Exploration of the association between chronic periodontal disease and erectile dysfunction from population based view point

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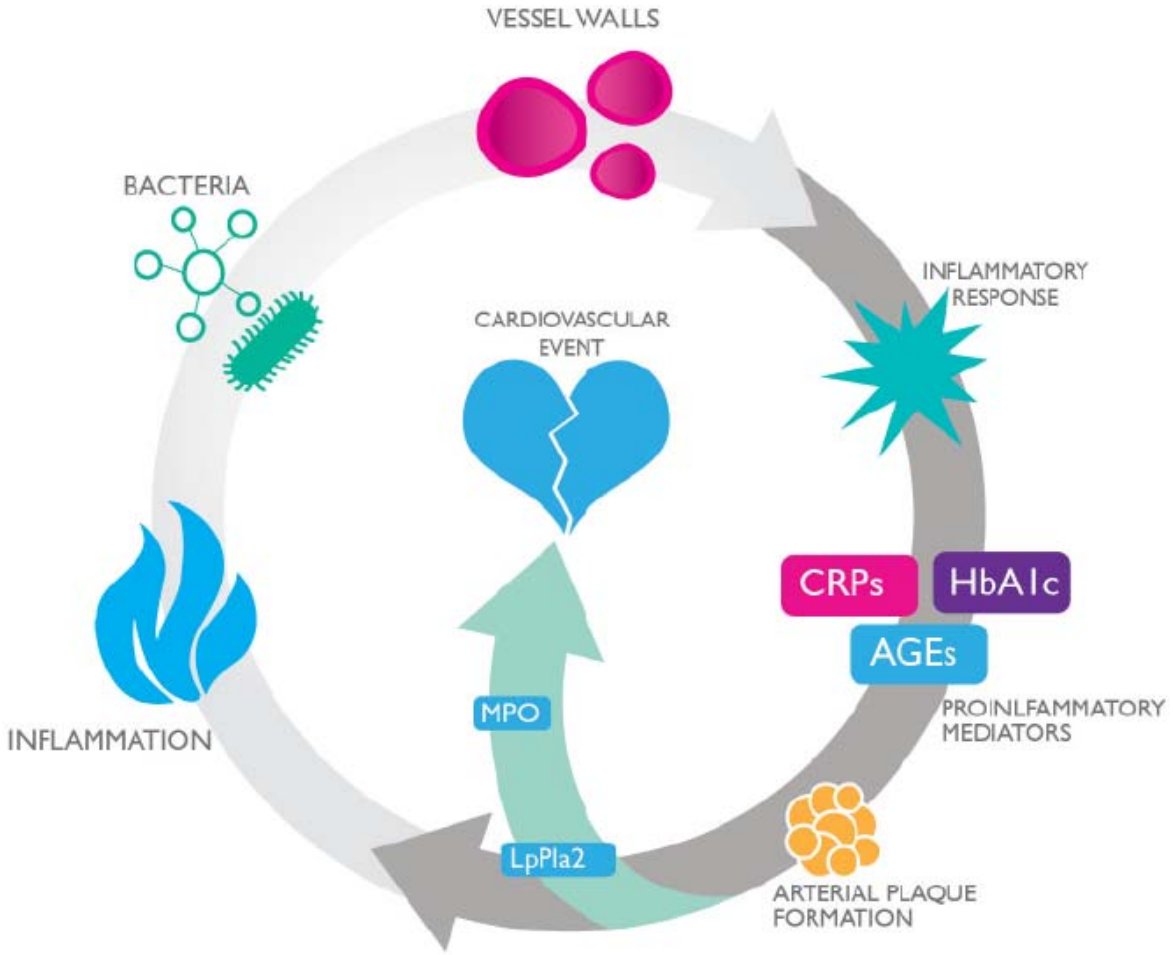
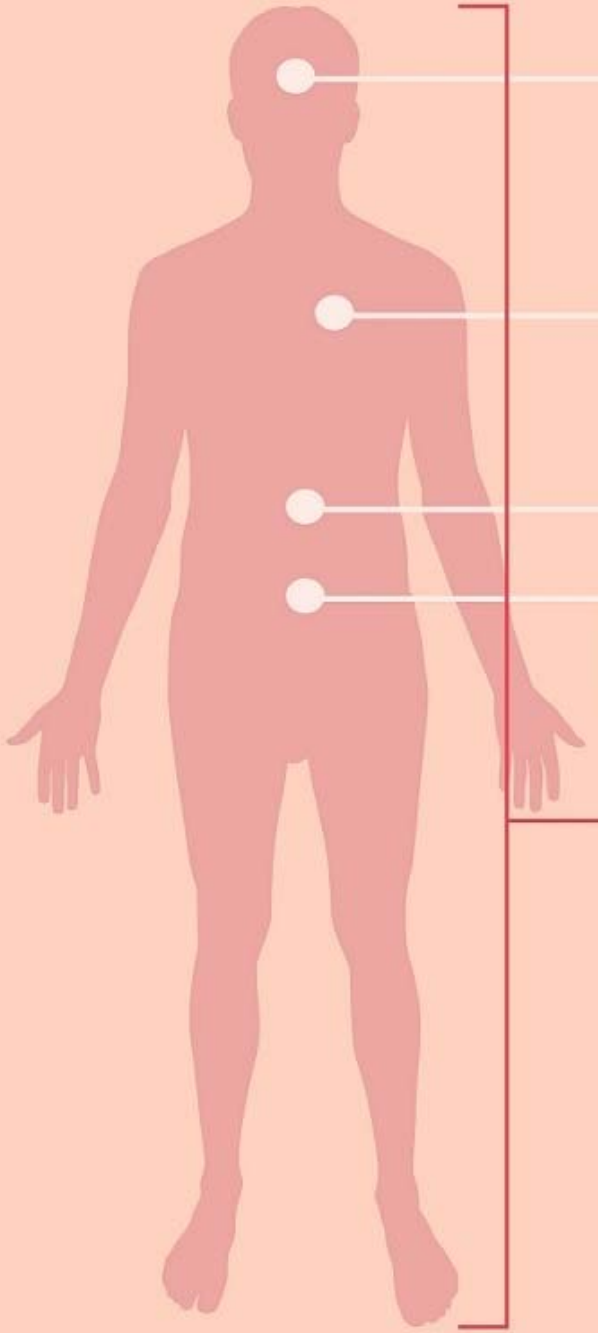

VESSEL WALLS
BACTERIA
INFLAMMATORY RESPONSE
CARDIOVASCULAR EVENT
CRPs
HbA1c
AGEs
PROINLFAMMATORY MEDIATORS
MPO
INFLAMMATION
LpPla2
ARTERIAL PLAQUE FORMATION



1. Alzheimer's, Cognitive Memory
Alzheimer's patients have a significantly higher amount of antibodies and inflammatory molecules associated with periodontal disease in their blood stream.

2. Heart Disease
Certain bacteria found in an inflammed mouth have been found in arterial plaque and have been known to alter clotting in the blood stream.

3. Diabetes
Gum disease has an adverse effect on controlling blood sugar levels and studies show periodontal disease increases the risk for Diabetes complications.

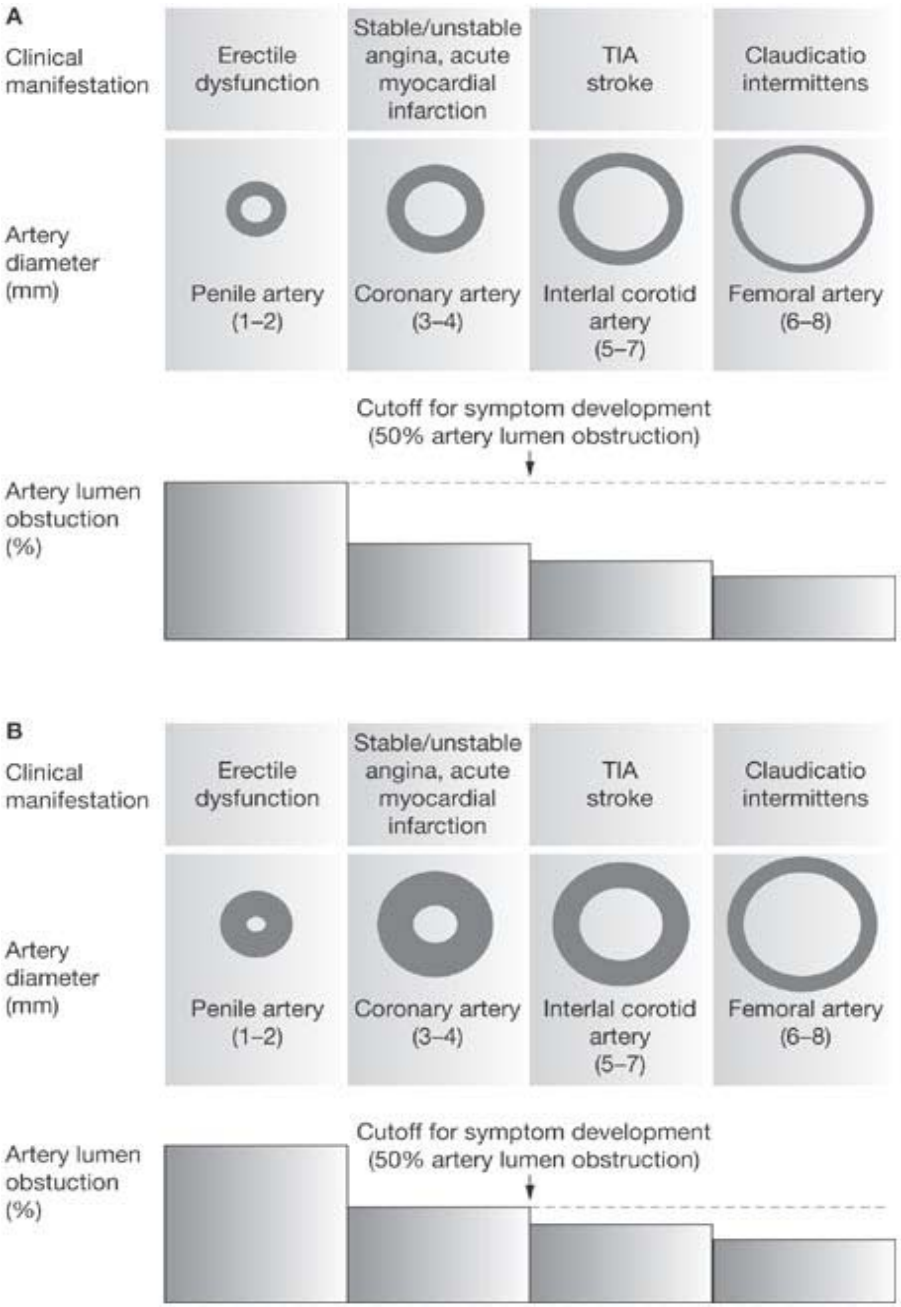
4. Pregnancy, Health of the Fetus
Gum disease present in the expecting mother can lead to low birthweights and premature birth.

5. Overall Inflammation
Studies indicate that gum disease may add to overall inflammation in the body by raising C-reactive protein index.

How Gum Disease affects the body

Systemic diseases that can be affected by specific bacteria

Bacteria	Systemic Diseases Affected
AA - Aggregatibacter Actinomycetemcomitans Major etiological agent	• Infective Endocarditis • Brain Abcesses • Stenotic Coronary Artery Plaque • Aneurysmal wall • Aneurysmal thrombus tissues
Pg - Porphyromonas gingivalis Major etiological agent	• Diabetes • Rheumatoid Arthritis • Chronic Kidney Disease • Multiple Sclerosis • Stenotic Coronary Artery Plaque • Aneurysmal wall • Aneurysmal thrombus tissues • Artheromatosis, Atherosclerosis
Tf- Tannerella forsythia Major etiological agent	• Myocardial Infarction • Diabetes • Stenotic Coronary Artery Plaque • Aneurysmal wall • Aneurysmal thrombus tissues
Td - Treponema denticola Major etiological agent	• Diabetes • Stenotic Coronary Artery Plaque • Aneurysmal wall • Aneurysmal thrombus tissues
Fn - Fusobacterium nucleatium	•Pre-term births •Pre-eclampsia
Pi - Prevotella intermedia	•Myocardial infarction
Ec - Eikenella corrodens	•Respiratory
Cs- Capnocytophaga series (gingivalis, ochracea, sputigena)	•Diabetes



Mentori et al. Am J Cardiol 2005; 96 (Suppl): 19M–23M


Gum
Disease
?
Erectile
Dysfunction

Aims

- **To examine the association between CPD and ED and assess the effect of DE on ED from Taiwan National Health Insurance Research Database (NHIRD).**

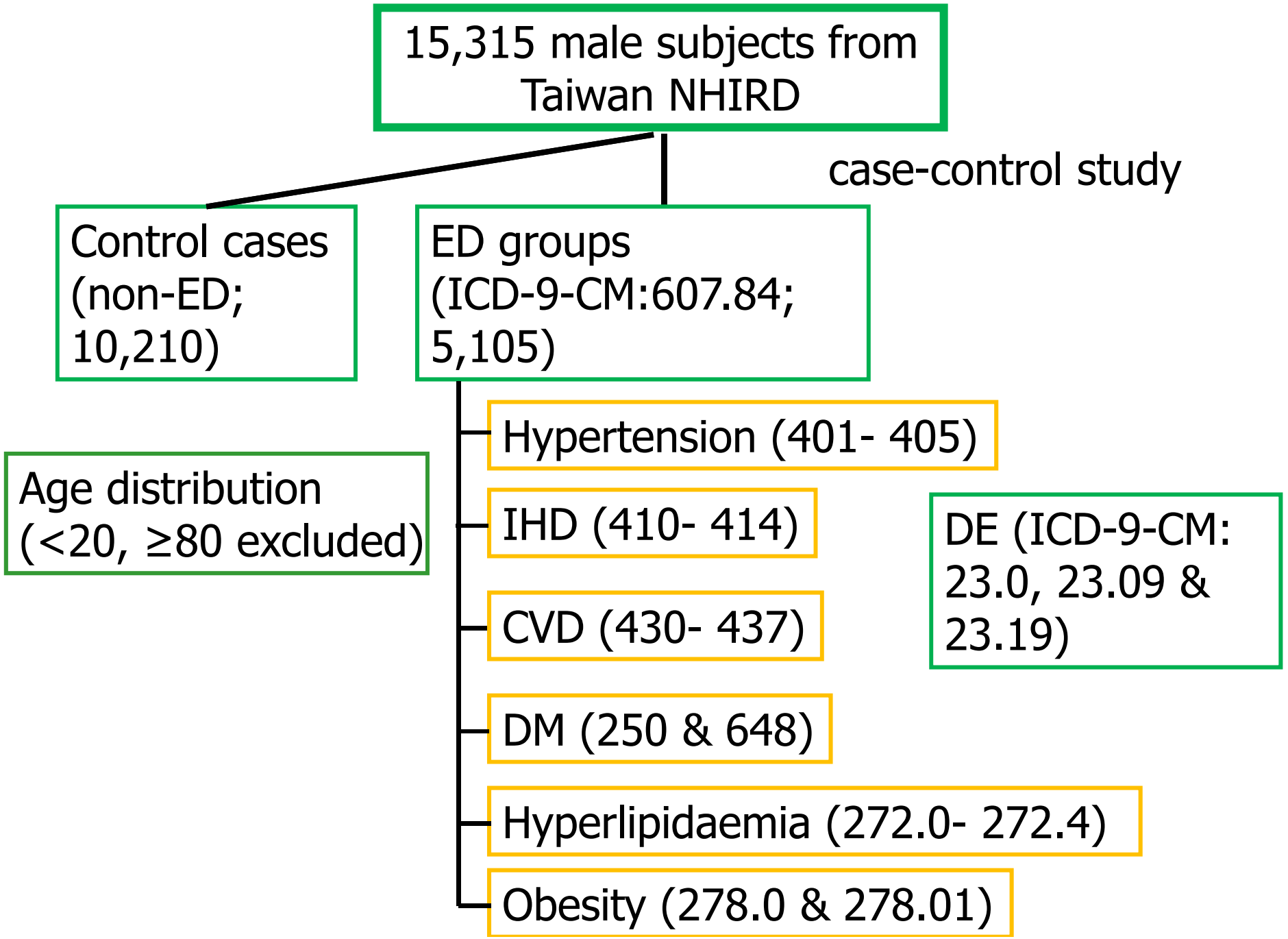

15,315 male subjects from Taiwan NHIRD
case-control study
Control cases (non-ED; 10,210)
ED groups (ICD-9-CM:607.84; 5,105)
Age distribution (<20, ≥80 excluded)
Hypertension (401- 405)
IHD (410- 414)
CVD (430- 437)
DM (250 & 648)
Hyperlipidaemia (272.0- 272.4)
Obesity (278.0 & 278.01)
DE (ICD-9-CM: 23.0, 23.09 & 23.19)

Table 1. Demographic characteristics of patients with ED and controls (n = 15,315)					
Variables	Patients with ED (n = 5,105)		Controls (n = 10,210)		P value
	Number	%	Number	%	
Age(years)					
<30	196	3.84	392	3.84	>0.999
30-39	575	11.26	1,150	11.26	
40-49	1,036	20.29	2,072	20.29	
50-59	1,278	25.03	2,556	25.03	
>59	2,020	39.57	4,040	39.57	
Co-morbid factors					
Hypertension	2,438	47.56	4,144	40.59	<0.0001
Ischemic heart disease	1,672	32.75	2,327	22.79	<0.0001
Cerebrovascular disease	1,044	20.45	1,592	15.59	<0.0001
Diabetes mellitus	1,646	32.24	2,104	20.61	<0.0001
Hyperlipidaemia	2,055	40.25	2,635	25.81	<0.0001
Obesity	55	1.08	53	0.52	<0.0001
ED: erectile dysfunction					

Table 2. Prevalence and ORs for CPD patients among ED compared to controls

Variables	Patients with ED (n = 5,105)		Controls (n = 10,210)		Total (n = 15,315)	
	n; %		n; %		n; %	
CPD	1,196	23.43	1421	13.92	2,617	17.09
Crude OR (95%CI)	1.89* (1.74-2.06)		1.00			
Adjusted OR (95%CI)	1.79* (1.64-1.96)		1.00			
CPD with DE	673	13.18	800	7.84	1,473	9.62
Crude OR (95%CI)	1.56* (1.39-1.76)		1.00			
Adjusted OR (95%CI)	1.51* (1.34-1.70)		1.00			
CPD without DE	523	10.25	621	6.08	1,144	7.47
Crude OR(95%CI)	2.22* (1.95-2.52)		1.00			
Adjusted OR (95%CI)	2.09* (1.84-2.38)		1.00			

ED: erectile dysfunction, CPD: Chronic periodontal disease, OR: odds ratio
Adjustments are made for age, hypertension, ischemic heart disease, cerebrovascular disease, diabetes mellitus, hyperlipidaemia and obesity.
*p<0.001

Table 3. ORs for CPD patients, CPD with DE patients among ED and controls, by age group

Variables	Age group									
	<30		30-39		40-49		50-59		>59	
	ED n; %	Controls n; %	ED n; %	Controls n; %	ED n; %	Controls n; %	ED n; %	Controls n; %	ED n; %	Controls n; %
CPD	29; 14.8	30 ; 7.65	96; 16.7	135; 11.74	184; 17.76	295; 14.24	307; 24.02	378; 14.79	580; 28.71	583; 14.43
Crude OR (95%CI)	2.10* (1.22-3.60)	1.0	1.51* (1.14-2.00)	1.0	1.30* (1.06-1.59)	1.0	1.82* (1.54-2.16)	1.0	2.40* (2.10-2.72)	1.0
Adjusted OR (95%CI)	2.13* (1.23-3.70)	1.0	1.42* (1.10-1.89)	1.0	1.31* (1.06-1.61)	1.0	1.76* (1.48-2.09)	1.0	2.27* (1.99-2.59)	1.0
CPD with DE	16; 8.16	13; 3.32	41; 7.13	60; 5.22	104; 10.04	144; 6.95	166; 12.99	215; 8.41	346; 17.13	638; 9.11
Crude OR (95%CI)	2.00 (0.92-4.36)	1.0	1.37 (0.89-2.12)	1.0	1.27(0.96-1.68)	1.0	1.45 ‡ (1.15-1.82)	1.0	1.77* (1.50-2.10)	1.0
Adjusted OR (95%CI)	2.00 (0.91-4.40)	1.0	1.29 (0.83-2.03)	1.0	1.35†(1.00-1.81)	1.0	1.40 ‡ (1.10-1.77)	1.0	1.74* (1.46-2.07)	1.0

ED: erectile dysfunction, CPD: Chronic periodontal disease, OR: odds ratio
Adjustments are made for age, hypertension, ischemic heart disease, cerebrovascular disease, diabetes mellitus, hyperlipidaemia and obesity.
*p <0.001, †p < 0.05, ‡p < 0.01

Table 3. ORs for CPD patients, CPD with DE patients among ED and controls, by age group

Variables	<30		>59	
	ED n; %	Controls n; %	ED n; %	Controls n; %
CPD	29; 14.8	30 ; 7.65	580; 28.71	583; 14.43
Crude OR (95%CI)	2.10* (1.22-3.60)	1.0	2.40* (2.10-2.72)	1.0
Adjusted OR (95%CI)	2.13* (1.23-3.70)	1.0	2.27* (1.99-2.59)	1.0

Table 3. ORs for CPD patients, CPD with DE patients among ED and controls, by age group

	Age group					
	40-49		50-59		>59	
CPD with DE	104; 10.04	144; 6.95	166; 12.99	215; 8.41	346; 17.13	638; 9.11
Crude OR (95%CI)	1.27(0.96-1.68)	1.0	1.45 ‡ (1.15-1.82)	1.0	1.77* (1.50-2.10)	1.0
Adjusted OR (95%CI)	1.35 †(1.00-1.81)	1.0	1.40 ‡ (1.10-1.77)	1.0	1.74* (1.46-2.07)	1.0

Table 4. Prevalence and ORs for CPD patients with different time DE among ED compared to controls

Variables	DE time					
	1		2		≥3	
	ED n ; %	Controls n ; %	ED n ; %	Controls n ; %	ED n ; %	Controls n ; %
CPD with DE	256; 23.9	305; 16.3	147; 23.9	187; 18.5	270; 29.3	308; 20.5
Crude OR (95%CI)	1.62* (1.34-1.95)	1.0	1.39* (1.09-1.77)	1.0	1.61* (1.03-1.70)	1.0
Adjusted OR (95%CI)	1.57* (1.30-1.90)	1.0	1.32* (1.03-1.70)	1.0	1,55* (1.28-1.88)	1.0

CPD: chronic periodontal disease, ED: erectile dysfunction, DE: dental extraction, OR: odds ratio
*p < 0.001

Discussion

a. CPD is associated with CHD in younger men, independently of established risks
b. ED is thought to be an early sign of CHD via endothelial dysfunction
c. CPD plays a key role in the pathological process of ED
d. CPD might be associated with ED in the earlier life and later with CHD

1 Higashi et al. Hypertension 2008; 51: 446-453
2 Geismar et al. J Periodontol 2006; 77: 1547-1554
3 Billups et al. Int J Impot Res 2005; 17(suppl. 1): S19-S24
4 Zadik et al. J Sex Med 2009; 6: 1111-1116

Discussion

a. P. gingivalis has been shown to invade endothelial cells
b. Periodontal pathogens have been identified in patients undergoing endarterectomy
c. DE in CPD patients may eliminate or ease the inflammation of oral cavity and diminish systemic inflammation

1. Haraszthy et al. J Periodontol 2000; 71: 1554-1560
2. Dorn et al. FEMS Microbiol Lett 2000; 187: 139-144

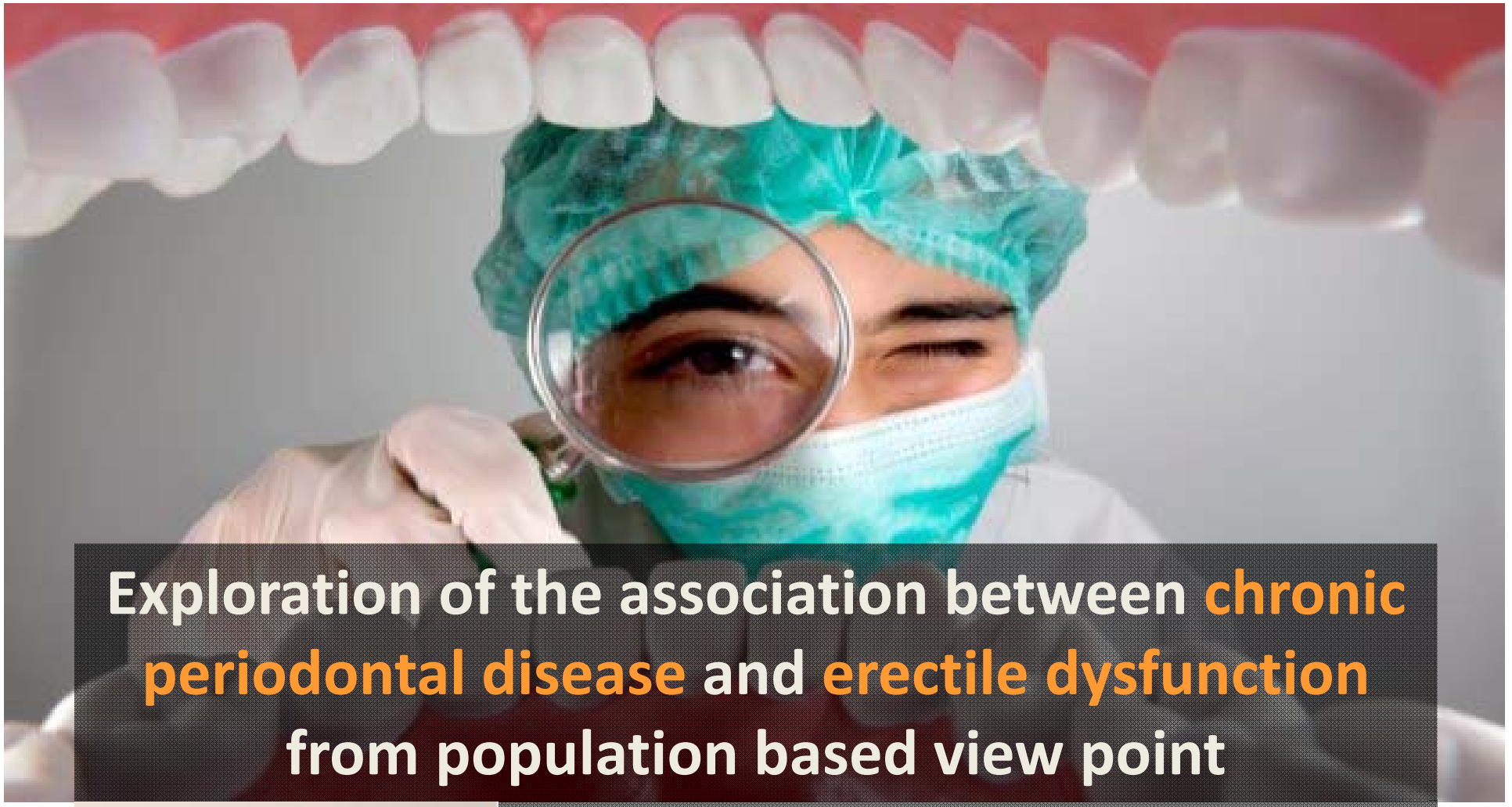
In our study

N= 15,315; the largest case-control study focused the association between CPD and ED, the first assessed the effect of DE

a. **A novel relationship between CPD and ED**

b. **CPD plays a role of ED pathogenesis**

c. **DE seems to attenuate ED, except middle-aged males**



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