Frequency
- Severity
- Predictability
- Reward for endurance
- Altering sequence
- Escape route

Moving forward safely

- Literature
- Experts
- Pilot studies
- Physiological monitoring
- Videosurveillance of behaviour
- Review of progress
