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Validation of an improved in vitro bioassay to measure LH in diverse species

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Cultured Leydig tumor cells (MA-10) respond to luteinizing hormone (LH) by synthesizing and secreting progesterone (P). The specificity of the response to LH prompted us to develop this system for use as a simple and rapid in vitro bioassay for LH. The aims of this study were to (1) improve sensitivity and reproducibility, and (2) optimize the assay for use in diverse animal species. A minimum sensitivity was observed at 0.05 mIU/well of LH with 0.5 x 10(4) cells/well for 1.5 hours. At higher concentrations of LH, shorter incubation periods also significantly stimulated P production. Addition of human LH standard or serum samples resulted in a dose-dependent increase in P production. Parallel dose-dependent curves were observed with LH preparations from mammalian, avian, and amphibian species. In conclusion, these findings demonstrate that (1) the assay is rapid, sensitive, and reproducible; (2) serum LH levels analyzed using this assay and the mouse Leydig cell bioassay are comparable; (3) shorter incubation times suggest the implementation of this assay for rapid qualitative determination of LH surges; and (4) the assay can be used for the analysis of samples from diverse species, especially those lacking radioimmunoassays. Therefore, this assay system allows for the simple and rapid measurement of circulating bioactive LH levels in humans and diverse animal species, and should provide insight regarding the role of bioactive LH in physiological and pathological conditions.