



# Genetic Polymorphisms and Periodontitis In Hong Kong Chinese Population

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## Background

Genetic factors can influence the intensity and severity of host responses to bacterial challenge which may result in various levels of periodontal tissue destruction. It seems that patients with different genetic composition might exhibit different levels of immune responses to the same infection.

Over the past decades, the associations between genetic polymorphisms and periodontitis have been widely studied. More and more researchers believe that multigenetic polymorphisms are associated with periodontitis. Our study was planned to investigate the association between multigenetic polymorphisms and periodontitis in the Hong Kong Chinese population.

## Objective

To screen for 165 single nucleotide polymorphisms (SNPs) in 18 genes of individuals with or without periodontitis in order to investigate detectable associations between multigenetic polymorphisms and periodontitis.

## Materials and Methods

193 periodontitis patients and 120 non-periodontitis Hong Kong Chinese adult subjects were recruited from the Prince Philip Dental Hospital patient pool of the Faculty of Dentistry, the University of Hong Kong.

- Periodontitis defined as one panoramic oral radiograph showing more than 50% alveolar bone loss in more than 30% sites.
- non-periodontitis control defined as current panoramic oral radiograph revealing no site with more than 15% bone loss and no evidence of furcation involvement while clinical examination detected no probing depth greater than 4mm.

DNA were extracted from whole blood taken from the subjects and then genotyped by the Sequenom MassARRAY system. (Fig. 1)

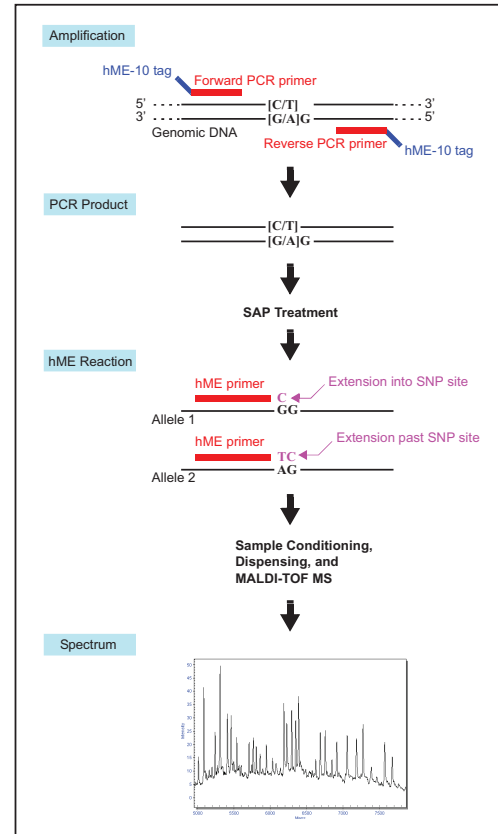


Figure 1. Multiplexed Homogeneous MassEXTEND Assay

## Results

165 SNPs were screened (Table 1). None of the SNPs showed significant difference in genotype distributions between periodontitis patients and non-periodontitis controls.

Table 1. Summary of SNPs Screened

Gene Symbols	SNP Screened	
	Coding	Non-coding
IL1A (IL-1 $\alpha$ )	3	6
IL1B (IL-1 $\beta$ )	1	8
IL1RN (IL-1 receptor antagonist)	1	7
IL1Fs & Others (IL1F5, IL1F7, IL1F8, IL1F10 & FLJ40629)	-	9
IL6 (IL-6)	5	22
IL8 (IL-8)	-	9
IL10 (IL-10)	-	13
IL15 (IL-15)	-	10
TNF (TNF- $\alpha$ )	5	12
TGFB1 (TGFB1)	2	5
FCGR2A (Fc $\gamma$ RIIa)	5	11
FCGR3A & 3B (Fc $\gamma$ RIIIa & IIIb)	13	4
MMP1 (MMP-1)	2	9

Candidate SNPs for multigenetic polymorphism analysis (Table 2)

- Coding SNPs or non-coding SNPs in regulatory region
- Minor allele frequencies > 5%
- p-value (Chi-square test) of the single SNP association analysis < 0.1

Table 2. Candidate SNPs for Multigenetic Polymorphism Analysis

Gene Symbol	SNP ID	SNP Type	Call Rate	Minor Allele Frequency	Genotype Count
FCGR2A	rs1801274	Non-synonymous	0.99	0.31	CC 23
					CT 149
					TT 138
FCGR2A	rs13878	3PRIME_UTR	0.81	0.06	CC 224
					CT 28
					TT 1
FCGR3A	rs15811	3PRIME_UTR	0.81	0.09	AG 45
					GG 210
					GG 192
FCGR3A	rs396991	Non-synonymous	0.9	0.16	GT 88
					TT 1

The homozygous genotypes of coding SNP (rs1801274) together with genotype CC of the SNP (rs13878) in regulatory region of FCGR2A were significantly more prevalent in periodontitis patients ( $p=0.041$ ) (Table 3).

Table 3. Analysis of rs1801274 & rs13878 Combined genotypes

rs1801274 + rs13878 Genotype	Group Count (%)		Total Count (%)
	No periodontitis	Periodontitis	
CC/TT + CC	36 (37.1%)	77 (50.3%)	113 (45.2%)
Others	61 (62.9%)	76 (49.7%)	137 (54.8%)
<b>Total</b>	<b>97 (100.0%)</b>	<b>153 (100.0%)</b>	<b>250 (100.0%)</b>

Chi square test  $p=0.041$

The genotype GG of coding SNP (rs396991) together with the genotype GG of SNP (rs15811) in regulatory region of FCGR3A were marginally more prevalent in periodontitis patients ( $p=0.051$ ) (Table 4).

Table 4. Analysis of rs15811 & rs396991 Combined Genotypes

rs15811 + rs396991 Genotype	Group Count (%)		Total Count (%)
	No periodontitis	Periodontitis	
GG + GG	40 (44.4%)	79 (57.7%)	119 (52.4%)
Others	50 (55.6%)	56 (42.3%)	108 (47.6%)
<b>Total</b>	<b>90 (100.0%)</b>	<b>137 (100.0%)</b>	<b>227 (100.0%)</b>

Chi square test  $p=0.051$

## Discussion and Conclusion

Homozygous genotypes of SNP rs1801274 together with genotype CC in rs13878 in FCGR2A; genotype GG in rs396991 together with GG in rs15811 in FCGR3A seem to be associated with periodontitis in the Hong Kong Chinese population.

## Acknowledgement

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