
Review

# Cytochrome $b_5$: novel roles in steroidogenesis

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# Cytochrome $b_5$: novel roles in steroidogenesis

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**Abstract**

Cytochrome $b_5$ (cyt-$b_5$) is essential for the regulation of steroidogenesis and as such has been implicated in a number of clinical conditions. It is well documented that this small hemoprotein augments the 17,20-lyase activity of cytochrome P450 17α-hydroxylase/17,20-lyase (CYP17A1). Studies have revealed that this augmentation is accomplished by cyt-$b_5$ enhancing the interaction between cytochrome P450 reductase (POR) and CYP17A1. In this paper we present evidence that cyt-$b_5$ induces a conformational change in CYP17A1, in addition to facilitating the interaction between CYP17A1 and POR. We also review the recently published finding that cyt-$b_5$ allosterically augments the activity of 3β-hydroxysteroid dehydrogenase/$\Delta^5$-$\Delta^4$ isomerase (3βHSD), a non cytochrome P450 enzyme, by increasing the enzymes affinity for its cofactor, $NAD^+$. The physiological importance of this finding, in terms of understanding adrenal androstenedione production, is examined. Finally, evidence that cyt-$b_5$ is able to form homomeric complexes in living cells is presented and discussed.

**Keywords:** Cytochrome $b_5$; cytochrome P450 17α-hydroxylase/17,20-lyase; CYP17A1; 3β-hydroxysteroid dehydrogenase/$\Delta^5$-$\Delta^4$ isomerase; 3βHSD; steroidogenesis

**Abbreviations**

3β-hydroxysteroid dehydrogenase/$\Delta^5$-$\Delta^4$ isomerase, 3βHSD; 16-hydroxyprogesterone, 16OH-PROG; 17-hydroxypregnenolone, 17OH-PREG; 17-hydroxyprogesterone, 17OH-PROG; androstenedione, A4; cytochrome $b_5$, cyt-$b_5$; cytochrome P450 17α-hydroxylase/17,20-lyase, CYP17; dehydroepiandrosterone, DHEA; pregnenolone, PREG; progesterone, PROG