27th International Biology Olympiad

17th-23rd July, 2016

Hanoi, Vietnam

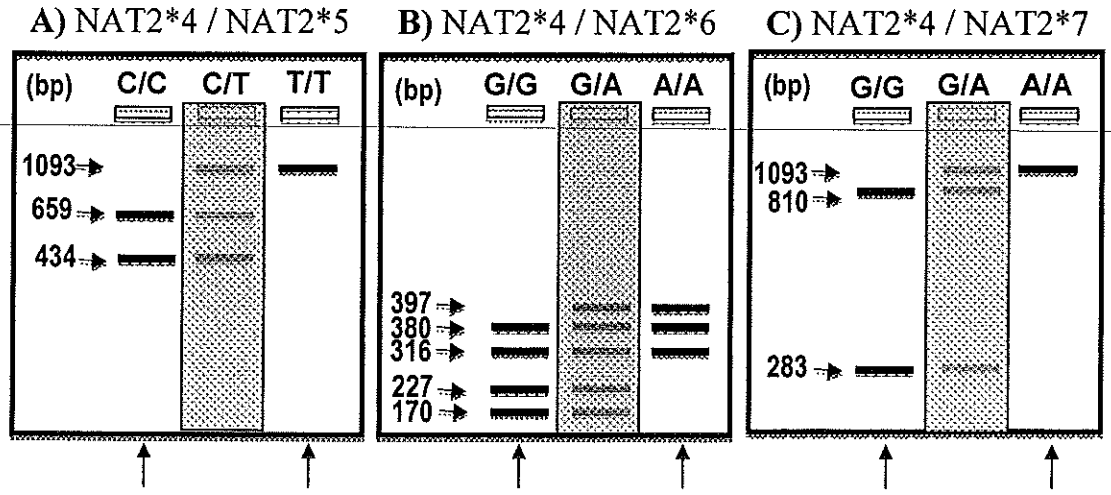
Practical Exam 4

MOLECULAR BIOLOGY

ANSWER KEYS with SCORING SCHEME

Total points: 100 points

Q.1.1 (12 points)



Scoring scheme:

+ Scored per lane (2.0 points/lane)
+ For each lane, both the number of bands and the position of each band must be correct.

Total points: 2.0 points x 6 lanes = **12 points**

Q.1.2 (5 points)

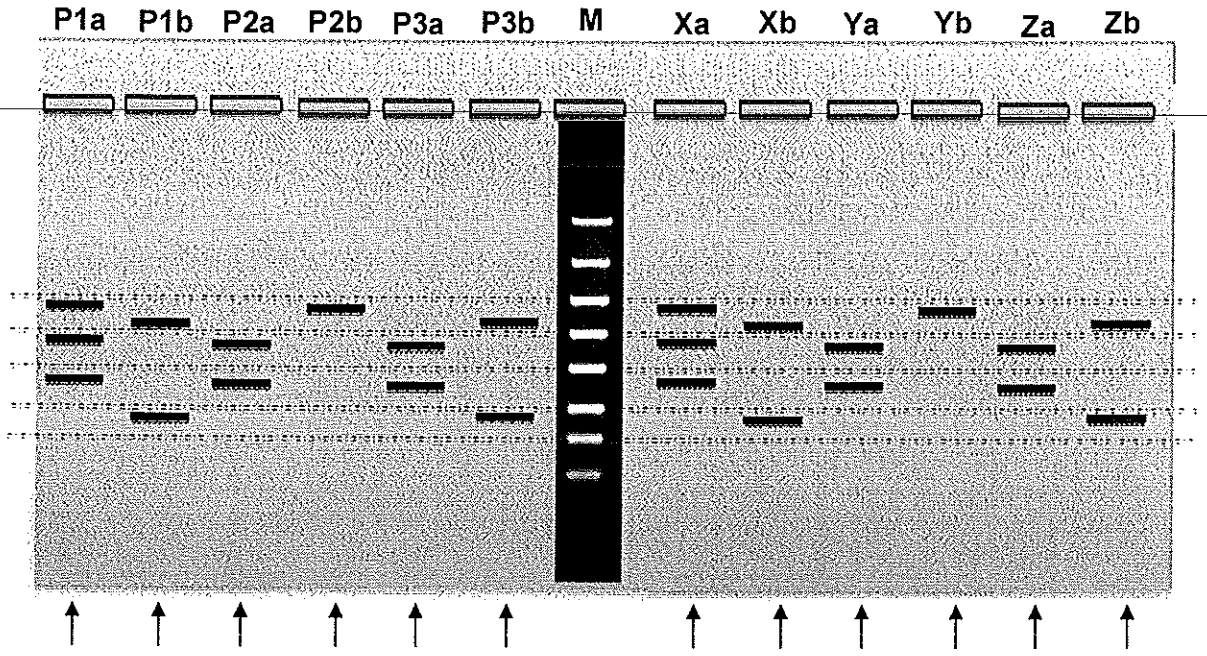
Reagents (in μL)	**NAT2*4 / NAT2*5** (labelled **a**)	**NAT2*4 / NAT2*7** (labelled **b**)
Sterile water (W)	**4.5**	**4.5**
10 x Restriction Buffer (BF)	**1**	**1**
PCR products of genomic DNA (2.0 μg/μL)	**3.5**	**3.5**
RE 1 *(KpnI)*	**1**	**-**
RE 2 *(Bam*HI*)*	**-**	**1**
Total volume (μL)	**10**	**10**

Scoring scheme:

+ Scored per box (cell).
+ **0 points** to the first two correct boxes;
+ **0.5 point** is given for each correct box from the third correct one.

Total points: 0.5 points x 10 boxes = **5 points**

Q.2.1. Drawing of gel (1.5 points x 12 lanes = **18 points)**

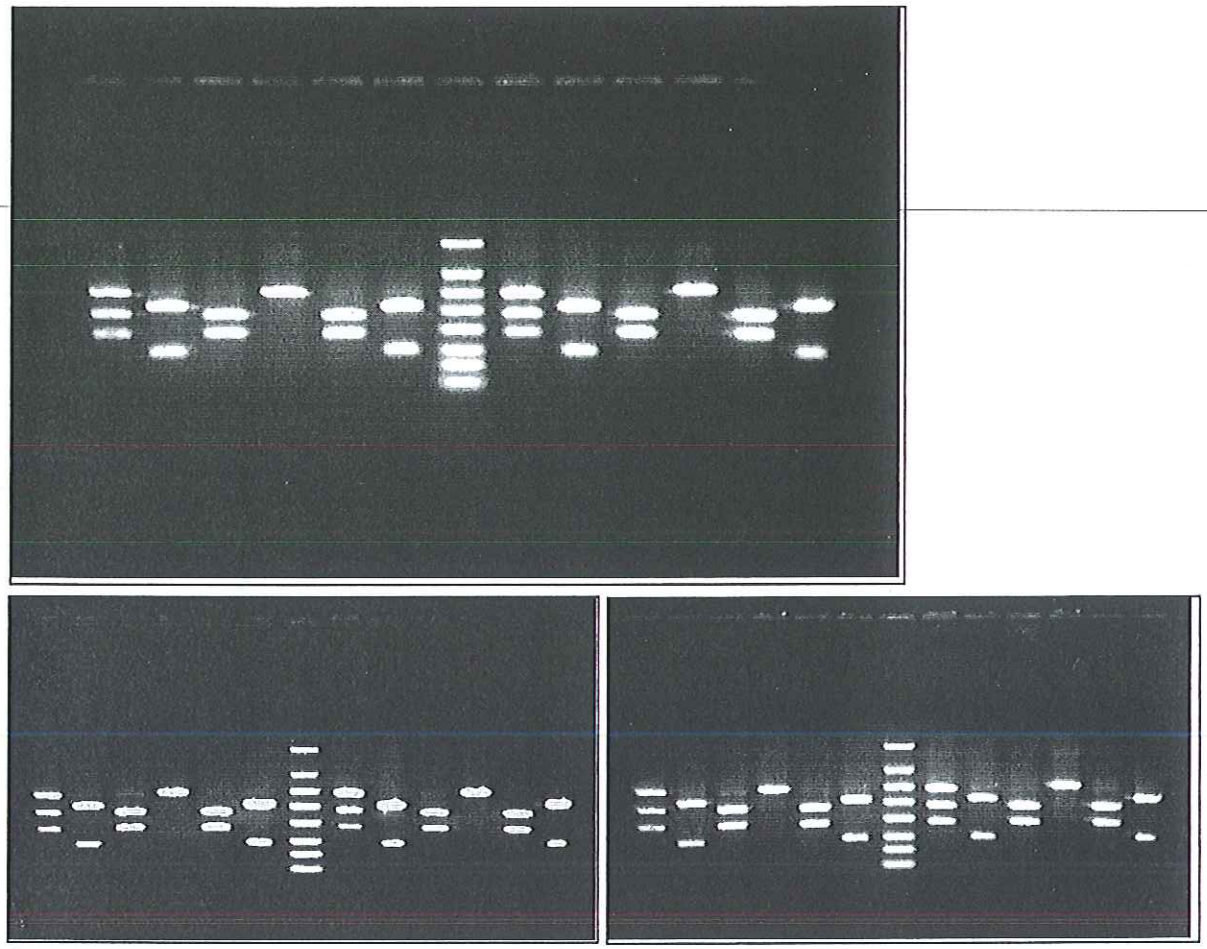


Scoring scheme:

+ Scored per lane (1.5 points/lane)
+ The number of bands and the vertical position of each band must correspond to the photographed gel **(Q.2.2.)** and to the pre-printed ladder (M).

Total points: 1.5 points x 12 lanes = **18 points**

Q.2.2. Photo **(26 points)**



Scoring scheme:

+ Scored per lane (2.0 points/lane)
+ ***For sample lanes:***
  - Complete digestion (*see above*): **2.0** points
  - Partial digestion or Missed bands: **1.0** points
  - Un-digestion or Unspecific bands: **0.5** points
  - No band (unloading sample): **0.0** points
+ ***For the ladder (M) lane:***
  - Apparently (8) separate bands (*see above*): **2.0** points
  - Loading in wrong positions (with separate bands): **1.0** points
  - Missed band(s) or fused band(s): **0.5** points
  - No band (unloading sample): **0.0** points

Total points: 2.0 points x 13 lanes = **26 points**

Q.3.1. (9 points)

Patients	Biopsy specimens (X, Y or Z)
P1	..... **X** .....
P2	..... **Y** .....
P3	..... **Z** .....

Scoring scheme:

+ Scored per matching (3.0 points/correct matching)
+ Must be evidenced by the gel image (**Q.2.1** or **Q.2.2**)

Total score: 3 points x 3 correct matches = **9 points**

Q.4.1. (9 points)

Patients	Genotype at C481T	Genotype at G590A	Genotype at G857A
P1	**C / T**	G/G	**G / G**
P2	**C / C**	G/A	**A / A**
P3	**C / C**	G/G	**G / G**

Scoring scheme:

+ Scored per box (1.5 points/box)
+ Must be evidenced by the gel image (**Q.2.1** or **Q.2.2**)

Total score: 1.5 points x 6 correct boxes = **9 points**

Q.4.2. (3 points)

Patients	Slow acetylator	Intermediate acetylator	Rapid acetylator
P1		✓	
P2	✓		
P3			✓

Scoring scheme:

+ Scored per matching; 1.0 point/correct match
+ Must correspond to the genotypes in **Q.4.1**

Total score: 1.0 points x 3 patients = **3 points**

Q.5.1. (6 points)

Patients	INH concentration (mg/L)
P1	.....**4.548**.....
P2	.....**6.821**.....
P3	.....**2.275**.....

Scoring scheme:

+ Scored per box (2.0 points/box)
+ 1.0 points penalty for each number not presented to 3 decimal digits.
+ Must correspond to the phenotypes in **Q.4.2**

Total score: 2.0 points x 3 correct determinants = **6 points**

Q.5.2. (12 points)

Patients	Oral dosage (number of tablets per day)
P1	.....**2 or 3**.....
P2	.....**2**.....
P3	.....**4**.....

Scoring scheme:

+ Scored per box (4.0 points/box)
+ 2.0 points penalty for each number not presented in integer.
+ Must correspond to the INH concentration in **Q.5.1**

Total score: 4.0 points x 3 correct determinants = **12 points**

---------- END OF ANSWER KEYS & SCORING SCHEME ----------