

# SEXUAL ACTIVITY

## IN CORONARY ARTERY DISEASE PATIENTS

A/Prof. HOÀNG QUỐC HÒA, M.D., Ph.D.  
Director, Gia Định People's Hospital, HCMC.

# OVERVIEW

- ▶ Sexual activity is a legitimate requirement of healthy people as well as patients with coronary disease (CAD).
- ▶ Is not always as expected, because erectile dysfunction (ED) usually accompanies old age and some diseases including CAD.
- ▶ It is estimated that there are 20-30 millions males affected by ED each year in the USA.
- ▶ The decline of sexual activity in CAD patients is usually caused by anxiety and depression after MI, it is rarely due to drugs.

# OVERVIEW

## CONTRIBUTORS OF ERECTILE DYSFUNCTION IN CARDIOVASCULAR DISEASE (CVD) PATIENTS:

- Smoking
- Diabetes mellitus
- Hypertension
- Dyslipidemia

Mechanism: endothelial dysfunction → decrease NO  
(Nitric oxide) secretion

# PHYSIOLOGICAL RESPONSE WHEN SEXUAL INTERCOURSE

## ▶ HEART RATE AND ATRTERIAL BLOOD PRESSURE:

	Young	Old
Maximum HR	115-180 bpm	80-185 bpm
Systolic BP	≤ 190 mmHg	≤ 150 mmHg

## ▶ CARDIOVASCULAR RESPONSE IS AFFECTED BY:

- Surrounding atmosphere and environment
- Currently drugs used
- Tobacco, alcohol
- Stimulants: cocaine, heroin
- After heavy meals
- Awareness or unawareness of CAD

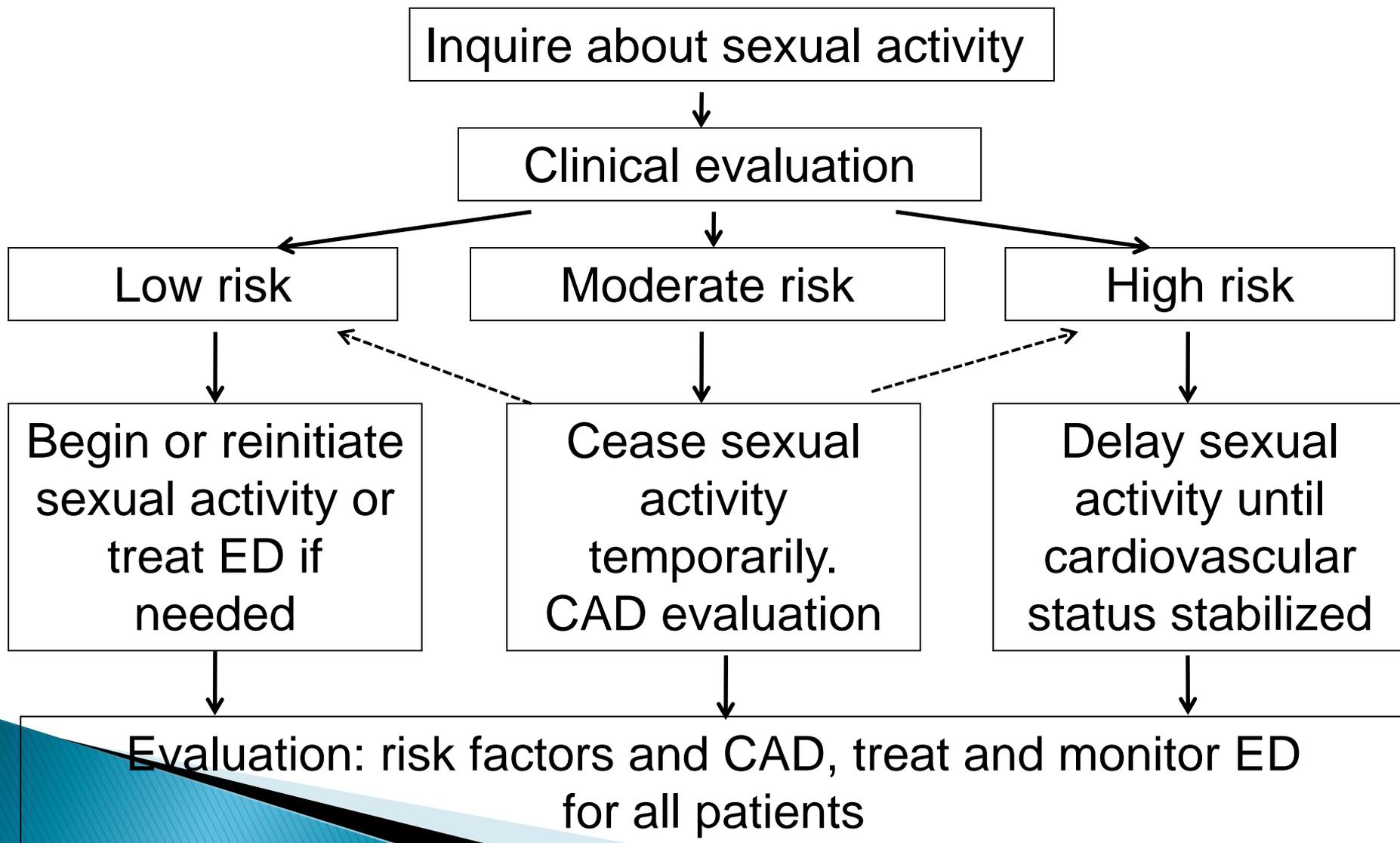
# ENERGY EXPENDITURE FOR SEXUAL AND OTHER ACTIVITIES



<b>Walking</b>	<b>2-3 METS</b>
Light housework	3-4 METS
Heavy housework	5-6 METS
Climbing hill or stairs	4-5 METS
Painting, building, masonry	4-5 METS
<b>Sexual intercourse</b>	<b>2-6 METS</b>
Bicycling	6-7 METS
Golf, double tennis, dancing, bowling	5-7 METS
Shoveling	10 METS
Swimming, single tennis, basket ball, skiing	> 10 METS

**METS: METABOLIC EQUIVALENTS**

# RISK EVALUATION IN SEXUAL ACTIVITY





# GUIDELINES OF THE AMERICAN HEART ASSOCIATION (AHA)

## I. LOW RISK PATIENT (ASYMPTOMATIC)

- ▶ < 3 CAD risk factors.
- ▶ BP well controlled.
- ▶ CCS I, II (according to the Canadian Cardiovascular Society).
- ▶ Successful revascularization.
- ▶ History of uncomplicated MI.
- ▶ Mild heart valve disease.
- ▶ Heart failure without reduced EF and/or NYHA class I

(These patients can have normal sexual activity or consulted on ED treatment)

Risk factors: hypertension, smoking, diabetes, dyslipidemia, obesity, family history)

Successful revascularization based on: anatomical, procedural and clinical criteria

# GUIDELINES OF THE AMERICAN HEART ASSOCIATION (AHA)

## II. INTERMEDIATE RISK PATIENTS:

- ▶  $\geq 3$  CAD risk factors
- ▶ CCS II, III angina pectoris
- ▶ Recent acute MI: 2-6 weeks
- ▶ NYHA class II heart failure and/or left ventricular diastolic dysfunction.
- ▶ Consequential disease of atherosclerosis: stroke and/or peripheral vascular disease.

(These patients need to have their cardiac function evaluated carefully before permitted to perform sexual activity)

# GUIDELINES OF THE AMERICAN HEART ASSOCIATION (AHA)

## III. HIGH RISK PATIENTS:

- ▶ Unstable angina or regular recurrence.
- ▶ Uncontrolled hypertension.
- ▶ New acute MI (<2 weeks).
- ▶ High risk arrhythmias (ventricular arrhythmias).
- ▶ Occlusive hypertrophic cardiomyopathy.
- ▶ NYHA class III, IV heart failure
- ▶ Moderate to severe valvular heart diseases.

(These patients must have their sexual activity postponed until cardiovascular status is stable)

Need to be consulted by cardiologists because risk far outweighs benefit

# WHEN IS SAFE FOR SEXUAL ACTIVITY?

- ▶ Sexual activity is safe when: activity equal to 5-6 METS.  
example: climbing 20 steps of stairs within 10-15s,  
without exhaustion or climb 2- 4 flights of stairs without  
angina.
- ▶ Stress test after MI to 5-6 METS, with no signs of  
myocardial ischemia, no arrhythmias.
- ▶ Many studies show that sexual activity rarely triggers MI.



# BASIC METHODS FOR CAD EVALUATION

- ▶ Clinical: angina pectoris (CCS).
- ▶ Cardiac enzymes: CK MB, Troponin.
- ▶ ECG: at rest and on exertion.
- ▶ Echocardiography: at rest and on exertion.
- ▶ CT scan (MDCT: Multidetector- row Computed Tomography).
- ▶ MRI.
- ▶ Myocardial perfusion scintigraphy (SPECT: Single Photon Emission CT, PET: Positron Emission Tomography).
- ▶ Coronary angiogram.

# DRUG CONTRIBUTING TO ED

- ▶ Thiazides diuretics.
- ▶ Beta blockers.
- ▶ Alpha blockers
- ▶ Calcium channel blockers
- ▶ Hydralazine
- ▶ Psychoactive drugs
- ▶ Gemfibrozil
- ▶ Cimetidine
- ▶ Digoxin
- ▶ ACEI
- ▶ Stimulants: alcohol, cocaine, heroin, marijuana

# ED PATHOPHYSIOLOGY

- ❖ Normal erection is the harmony of:
  - Hormone
  - Neurologic function
  - Blood vessel
  - And psychological status
- ❖ The erectile process is moderated by non-cholinergic and non-adrenergic nerve cells in the corpora cavernosa, causing NO releasing

# ED PATHOPHYSIOLOGY

- ❖ Nitric oxide (NO) causes dilation of corpora cavernosa smooth muscle arteries via GTP (Guanosine triphosphate) & cyclic GMP (Guanosine monophosphate) → results in capillary-venous congestion and tumescence.
- ❖ ED may be the consequence of:
  - Drug
  - Hormone
  - Blood vessel
  - Neurologic function
  - Psychological status

(The above factors usually combine with each other)

# ED PATHOPHYSIOLOGY

- ❖ In ED, NO release is generally reduced.
- ❖ PDE 5 inhibitor drugs (PDE5I: phospho- diesterase-5 inhibitors)
  - Sildenafil (Viagra)
  - Tadalafil
  - Vardenafil

Hydrolysis inhibitor: cyclic GMP → GMP, results in accumulated cGMP → increase vasodilation → increase erection

# WHY PDE-5 INHIBITORS AND NITRATES CANNOT BE USED CONCOMITANTLY?

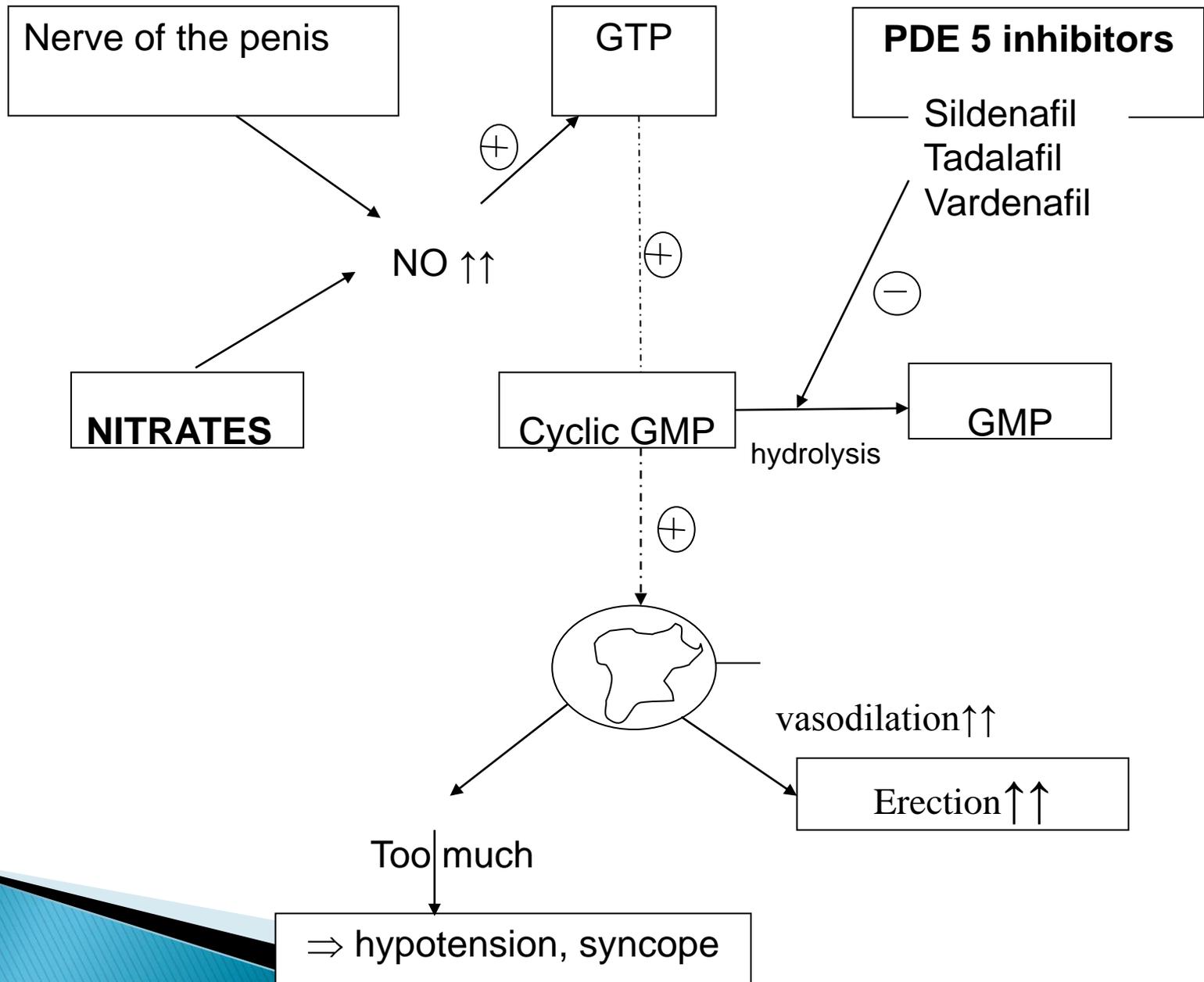
- ❖ Nitroglycerine and long acting Nitrates are exogenous NO, they affect blood vessel smooth muscle cells and platelets, causing increase of cGMP via the activation of Guanylate cyclase (GC) → vasodilation.
- ❖ On the other hand, PDE-5 inhibitors also cause increase of cyclic GMP (mechanism on the previous slide) → vasodilation.
- ❖ Because both drugs results in vasodilation, they can cause severe hypotension if used concomitantly.

# DRUGS FOR ED TREATMENT (FDA APPROVED)



Characteristics	Sildenafil	Vardenafil	Tadalafil
First dose	50mg	5mg	10mg
Onset of action	60 minutes	45 minutes	45 minutes
Half-life	4 hours	4 hours	17,5 hours
Taking time	2 hours after eating	2 hours after eating	Anytime
QT prolongation	No	Yes	No
Use with nitrates	No	No	No
Common side effects (>2% patients)	-Headache. -Flushing. -Blurring. -Dizziness (hypotension). -Diarrhea. -Mild snuffles.	-Headache. -Flushing. -Rhinitis. -Indigestion. -Flu-like syndrome.	-Headache. -Indigestion. -Back pain. -Muscle pain.
Caution	-LVOT stenosis. -Unstable autonomic nervous system	-LVOT stenosis. -Congenital long QT syndrome, class Ia & III antiarrhythmic drugs	-Unstable autonomic nervous system. -LVOT stenosis.

# MECHANISM OF SILDENAFIL ACTION



# DRUGS THAT CANNOT BE COMBINED WITH SILDENAFIL (VIAGRA)



- ▶ Nitroglycerin
- ▶ Isosorbide dinitrate, 5-mononitrate
- ▶ Nitroprusside



# POTENTIAL RISK WHEN SILDENAFIL IS USED WITH

- ▶ Many hypertensive drugs.
- ▶ Many heart failure drugs.
- ▶  $\geq 2$  vasoactive drugs

(Sildenafil + 1 hypertensive drug  $\rightarrow$  safe)

# SILDENAFIL DOSE ADJUSTMENT

When using with drugs that inhibit Cytochrome 3A4 →  
prolongs Sildenafil's half-life.

- Macrolide antibiotics ( Erythromycin...)
- Antifungal agents
- Antiviral agents
- Some statin
- Cimetidine

Lower dose in hepatic or renal insufficiency.

# ADVISE FOR CVD PATIENTS

- ▶ Patients with: hypertension, heart failure, CAD after optimal medical therapy, mild or moderate exertional ability (2-5 METS) → normal sexual activity.
  - ▶ Patients after MI (3-4 weeks), 6 weeks optimal, having been:
    - Revascularized successfully: anatomical, procedural, clinical.
    - Stress test (2-6 METS) doesn't cause ischemia, arrhythmia or angina
- safe for sexual activity

# ADVISE FOR CVD PATIENTS

Patients with CVD, diabetes having ED should be cautious when using Sildenafil:

- ▶ Do not use Sildenafil (Viagra) when being on treatment with Nitroglycerine, Nitromint, Imdur...
- ▶ If patient taking Nitrates wants to use Sildenafil, he must stop Nitrates 24 hours before and reinitiate Nitrates at least 24 hours after Sildenafil.
- ▶ Starting dose should be low:  $\frac{1}{4}$  to  $\frac{1}{2}$  of recommended dose

# ADVISE FOR CVD PATIENTS

- ▶ Patients who are currently taking many drugs to treat heart failure or hypertension, if heart failure class III (symptomatic) or hypotension → do not use Sildenafil.
- ▶ CVD patients having dyspnea or angina pectoris during intercourse → cease → contact with cardiologist immediately for appropriate advisory: intensive medical therapy or early intervention.

# TREATMENT OF HYPOTENSION DUE TO SILDENAFIL AND NITRATES CONCOMITANT USE



- ▶ If mild hypotension (Systolic BP  $\geq$  90mmHg)
  - No signs of target organ hypoperfusion.
  - Only best rest needed.
  - Drink a lot of water.
- ▶ If BP too low (Systolic BP  $\leq$  80mmHg) and signs of hypoperfusion: obtundation, oliguria, cold extremities → immediately do:
  - Call for emergency service
  - Head low- feet high position (Trendelenburg).
  - Rapid NaCl 0.9% infusion (because of severe preload reduction) pay attention on heart failure patients.
  - Vasoactive drugs (Dopamine).
- ▶ Infusion + Vasoactive drugs : optimal treatment for hypotension due to Nitrates + Sildenafil

# TREATMENT OF ANGINA PECTORIS IN PATIENTS USING PDE 5-I



CVD patients using Sildenafil or other drug of the same class and have angina pectoris:

- ▶ Do not use nitrates in this situation.
- ▶ Use rapid acting beta blockers (IV) Esmolol or Metoprolol (if BP is not too low).
- ▶ Diltiazem (IV) is also an option.
- ▶ Morphine (low dose) should be added if necessary.

# CONCLUSION



- ▶ CVD patients in general, CAD patients in specific, when going for examination or after hospital discharge, should be advised fully about sexual activity.
- ▶ Cautions when using ED treatment drugs:
  - Starting dose
  - Drug combination
  - Drugs that prolong PDE-5 inhibitors half-life
  - Management of complications of drug combination

# REFERENCE

1. Braunwald (2012) Heart disease.
2. Harrison's (2012) Principles of internal medicine.
3. Hoàng Quốc Hòa (2011) Bệnh mạch vành chẩn đoán và điều trị.
4. Michael H. Crawford (2010) Cardiology

A close-up photograph of a field of pink geranium flowers. The flowers are in various stages of bloom, with some fully open and others as buds. The leaves are finely divided and green. The background is a soft-focus green field.

**THANK YOU VERY MUCH!**