The purpose of the proposed research is to discover previously unrecognized stimulants and suppressants for secretion of steroid hormones, principally aldosterone, a product of the peripheral-most zone of mammalian adrenal gland cortex, by use of tissue cultures of rodent adrenal gland explants grown in roller tube cultures. Putative stimulants and suppressors will include non-adrenocortical hormones, neurotransmitters and neuroinhibitors, growth and activation factors, and inorganic ions present in the extracellular and intracellular fluids. The peripheral-most adrenal cortical cells (zona glomerulosa cells) from normal rodents will be explanted onto reconstituted rat-tail stimulator or suppressor will be added to the cultures. After 24, 36, and 48 hours with and without additives, medium will be removed for quantification of aldosterone, using enzyme-linked immunosorbent assays. The method is expected to reveal which putative stimulants and suppressors affect the secretion of aldosterone in vitro. Knowledge of these mechanisms is expected to shed light on variation of secretion of aldosterone in explaining possible previously unrecognized mechanisms for the genesis of essential hypertension in man. If such mechanisms can be shown in mammalian cells, they are likely to be operative in humans in vivo.