

Treatment of Erectile Dysfunction
with Phosphodiesterase Type 5 Inhibitors
(*Viagra, Levitra, Cialis*)

高雄醫學大學 泌尿科

王起杰 醫師

勃起功能障礙（陽痿） 的治療流程

根據病人需求為導向的檢查及診斷



口服藥物治療

(如：磷酸二脂酶抑制劑第五型PDE5-I)

有效

繼續服用

無效

海綿體
注射

或

真空
吸引器

有效

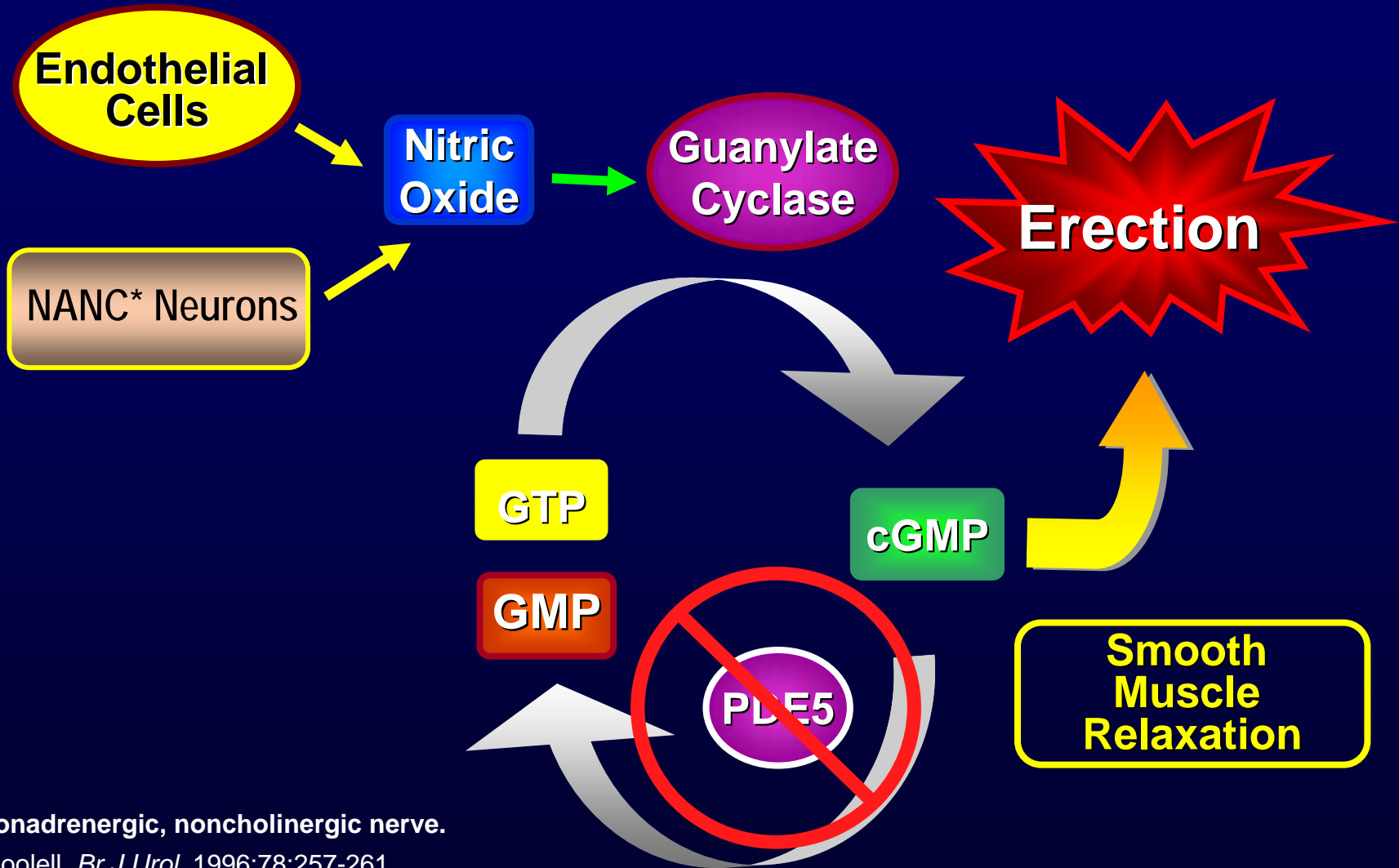
繼續使用

無效

人工陰莖植入
或血管手術



How PDE5 Inhibitors Work



*Nonadrenergic, noncholinergic nerve.

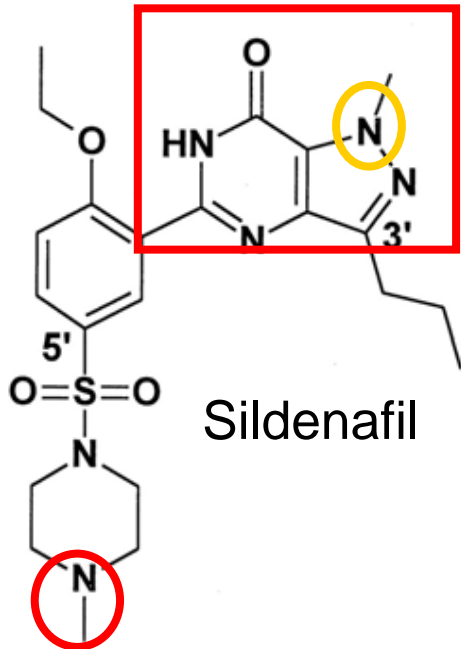
1. Boolell. *Br J Urol.* 1996;78:257-261

2. Burnett. *J Urol.* 1997;157:320-324

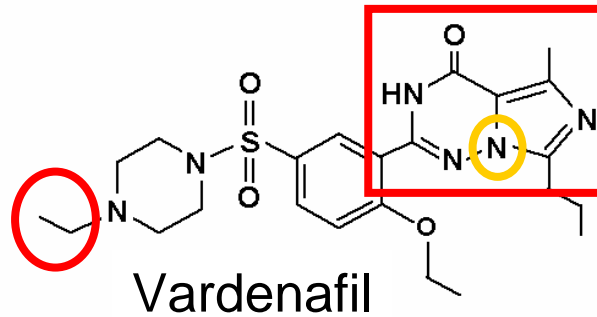
3. Heaton. *Neurosci Biobehav Rev.* 2000;24:561-569.

PDE5 Inhibitors

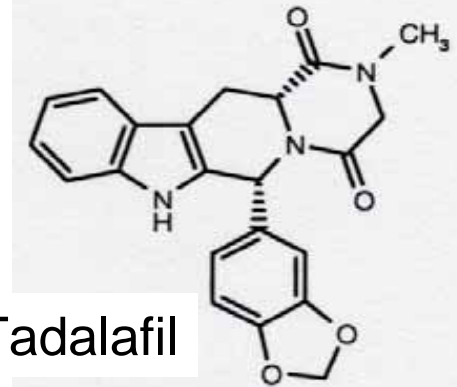
Relationship to Natural Substrate



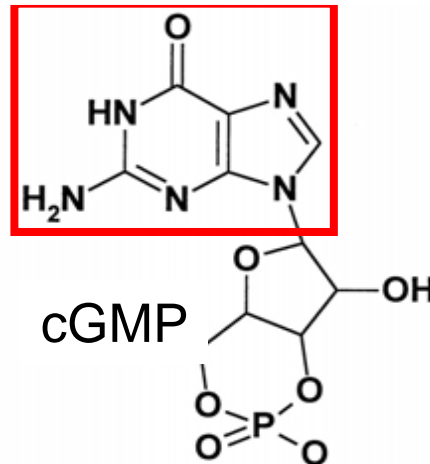
Sildenafil



Vardenafil



Tadalafil



cGMP

Cyclic Guanosine
Monophosphate
Natural Substrate

PDE isoenzymes: variation and distribution in the Body



PDE	Substrate	Tissues
PDE1	cAMP/cGMP	Cardiac ventricle cells, airway smooth muscle
PDE 2	cAMP/cGMP	Corpus cavernosum (CC) and airway smooth muscle
PDE 3	cAMP/cGMP	CC and airway smooth muscle, platelets, cardiac tissue
PDE 4	cAMP	CC and airway smooth muscle, striated muscle, brain, inflammatory cell functions
PDE 5	cGMP	CC and coronary vascular smooth muscle, platelets
PDE 6	cGMP	Retina
PDE 11	cAMP/cGMP	Kidney, testes, prostate, skeletal muscle

Boolell M *et al.* *Int J Impot Res* 1999; 8: 47-52.

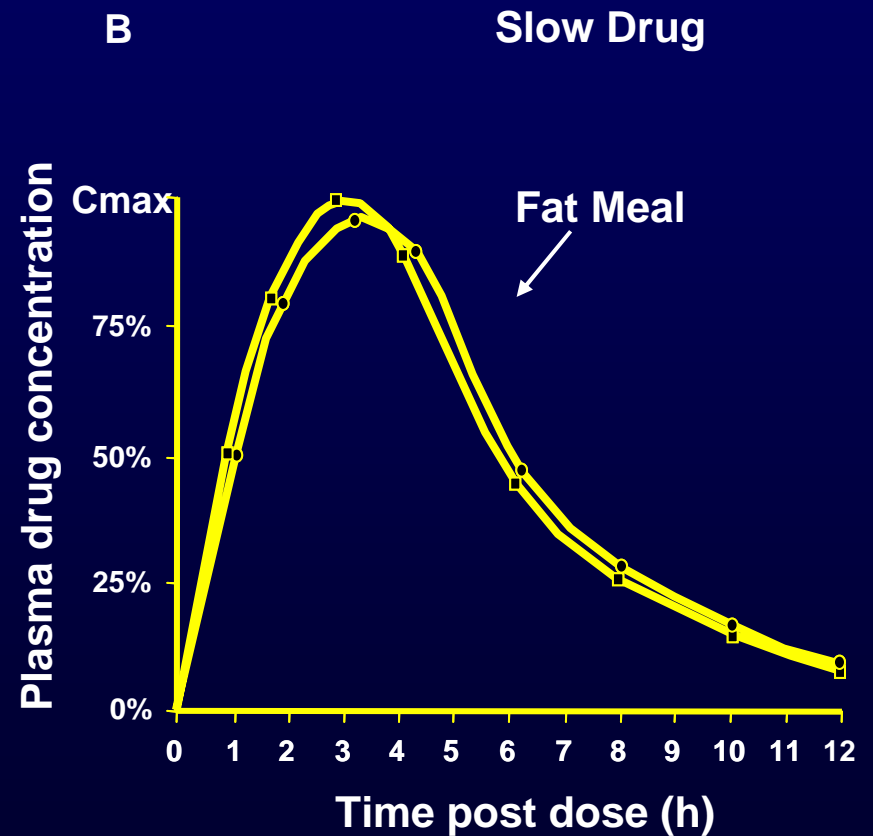
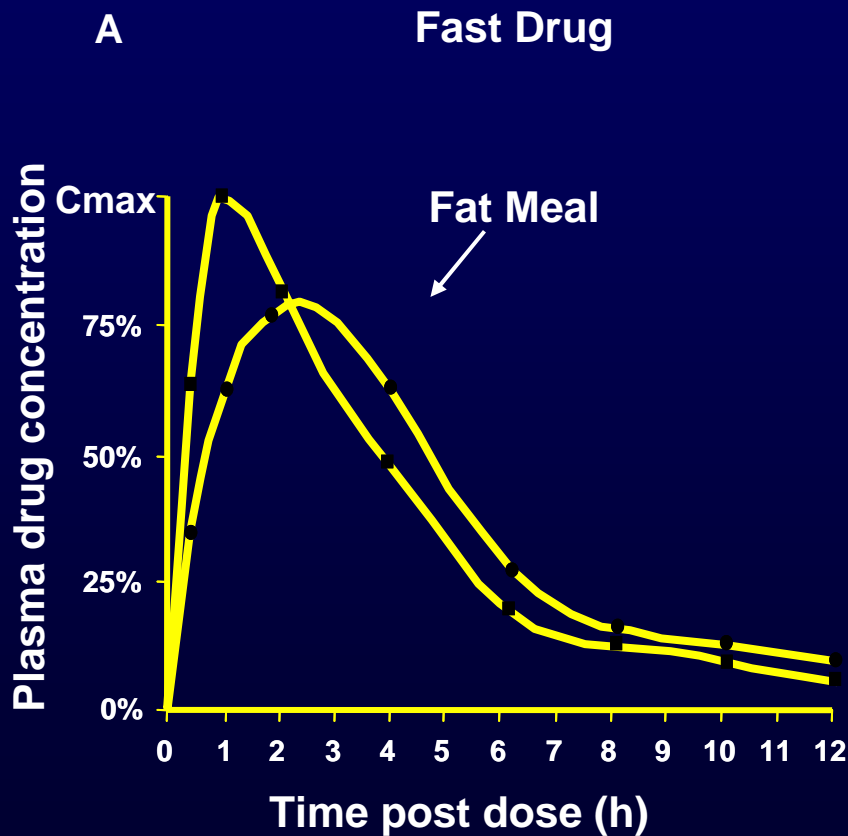
Wallis RM *et al.* *Am J Cardiol* 1999; 83: 3C-12C.

PDE5 Inhibitors Kinetics

	<i>Sildenafil</i>	<i>Vardenafil</i>	<i>Tadalafil</i>
Tmax (hrs)	1.16	0.66	2.0
T1/2 (hrs)	3.82	3.94	17.5

NB All drugs active before Tmax

The Effect of a High-Fat Meal on Pharmacokinetic Parameters of Fast & Slow Onset Drugs



PDE5 Inhibitors與食物之關係

- 低脂食物
 - 無影響
- 高油脂食物
 - 延遲 sildenafil and vardenafil 之吸收
 - 對tadalafil 之吸收影響較小

What Are Men Seeking in ED Therapy?



PDE5 inhibitors之使用禁忌

- 絕不可和硝酸鹽類的藥物一起併用
- 不適合進行性行為的心臟病患及有不穩定
心血管疾病者

Summary – PDE5 inhibitors

- **The NO/cGMP pathway is the primary pathway for corporeal smooth-muscle relaxation and consequent penile erection**
- **PDE5 inhibitors are specific for the NO/cGMP pathway**
- **Vardenafil, sildenafil and tadalafil are potent and selective PDE5 inhibitors**
- **Increased potency and selectivity of PDE5 inhibitors may improve their safety and efficacy**

治療勃起功能障礙之最新口服藥物

	Sildenafil	Vardenafil	Tadalafil
商品名	Viagra (威而鋼)	Levitra (樂威壯)	Cialis (犀利士)
建議劑量(mg)	25, 50, 100	10, 20	10, 20
產生藥效時間	30-60分鐘	30-60分鐘	30-60分鐘
勃起成功率	70-80 %	70-80 %	70-80 %
半衰期	3.7小時	3.9小時	17.5小時
副作用	臉部潮紅、 頭痛、暫時 性視力模糊	臉部潮紅、 頭痛、暫時 性視力模糊	臉部潮紅、 頭痛、背痛 、肌肉疼痛