

# **External Quality Assessment Exercise**

**2003**



**Antibiotic Resistance Surveillance & Control in the  
Mediterranean Region (ARMed)**



**European Antimicrobial Resistance Surveillance System  
(EARSS)**

**in association with United Kingdom National External Quality  
Assessment Scheme (UK NEQAS) for Microbiology**

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## Introduction and Summary

Since the year 2000, EARSS has been organising external quality assessment (EQA) exercises of antibiotic susceptibility testing in collaboration with UK NEQAS (United Kingdom National External Quality Assessment Scheme) for Microbiology, Centre National de Référence des Antibiotiques (CRAB) and the members of the EQA committee. In 2003 ARMed, through its link with EARSS, participated in this EQA. In this document the results of the EQA exercise of the ARMed participating laboratories are presented. The goal of these EQA exercises are to assess the comparability of susceptibility test results, as collected according to the ARMed-EARSS protocol across countries and guidelines, validating the comparison and pooling of antibiotic susceptibility data from laboratories of 6 countries in the Euro-Mediterranean region.

Table 1 displays the characteristics of the 6 strains that were provided by the 'French Reference Center for Antibiotics-Institut Pasteur' and the Canisius Wilhelmina Hospital, Nijmegen, The Netherlands. The strains were characterised and tested by two reference laboratories in France and The Netherlands and by two laboratories in the United Kingdom appointed by UK-NEQAS. Each reference laboratory interpreted the results according to its own breakpoint criteria: CA-SFM, CRG/NCCLS, and BSAC. The reference laboratories agreed upon the designated interpretation (DI) as given in Table 1.

The strains were distributed to 29 laboratories participating in ARMed-EARSS by UK-NEQAS through the ARMed co-ordinators and the laboratories were asked to report clinical susceptibility categorisation (S, I, R). Results were analysed and considered 'concordant' if the reported categorisation agreed with the designated interpretation of the reference laboratories. In Table 2 the proportion of participating laboratories returning reports specified per country is shown. The overall response rate was 89%, which is high considering that this was the first year of ARMed network.

The usage of guidelines by number of laboratories per country is displayed in Table 3. The majority of laboratories used NCCLS guidelines; 76%.

Of the reported methods used for the detection of antimicrobial susceptibility, Etest was used in 17 laboratory (65%) and 7 laboratories (27%) used automated systems. Four laboratories use both the automated systems and the Etest.

For the fully susceptible *S. aureus* (U2A166), the overall concordance was 100% for species identification and for most of the antibiotics tested. Lower concordance was found for ceftazidime (94%), erythromycin (88%), penicillin (85%) and ciprofloxacin (79%) (Table 4). For the methicillin heteroresistant *S. aureus* (MRSA) (U2A1786), known from outbreaks, a low

concordance for oxacillin (69%) and ceftazidime (50%) was reported, but the concordance for gentamicin, vancomycin, teicoplanin, penicillin and ciprofloxacin was  $\geq 92\%$  (Table 5).

One of the *S. pneumoniae* (U2A961) strains was erythromycin resistant, which was correctly detected by 92% of laboratories (Table 6). The other *S. pneumoniae* (U2A1787) was intermediately resistant to penicillin, which was correctly detected by only 56% of the laboratories (Table 7). The designated interpretation for oxacillin susceptibility of *S. pneumoniae* U2A1787 was changed from intermediate (I) to intermediate and resistant (IR), which resulted in an overall concordance of 88%.

The ESBL production of the *E. coli* (U2A1789) strain was correctly identified by 90% of the laboratories (Table 8). The *vanC* resistant enterococcus (U2A604) was correctly identified as *E. gallinarum*, by only 23% of laboratories, but 69% (I=46%/R=23%) of the laboratories found the reduced susceptibility to vancomycin and susceptibility to teicoplanin, which is typical for this type of resistance (Table 9).

This first ARMed-EARSS EQA exercise showed that, overall, laboratories participating in ARMed-EARSS are capable of delivering susceptibility data of good quality. However, 23% of laboratories failed to detect penicillin non-susceptibility in *S. pneumoniae*. Moreover, 31% of laboratories missed detection of an MRSA that caused epidemics in Europe. This strain is difficult to detect since the resistance phenotype is heterogeneously expressed and maybe this property even contributes to its spread. The results illustrate that there is room for improvement in routine susceptibility testing.

Since this was the first time that ARMed distributed EQA strains, we encountered some difficulties in releasing the strains from customs in some countries. Due to this fact, the strains were received by some labs either very close to the deadline set by UK NEQAS or even after this deadline. This brought to the fact that the intended results were already published on the UK NEQAS web page before the results of the EQA of some laboratories were sent to the coordinators. For the next EQA exercise, we will try to get the strains delivered earlier and send out prior correspondence to each country project leader to facilitate customs clearance.

### **Acknowledgements**

ARMed MB would like to thank the EARSS MT together with the EARSS Advisory board and UK NEQAS for organising and carrying out the first ARMed EQA exercise, the country project leaders for the distribution of the strains, and all the participating laboratories for the very good response rate. We would also like to thank the members of the EARSS EQA committee for their important contribution to this EQA exercise.

**Table 1.** Reference laboratory results: MICs, and susceptibility as determined by the reference laboratories (designated interpretation)

|   | MICs (mg/L) | Designated Interpretation |
|---|-------------|---------------------------|
| Specimen U2A 166 <i>S. aureus</i> (wild-type)       |             |                           |
| Oxacillin   | 0.25-0.5    | S                         |
| Methicillin   | NT          | S                         |
| Gentamicin  | ≤0.38       | S                         |
| Erythromycin  | 0.19-0.5    | S                         |
| Tetracycline  | 0.25-0.5    | S                         |
| Rifampicin  | <0.016      | S                         |
| Vancomycin  | 1-2         | S                         |
| Teicoplanin   | 0.25-1      | S                         |
| Penicillin  | 0.016-0.064 | S                         |
| Ciprofloxacin                                       | 0.75-1      | S                         |
| Cefoxitin   | 1-1.5       | S                         |
| Specimen U2A 1786 <i>S. aureus</i> (mec A positive) |             |                           |
| Oxacillin   | 2-4         | R                         |
| Methicillin   | NT          | R                         |
| Gentamicin  | 0.12-0.5    | S                         |
| Erythromycin  | >128        | R                         |
| Tetracycline  | 0.25-1      | S                         |
| Rifampicin  | ≤0.016      | S                         |
| Vancomycin  | 1-2         | S                         |
| Teicoplanin   | 0.25-2      | S                         |
| Penicillin  | 6-64        | R                         |
| Ciprofloxacin                                       | ≥16         | R                         |
| Cefoxitin   | 4-12        | R                         |
| Specimen U2A 961 <i>S. pneumoniae</i>               |             |                           |
| Oxacillin   | 0.064       | S                         |
| Penicillin-G  | ≤0.016      | S                         |
| Ceftriaxone   | 0.016       | S                         |
| Cefotaxime  | 0.016       | S                         |
| Ciprofloxacin                                       | 0.75-1      | S                         |
| Erythromycin  | 8-16        | R                         |
| Clindamycin   | 0.125-0.5   | S                         |

**Table 1 (continued).** Reference laboratory results: MICs, and susceptibility as determined by the reference laboratories (designated interpretation)

|   | MICs (mg/L) | Designated Interpretation |
|---|-------------|---------------------------|
| Specimen U2A 1787 <i>S. pneumoniae</i>                  |             |                           |
| Oxacillin   | 2           | IR                        |
| Penicillin-G  | 0.25        | I                         |
| Ceftriaxone   | 0.047-0.125 | S                         |
| Cefotaxime  | 0.016-0.064 | S                         |
| Ciprofloxacin   | 0.38-1      | S                         |
| Erythromycin  | 0.064-0.125 | S                         |
| Clindamycin   | 0.125-0.38  | S                         |
| Specimen U2A 1789 <i>E. coli</i>                        |             |                           |
| Amoxicillin   | NT          | R                         |
| Ampicillin  | >256        | R                         |
| Gentamicin  | 1           | S                         |
| Tobramycin  | 12-16       | R                         |
| Ciprofloxacin   | 0.006-0.016 | S                         |
| Cefotaxime  | ≥16         | IR                        |
| Ceftriaxone   | ≥12         | IR                        |
| Ceftazidime   | >256        | R                         |
| Piperacillin  | >256        | R                         |
| Piperacillin/Tazobactam                                 | 2           | S                         |
| ESBL  |             | positive                  |
| Specimen U2A 604 <i>E. gallinarium</i> (van C positive) |             |                           |
| Amoxicillin   | NT          | S                         |
| Ampicillin  | 0.5-2       | S                         |
| Vancomycin  | 12          | I                         |
| Gentamicin  | 6           | S                         |
| Teicoplanin   | 0.5-1       | S                         |

**Table 2.** Proportion of participating laboratories returning reports specified per country

| Country      | Number of QA samples sent | Number of returning reports | Percentage returned reports |
|--------------|---------------------------|-----------------------------|-----------------------------|
| Cyprus (CY)  | 1                         | 1                           | 100%                        |
| Egypt (EG)   | 5                         | 5                           | 100%                        |
| Jordan (JO)  | 5                         | 3                           | 60%                         |
| Morocco (MA) | 2                         | 1                           | 50%                         |
| Tunisia (TN) | 4                         | 4                           | 100%                        |
| Turkey (TR)  | 12                        | 12                          | 100%                        |
| Total        | 29                        | 26                          | 89%                         |

**Table 3.** The Usage of guidelines by number of Laboratories per country

| Country | Guideline |       |         | Total |
|---------|-----------|-------|---------|-------|
|         | CA-SFM    | NCCLS | Missing |       |
| MA      |           | 1     | 1       | 2     |
| CY      |           | 1     |         | 1     |
| EG      |           | 5     |         | 5     |
| JO      |           | 2     | 3       | 5     |
| TN      | 3         | 1     |         | 4     |
| TR      |           | 12    |         | 12    |
| Total   | 3         | 22    | 4       | 29    |

**Table 4.** Detection of antimicrobial susceptibility in *S. aureus* U2A 166 by country

| Country | Species identification |         | Oxacillin (DI**=S) |         | Gentamicin (DI=S) |         | Erythromycin (DI=S) |         | Tetracycline (DI=S) |         | Rifampin (DI=S) |         |
|---------|------------------------|---------|--------------------|---------|-------------------|---------|---------------------|---------|---------------------|---------|-----------------|---------|
|         | n*                     | correct | n                  | correct | n                 | correct | n                   | correct | n                   | correct | n               | correct |
| MA      | 1                      | 100%    | 1                  | 100%    | 1                 | 100%    | 1                   | 100%    | 1                   | 100%    | 1               | 100%    |
| CY      | 1                      | 100%    | 1                  | 100%    | 1                 | 100%    | 1                   | 100%    | 1                   | 100%    | 1               | 100%    |
| EG      | 5                      | 100%    | 5                  | 100%    | 5                 | 100%    | 5                   | 40%     | 4                   | 100%    | 5               | 100%    |
| JO      | 3                      | 100%    | 2                  | 100%    | 3                 | 100%    | 3                   | 100%    | 3                   | 100%    | 3               | 100%    |
| TN      | 4                      | 100%    | 4                  | 100%    | 4                 | 100%    | 4                   | 100%    | 4                   | 100%    | 4               | 100%    |
| TR      | 12                     | 100%    | 12                 | 100%    | 12                | 100%    | 12                  | 100%    | 12                  | 100%    | 12              | 100%    |
| Total   | 26                     | 100%    | 25                 | 100%    | 26                | 100%    | 26                  | 88%     | 25                  | 100%    | 26              | 100%    |

\* Number of laboratories performing the test, \*\* DI= designated interpretation of the reference laboratories

**Table 4 (continued).** Detection of antimicrobial susceptibility in *S. aureus* U2A 166 by country

| Country | Vancomycin (DI**=S) |         | Teicoplanin (DI=S) |         | Penicillin (DI=S) |         | Ciprofloxacin (DI=S) |         | Cefoxitin (DI=S) |         |
|---------|---------------------|---------|--------------------|---------|-------------------|---------|----------------------|---------|------------------|---------|
|         | n*                  | correct | n                  | correct | n                 | correct | n                    | correct | n                | correct |
| MA      | 1                   | 100%    | 1                  | 100%    | 1                 | 100%    | 1                    | 100%    | 1                | 100%    |
| CY      | 1                   | 100%    |                    |         | 1                 | 100%    | 1                    | 0%      |                  |         |
| EG      | 5                   | 100%    |                    |         | 5                 | 60%     | 5                    | 60%     | 3                | 100%    |
| JO      | 3                   | 100%    | 3                  | 100%    | 3                 | 100%    | 3                    | 67%     | 3                | 100%    |
| TN      | 4                   | 100%    | 4                  | 100%    | 4                 | 100%    | 3                    | 67%     | 4                | 100%    |
| TR      | 12                  | 100%    | 12                 | 100%    | 12                | 83%     | 11                   | 100%    | 6                | 83%     |
| Total   | 26                  | 100%    | 20                 | 100%    | 26                | 85%     | 24                   | 79%     | 17               | 94%     |

\* Number of laboratories performing the test, \*\* DI= designated interpretation of the reference laboratories

**Table 5.** Detection of antimicrobial susceptibility in *S. aureus* U2A 1786 by country

| Country | Species identification |         | Oxacillin (DI**=R) |         | Gentamicin (DI=S) |         | Erythromycin (DI=R) |         | Tetracycline (DI=S) |         | Rifampin (DI=S) |         |
|---------|------------------------|---------|--------------------|---------|-------------------|---------|---------------------|---------|---------------------|---------|-----------------|---------|
|         | n*                     | correct | n                  | correct | n                 | correct | n                   | correct | n                   | correct | n               | correct |
| MA      | 1                      | 100%    | 1                  | 100%    | 1                 | 100%    | 1                   | 100%    | 1                   | 100%    | 1               | 100%    |
| CY      | 1                      | 100%    | 1                  | 0%      | 1                 | 100%    | 1                   | 100%    | 1                   | 100%    | 1               | 100%    |
| EG      | 5                      | 100%    | 5                  | 100%    | 5                 | 80%     | 5                   | 100%    | 4                   | 75%     | 5               | 100%    |
| JO      | 3                      | 100%    | 3                  | 33%     | 3                 | 67%     | 3                   | 100%    | 3                   | 100%    | 3               | 100%    |
| TN      | 4                      | 100%    | 4                  | 100%    | 4                 | 100%    | 4                   | 75%     | 4                   | 100%    | 4               | 75%     |
| TR      | 12                     | 100%    | 12                 | 58%     | 12                | 100%    | 12                  | 100%    | 12                  | 83%     | 12              | 100%    |
| Total   | 26                     | 100%    | 26                 | 69%     | 26                | 92%     | 26                  | 96%     | 25                  | 88%     | 26              | 96%     |

\* Number of laboratories performing the test, \*\* DI= designated interpretation of the reference laboratories

**Table 5 (continued).** Detection of antimicrobial susceptibility in *S. aureus* U2A 1786 by country

| Country | Vancomycin (DI**=S) |         | Teicoplanin (DI=S) |         | Penicillin (DI=R) |         | Ciprofloxacin (DI=R) |         | Cefoxitin (DI=R) |         |
|---------|---------------------|---------|--------------------|---------|-------------------|---------|----------------------|---------|------------------|---------|
|         | n*                  | correct | n                  | correct | n                 | correct | n                    | correct | n                | correct |
| MA      | 1                   | 100%    | 1                  | 100%    | 1                 | 100%    | 1                    | 100%    | 1                | 100%    |
| CY      | 1                   | 100%    |                    |         | 1                 | 100%    | 1                    | 100%    |                  |         |
| EG      | 5                   | 100%    |                    |         | 5                 | 100%    | 5                    | 100%    | 3                | 0%      |
| JO      | 3                   | 100%    | 3                  | 100%    | 3                 | 100%    | 3                    | 100%    | 3                | 33%     |
| TN      | 4                   | 100%    | 4                  | 100%    | 4                 | 100%    | 4                    | 100%    | 4                | 100%    |
| TR      | 12                  | 100%    | 12                 | 92%     | 12                | 100%    | 11                   | 100%    | 7                | 43%     |
| Total   | 26                  | 100%    | 20                 | 95%     | 26                | 100%    | 25                   | 100%    | 18               | 50%     |

\* Number of laboratories performing the test, \*\* DI= designated interpretation of the reference laboratories

**Table 6.** Detection of antimicrobial susceptibility in *S. pneumoniae* U2A 961 by country

| Country | Species identification |         | Oxacillin (DI**=S) |         | Penicillin-G (DI=S) |         | Ceftriaxone (DI=S) |         | Cefotaxime (DI=S) |         | Ciprofloxacin (DI=S) |         | Erythromycin (DI=R) |         | Clindamycin (DI=S) |         |
|---------|------------------------|---------|--------------------|---------|---------------------|---------|--------------------|---------|-------------------|---------|----------------------|---------|---------------------|---------|--------------------|---------|
|         | n*                     | correct | n                  | correct | n                   | correct | n                  | correct | n                 | correct | n                    | correct | n                   | correct | n                  | correct |
| MA      | 1                      | 100%    | 1                  | 100%    | 1                   | 100%    | 1                  | 100%    | 1                 | 100%    | 1                    | 100%    | 1                   | 100%    | 1                  | 100%    |
| CY      | 1                      | 100%    | 1                  | 100%    | 1                   | 100%    | 1                  | 100%    | 1                 | 100%    | 1                    | 100%    | 1                   | 100%    | 1                  | 100%    |
| EG      | 5                      | 100%    | 5                  | 100%    | 5                   | 100%    | 5                  | 100%    | 3                 | 100%    | 5                    | 80%     | 5                   | 80%     | 3                  | 100%    |
| JO      | 3                      | 100%    | 3                  | 100%    | 3                   | 100%    | 3                  | 100%    | 3                 | 100%    | 3                    | 100%    | 3                   | 100%    | 3                  | 100%    |
| TN      | 4                      | 100%    | 4                  | 100%    | 4                   | 100%    | 4                  | 100%    | 4                 | 100%    | 4                    | 100%    | 4                   | 100%    | 4                  | 100%    |
| TR      | 12                     | 92%     | 12                 | 100%    | 12                  | 100%    | 6                  | 100%    | 6                 | 100%    | 12                   | 83%     | 12                  | 92%     | 11                 | 100%    |
| Total   | 26                     | 96%     | 26                 | 100%    | 26                  | 100%    | 15                 | 100%    | 17                | 100%    | 26                   | 88%     | 26                  | 92%     | 23                 | 100%    |

\* Number of laboratories performing the test, \*\* DI= designated interpretation of the reference laboratories

**Table 7.** Detection of antimicrobial susceptibility in *S. pneumoniae* U2A 1787 by country

| Country | Species identification |         | Oxacillin (DI**=IR) |         | Penicillin-G (DI=I) |         | Ceftriaxone (DI=S) |         | Cefotaxime (DI=S) |         | Ciprofloxacin (DI=S) |         | Erythromycin (DI=S) |         | Clindamycin (DI=S) |         |
|---------|------------------------|---------|---------------------|---------|---------------------|---------|--------------------|---------|-------------------|---------|----------------------|---------|---------------------|---------|--------------------|---------|
|         | n*                     | correct | n                   | correct | n                   | correct | n                  | correct | n                 | correct | n                    | correct | n                   | correct | n                  | correct |
| MA      | 1                      | 100%    | 1                   | 100%    | 1                   | 100%    |                    |         | 1                 | 100%    | 1                    | 100%    | 1                   | 100%    | 1                  | 100%    |
| CY      | 1                      | 100%    | 1                   | 100%    | 1                   | 0%      | 1                  | 100%    |                   |         | 1                    | 100%    | 1                   | 100%    | 1                  | 100%    |
| EG      | 5                      | 100%    | 5                   | 100%    | 5                   | 0%      | 5                  | 100%    | 3                 | 100%    | 5                    | 80%     | 5                   | 60%     | 3                  | 100%    |
| JO      | 3                      | 100%    | 3                   | 67%     | 3                   | 33%     | 3                  | 100%    | 3                 | 100%    | 3                    | 100%    | 3                   | 100%    | 3                  | 100%    |
| TN      | 4                      | 100%    | 3                   | 33%     | 4                   | 100%    |                    |         | 4                 | 75%     | 4                    | 100%    | 4                   | 100%    | 4                  | 100%    |
| TR      | 12                     | 100%    | 12                  | 100%    | 11                  | 73%     | 5                  | 80%     | 9                 | 100%    | 12                   | 100%    | 12                  | 100%    | 11                 | 100%    |
| Total   | 26                     | 100%    | 25                  | 88%     | 25                  | 56%     | 14                 | 93%     | 20                | 95%     | 26                   | 96%     | 26                  | 92%     | 23                 | 100%    |

\* Number of laboratories performing the test, \*\* DI= designated interpretation of the reference laboratories

**Table 8.** Detection of antimicrobial susceptibility in *E. coli* U2A 1789 by country

| Country | Species identification |         | Ampicillin (DI**=R) |         | Gentamicin (DI=S) |         | Tobramycin (DI=R) |         | Ciprofloxacin (DI=S) |         | Cefotaxime (DI=IR) |         |
|---------|------------------------|---------|---------------------|---------|-------------------|---------|-------------------|---------|----------------------|---------|--------------------|---------|
|         | n*                     | correct | n                   | correct | n                 | correct | n                 | correct | n                    | correct | n                  | correct |
| MA      | 1                      | 100%    | 1                   | 100%    | 1                 | 100%    | 1                 | 0%      | 1                    | 100%    | 1                  | 100%    |
| CY      | 1                      | 100%    | 1                   | 100%    | 1                 | 100%    | 1                 | 100%    | 1                    | 100%    |                    |         |
| EG      | 5                      | 100%    | 5                   | 100%    | 5                 | 100%    | 4                 | 100%    | 5                    | 100%    | 5                  | 60%     |
| JO      | 3                      | 100%    | 3                   | 100%    | 3                 | 100%    | 2                 | 100%    | 3                    | 100%    | 3                  | 33%     |
| TN      | 4                      | 100%    | 2                   | 100%    | 4                 | 100%    | 4                 | 100%    | 4                    | 100%    | 4                  | 100%    |
| TR      | 12                     | 100%    | 12                  | 100%    | 12                | 100%    | 11                | 73%     | 12                   | 100%    | 8                  | 75%     |
| Total   | 26                     | 100%    | 24                  | 100%    | 26                | 100%    | 23                | 83%     | 26                   | 100%    | 21                 | 71%     |

\* Number of laboratories performing the test, \*\* DI= designated interpretation of the reference laboratories

**Table 8 (continued).** Detection of antimicrobial susceptibility in *E. coli* U2A 1789 by country

| Country | Ceftriaxone (DI**=IR) |         | Ceftazidime (DI=R) |         | Piperacillin (DI=R) |         | Pip-Taz (DI=S) |         | ESBL (DI=positive) |         |
|---------|-----------------------|---------|--------------------|---------|---------------------|---------|----------------|---------|--------------------|---------|
|         | n*                    | correct | n                  | correct | n                   | correct | n              | correct | n                  | correct |
| MA      |                       |         | 1                  | 100%    |                     |         |                |         | 1                  | 100%    |
| CY      | 1                     | 100%    | 1                  | 100%    | 1                   | 100%    | 1              | 100%    | 1                  | 100%    |
| EG      | 5                     | 100%    | 4                  | 100%    | 4                   | 100%    | 1              | 100%    |                    |         |
| JO      | 2                     | 50%     | 3                  | 67%     | 3                   | 67%     | 3              | 67%     | 3                  | 100%    |
| TN      | 2                     | 100%    | 4                  | 100%    | 4                   | 75%     | 2              | 50%     | 4                  | 100%    |
| TR      | 8                     | 88%     | 12                 | 83%     | 6                   | 83%     | 10             | 80%     | 11                 | 82%     |
| Total   | 18                    | 89%     | 25                 | 88%     | 18                  | 83%     | 17             | 76%     | 20                 | 90%     |

\* Number of laboratories performing the test, \*\* DI= designated interpretation of the reference laboratories

**Table 9.** Detection of antimicrobial susceptibility in *E. gallinarium* U2A604 by country

| Country | Species identification |         | Ampicillin (DI**=S) |         | Amoxicillin (DI=S) |         | Vancomycin (DI=I) |         | Gentamicin (DI=S) |         | Teicoplanin (DI=S) |         |
|---------|------------------------|---------|---------------------|---------|--------------------|---------|-------------------|---------|-------------------|---------|--------------------|---------|
|         | n*                     | correct | n                   | correct | n                  | correct | n                 | correct | n                 | correct | n                  | correct |
| MA      | 1                      | 100%    | 1                   | 100%    | 1                  | 100%    | 1                 | 100%    | 1                 | 100%    | 1                  | 100%    |
| CY      | 1                      | 100%    | 1                   | 100%    |                    |         | 1                 | 0%      | 1                 | 100%    |                    |         |
| EG      | 5                      | 0%      | 5                   | 100%    | 5                  | 100%    | 5                 | 60%     | 5                 | 100%    |                    |         |
| JO      | 3                      | 33%     | 3                   | 100%    |                    |         | 3                 | 0%      | 3                 | 67%     | 3                  | 100%    |
| TN      | 4                      | 50%     | 3                   | 100%    | 2                  | 100%    | 4                 | 75%     | 4                 | 100%    | 4                  | 100%    |
| TR      | 12                     | 8%      | 11                  | 91%     | 2                  | 100%    | 12                | 42%     | 12                | 100%    | 12                 | 92%     |
| Total   | 26                     | 23%     | 24                  | 96%     | 10                 | 100%    | 26                | 46%     | 26                | 96%     | 20                 | 95%     |

\* Number of laboratories performing the test, \*\* DI= designated interpretation of the reference laboratories