

fectively terminated once the threatening condition is no longer present.

Regulation of Glucocorticoid Secretion Through Negative Feedback

Inhibition of glucocorticoid secretion is achieved primarily through the action of glucocorticoids themselves. This negative feedback inhibition is achieved partly by glucocorticoid binding to specific corticoid receptors in the brain. Based on biochemical and functional characteristics, two types of corticoid receptors have been described (Reul & De Kloet, 1985). The glucocorticoid receptor (GR) is widely distributed in the brain but is most abundant in hypothalamic CRH neurons and pituitary corticotrophs. The mineralocorticoid receptor (MR) is densely localized in hippocampal and septal neurons. The MR binds glucocorticoids with a tenfold higher affinity than the GR. The receptor characteristics and distribution complement each other, thus providing the organism with the ability to modulate HPA responses. The MR operates at low glucocorticoid concentrations and exerts a tonic inhibition. When glucocorticoid levels are high, the MR receptors become saturated and the corticosteroids then bind to GR receptors, thereby ensuring a return to homeostasis.

Association Between Glucocorticoid Regulation and Psychopathology

Several lines of research support the association between glucocorticoid regulation and psychiatric disorders (Holsboer, 1989; Tsigos & Chrousos, 1994). Both physical and psychological stressors have been shown to be temporally related to psychiatric illness. Because glucocorticoids are intricately linked to the neurobiology of stress, alterations in glucocorticoid levels and/or activity are expected in association with psychiatric conditions. Indeed, altered HPA function has been shown in a variety of psychiatric disorders, including depression, Anxiety Disorders, Substance Abuse, Anorexia Nervosa, and Schizophrenia. Pharmacological studies indicate that glucocorticoids directly modulate neurotransmitter function and behavioral systems, as well as the activity of psychotropic agents. Moreover, there is evidence that glucocorticoids exert genomic effects in the brain and regulate transcription of many genes, including those that code for behaviorally active neuropeptides. Therefore, a greater understanding of the effects of glucocorticoids at the molecular level, and their interactions with different neurotransmitter systems, should provide important clues into the pathophysiology and treatment of these disorders.

Summary

Because glucocorticoids target almost all organ systems to regulate a myriad of functional responses, alterations in

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ADULT INTELLECTUAL DEVELOPMENT

Why do some individuals retain their behavioral competence well into advanced old age, whereas others show early decline? This question has long been a central topic in the psychology of adult development and aging. Five central questions and relevant research findings address this issue:

1. Does intelligence change uniformly through adulthood, or are there different life course ability patterns?
2. At what age is there a reliably detectable age decrement in ability, and what is the magnitude of that decrement?
3. What are the patterns of generational differences, and what are their magnitudes?
4. What accounts for individual differences in age-related change in adulthood?
5. Can cognitive decline in old age be reversed?

The Measurement of Adult Intelligence

Most large-scale studies of adult intelligence conducted during the past few decades have used either the Wechsler Adult Intelligence Scale (WAIS), one of its derivatives, or a

derivative of Thurstone's work on the primary mental abilities. Findings of these studies differ markedly, however, depending on whether age comparisons have been made cross-sectionally or whether the same individuals have been followed longitudinally over time.

Differential Patterns of Change

There is no uniform pattern of age-related changes across all intellectual abilities. Studies of overall intellectual ability (IQ) are therefore insufficient to monitor age changes and age differences in intellectual functioning for either individuals or groups. Age difference work with the WAIS suggests that verbal abilities are maintained well, whereas performance tests show early age differences favoring younger adults. Longitudinal data on the WAIS also show high levels of stability of verbal behaviors into advanced old age, whereas performance scores begin to decline in midlife. Studies of the primary mental abilities indicate that active or fluid abilities tend to decline earlier than passive or crystallized abilities. These findings are complicated by ability-by-age and ability-by-cohort interactions. For example, women tend to decline earlier in the active abilities, whereas men do so on the passive abilities. Although fluid abilities begin to decline earlier, crystallized abilities appear to show steeper decrement once the late 70s are reached.

Age Level And Magnitude of Age-Related Intellectual Decline

Cross-sectional studies with the WAIS suggest that significant age differences favoring young adults can be found by the 30s for performance tests and by the 60s for verbal tests. These differences, however, confound cohort effects in education and health status. By contrast, in longitudinal studies, reliably replicable average age decrements in intellectual abilities are rarely found before age 60, but they are observed for all intellectual functions at least by age 74. Analyses of individual differences in intellectual change, however, demonstrate that even at age 81 less than half of all observed individuals showed reliable decremental change over the preceding 7 years.

Generational Differences

The existence of generational (cohort) differences in intellectual abilities has been conclusively demonstrated. Almost linear positive cohort shifts have been observed for inductive reasoning, with more spasmodic positive shifts for verbal ability and spatial orientation. A curvilinear cohort pattern has been found for number skills, which reach a peak for birth cohorts born in the 1920s and then follow a largely negative slope. A similar curvilinear cohort pattern has been observed for word fluency. As a consequence, cross-sectional studies of intellectual aging underestimate age

changes before age 60 for abilities with negative cohort gradients and overestimate age changes for abilities with positive cohort gradients.

Individual Differences in Age-Related Change in Adulthood

Individual differences are large at all ages, such that substantial overlap among samples can be found from young adulthood into the mid-70s (cf. Schaie, 1988b). Very few individuals decline on all or most abilities. Indeed, maintenance of functioning on one or more abilities is characteristic for most individuals well into advanced old age. A number of factors account for individual differences in decline, some of which have been shown to be amenable to experimental intervention. Predictors of favorable cognitive aging include (1) absence of cardiovascular and other chronic disease; (2) favorable environment, as indicated by high socioeconomic status; (3) involvement in a complex and intellectually stimulating environment; (4) flexible personality style at midlife; (5) high cognitive status of spouse; and (6) maintenance of level of perceptual processing speed.

Reversibility of Cognitive Decline

Present understanding of individual differences in cognitive decline suggests that unless neurological pathology is present, cognitive interventions may serve to remediate known intellectual decline and reduce cohort differences in those individuals who have remained stable in their own performance over time but who have become disadvantaged compared with younger peers. The effectiveness of cognitive interventions has been demonstrated in various laboratory studies as well as in a recent major clinical trial. Cognitive decline in many older people may well be the result of disuse of specific skills that can be reserved by appropriate training regimens. In two studies, approximately 66% of the experimental subjects showed significant improvement, and about 40% of those who had declined significantly over 14 years were returned to their predecline level.

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See also: Age Differences; Primary Mental Abilities

ADULTHOOD AND AGING: SOCIAL PROCESSES AND DEVELOPMENT

One of the most reliable findings in social gerontology is that with age, people report fewer social partners. Assuming that cultural ageism is responsible, researchers had