EQAS
EXTERNAL QUALITY ASSESSMENT SCHEME
ASSOCIAZIONE ITALIANA NEUROIMMUNOLOGIA

NINA
Network Italiano Neurologia Autoimmune

AINI EQAS 2023

FINAL REPORT

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ON BEHALF OF THE AINI SCIENTIFIC BOARD AND NINA SCIENTIFIC BOARD
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Roche

Table of Contents

Introduction

As every year, the Italian Association of Neuroimmunology (AINI), and the Italian Network for the study of Autoimmune Neurology (NINA group) have organized an External Quality Assessment Scheme (EQAS) to promote standardization in neuroimmunology laboratory diagnostics in Italy and in Europe.
In the evolving scenario of the neuroimmunology diagnostics, these schemes are an essential tool to promote self-evaluation, to highlight critical assays, and to identify issues to tackle to improve laboratory diagnostic.
Moreover, the recent rise of interest in many neuroimmunological disorders, mainly driven by the evolution of the therapeutic scenario, has made the standardization and optimization of laboratory diagnostics even more relevant to clinicians.

The results of the current EQAS are not intended as an exam for the participating laboratories, and the comparison with the reference result (the one codified as "sent as.." in the following report) should always be interpreted cautiously, and not necessarily looked at as a "true value".

The results of the current EQAS have been preliminarily presented, as every year, during the annual AINI conference in Palermo, and are now available for consultation on the AINI website not just by the participating laboratories, but also by everybody interested in this area. We believe that the full availability of these data will be relevant to further promote knowledge on this topic, and to help all stakeholders to understand the difficulties related to the laboratory diagnostics in neuroimmunology.

Via email each laboratory will receive the pre-assigned identifying code, that is used throughout this report, thus ensuring the privacy of the results.

We thank in advance all the people that contributed to support and organize the current EQAS, and all the participating laboratories.

We hope that the results presented in this report will be of help to the participating labs, as well as the AINI community.

General Data of AINI EQAS 2023

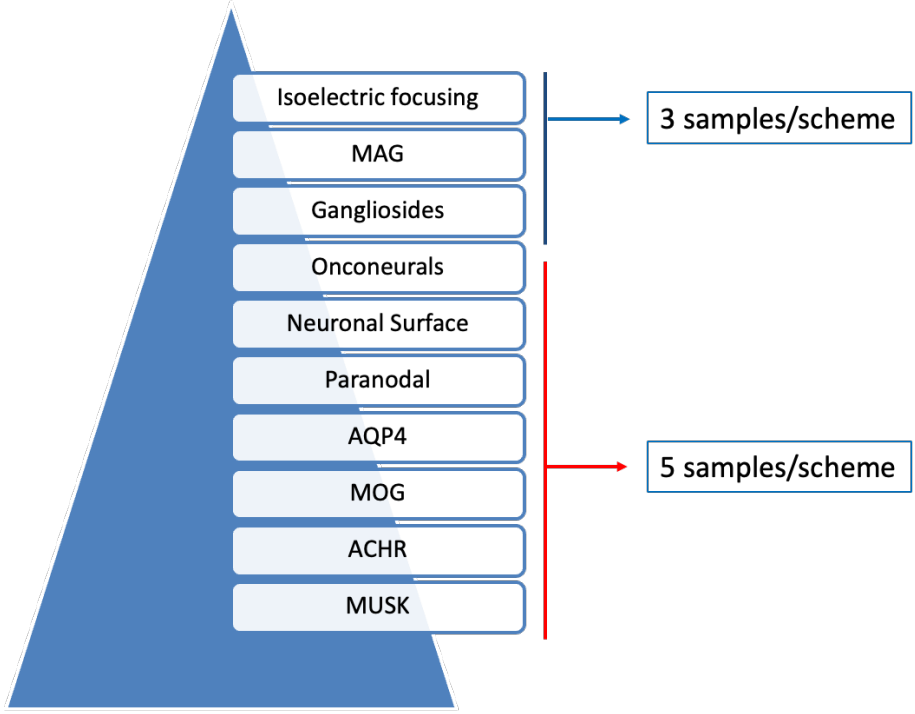
The numbers of the 2023 AINI EQUAS

2022		2023	
43	• Samples	44	• Samples
31	• Centres	47	• Centres
10	• Schemes	10	• Schemes

1140 aliquots shipped

This year the number of schemes, and the consequent number of samples used has remained very similar compared to the previous year. We observed a dramatic increase in the number of participating laboratories from 31 to 47. This has led to the consequent increase of the number of aliquots that had to be prepared and shipped. As you can observe from the picture, this required an immense amount of work, for which we would like to thank again Silvia Scaranzin, Chiara Morandi and Elisabetta Zardini.

The schemes included in the 2023 AINI EQAS



This year we included all the schemes of our previous EQAS, with no substantial modifications. Differently from the last years, we increased the number of samples in specific schemes that represent areas of specific interest, such as the identification of paranodal antibodies and of neuronal surface antibodies.

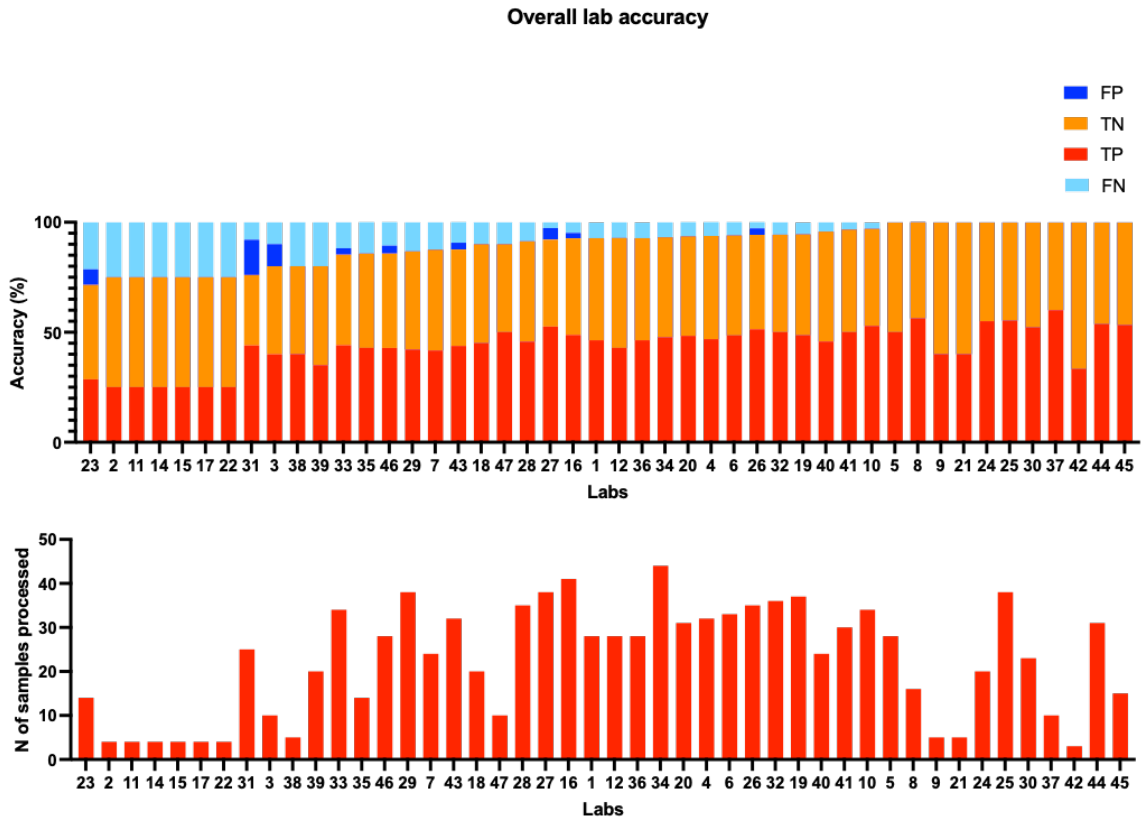
Participants to the AINI EQAS 2023

As in the previous editions, along with a long list of Italian collaborators that have participated to the EQAS for several years, we invited several labs from all around Europe. The contribution of these labs is extremely valuable, as allows our community to compare with some of the most relevant laboratories in the field. Here is a list of the centers participating to the EQAS

Foggia	Azienda Ospedaliero Universitaria OO RR di Foggia, Laboratorio Analisi Centrale,	Michele Falcone
Alessandria	Laboratorio di Autoimmunità Aso	Maria Cristina Sacchi
Bergamo	SC SMeL 2 Analisi chimico cliniche, ASST Papa Giovanni XXIII	Previtali Giulia
Brescia	Laboratorio Autoimmunità, Spedali Civili di Brescia	Emirena Michela Garrafa
Ferrara	LABORATORIO UNICO PROVINCIALE - Laboratorio Analisi Chimico Cliniche e Microbiologia - Azienda Ospedaliero-Universitaria di Ferrara	Sara Ghisellini, Michela Boni
Ferrara	Laboratorio di Neurochimica - Ferrara	Massimiliano Castellazzi
Pescara	UOC Laboratorio analisi cliniche S.Spirito	Gilda Angelini
Sassari	CLINICAL PATHOLOGY LABORATORY	Giovanni Andrea Deiana
Foggia	Laboratorio Analisi Centrale, settore Proteine. Policlinico Riuniti di Foggia	Giorgia Sernia
Merano	-	Christian Petter
Pisa	Laboratorio di Patologia Clinica	Laura Caponi
Innsbruck	Neurological Research Laboratory, Dept. of Neurology, Medical University of Innsbruck	Markus Reindl
-	Synlab Italia srl Autoimmunity	Simonetta Signorini
Gallarate	Laboratorio Analisi P.O. Gallarate. ASST Valle Olona	Pettini Paola, Sferrazzo Annarita
Milano	SSD medicina di Laboratorio SMEL 122, Istituto Besta	Francesca Andreetta
Milano	Laboratorio di Autoimmunità, Ospedale San Raffaele	Stefania Del Rosso
Pisa	Laboratorio di Neurobiologia Clinica e diagnostica Liquor, Ospedale Santa Chiara	Andrea Bacci
Taranto	Patologia Clinica PO SS. Annunziata, via F. Bruno n.1	Tampoia Marilina, Notaristefano Norma
Treviso	Laboratorio ULSS2 Treviso	Silvia Zago
Firenze	laboratorio generale AOU careggi	Tiziana Biagioli
Padova	UOC Medicina di Laboratorio, DIDAS Servizi di Diagnostica Integrata, Azienda Ospedale-Università Padova	Giulia Musso, Nicoletta Gallo
Padova	Euroimmun Laboratory	Piera De Gasperi
Trento	Laboratorio di Diagnostica Molecolare Avanzata (CIBIO-DMA)	Valentina Greco
Modena	Laboratorio di Neuroimmunologia, Ospedale Baggiovara	Roberta Bedin
Monza	Laboratory analysis ASST Monza San Gerardo	Cappellani Adele
Bologna	Laboratorio di Patologia Neuromuscolare e Neuroimmunolgia IRCCS Istituto delle Scienze Neurologiche di Bologna	Maria Pia Giannoccaro
Bologna	Lum AUSL	Gaia De Leonardi
Prato	Laboratorio Analisi, Ospedale di Prato	Annalisa Azzurri
Roma	IRCCS Fondazione Santa Lucia	Giulia Sancesario
Roma	UOC Laboratorio Analisi e Biochimica Clinica Ospedale Sant'andrea di Roma	Vittoria Polidori
Roma	PATOLOGIA CLINICA-OSP. SAN FILIPPO NERI	Laura Cuomo
Bari	Neurochemistry Lab -University of Bari	Maddalena Ruggieri - Antonio Frigeri
Genova	Laboratorio Diagnostico di Autoimmunologia-IRCCS Ospedale Policlinico San Martino	Federica Bozzano
Genova	Laboratorio Liquor, Clinica neurologica, IRCSS San Martino	Davide Visigalli
Lione	Centre de Recherche en Neurosciences de Lyon	Romain Marignier, Anne Ruiz
Vicenza	Laboratorio di Neurobiologia, Ospedale san Bortolo	Luigi Zuliani, De Riva Valentina
Milano	Laboratorio Neuroimmunologia, Ist. Neurologico Besta	Francesca Andreetta
Vienna	Koneczny lab, Division of Neuropathology and Neurochemistry, Department of Neurology, , Medical University of Vienna	Inga Koneczny
Milano	Laboratorio analisi, Ospedale San Raffaele	Stefania Del Rosso
Udine	Laboratory of Autoimmunity - University Hospital of Udine	Martina Fabris
Gallarate	LABORATORIO ANALISI, ASST VALLE OLONA- P.O. GALLARATE	Paola Pettini, Annarita Sferrazzo
Kiel	UKSH Neuroimmunology Kiel/Luebeck	Frank Leypoldt, Jansen
Vienna	Division of Neuropathology and Neurochemistry, Department of Neurology, , Medical University of Vienna	Romana Höftberger
Milano	Laboratorio autoimmunità, Isituto Humanitas	Claudia Giannotta
Milano	Laboratorio Analisi, AOR San Carlo	Teresa Carbone
Catania	Laboratorio Analisi, ARNAS Garibaldi	Maria Elena Di Prossimo
Barcellona	Unità di Neurologia Autoimmune, Hospital San Pau	Cinta Lleixà. Luis Querol
Barcellona	IDIBAPS	Marianna Spatola
Orbassano	SCDO NEUROLOGIA-CENTRO SM- ORBASSANO	SALA ARIANNA
Verona	Neurology and Neuropathology Unit, University of Verona	Sara Mariotto
Verona	Laboratorio Analisi Chimico Cliniche AOUI Verona	Maddalena Marini
Siena	Laboratorio di Neuroimmunologia Clinica UOC Laboratorio di Assistenza e Ricerca Traslazionale - Policlinico Le Scotte	Chiara Cioni
Oxford	Neuroimmunology laboratory, John Radcliffe Hospital	Paddy Waters
Montpellier	Institut de Génomique Fonctionnelle, Montpellier France	Jerome Devaux

Results summary

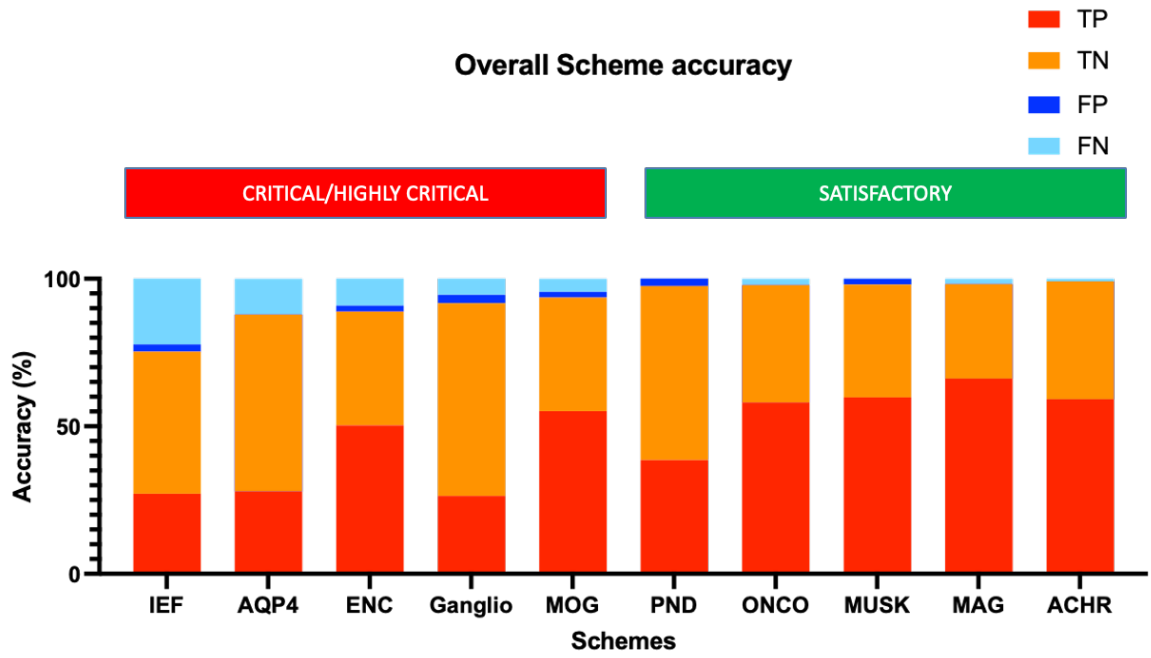
Overall accuracy of the laboratories



Overall accuracy can be estimated according to the % of samples tested that were concordant with the reference result established according to the coordinating lab results, that are here considered as true positives (TP, red) or true negatives (TN, orange). These results are reported in detail for each laboratory.

Accuracy was higher compared to last years' EQAS, and 61.7% of the laboratories had an accuracy >/=90%. Eleven laboratories had a 100% accuracy. Critical results, arbitrarily considered as an accuracy <80%, were obtained in only 8/47 laboratories (17%). The performance of each laboratory should be weighted according to the number of samples processed, that is shown at the bottom of the figure.

Overall accuracy of the schemes



In the graph are represented the performances in the 10 schemes of the EQAS. ENC= Neuronal surface antibodies; PN= paranodal antibodies; GANGLIO= ganglioside antibodies; IEF= isoelectric focusing; ONCO= intracellular neuronal antibodies. We divided schemes as “highly critical”, “critical” and “satisfactory”. Since there is no objective criterion to define a “critical” scheme, we took into consideration both the proportion of discrepant results and the potential impact of inaccurate results in patients’ management.

In tests that have huge clinical implications, such as the AQP4 antibodies, an accuracy below 90% has worrying implications for patient management and should be considered relevant in our opinion. Five schemes were considered as critical (4 of which “highly critical”), including IEF, AQP4, ENC, Ganglio and MOG.

Results for each scheme are summarized below.

Isoelectric focusing (IEF) scheme

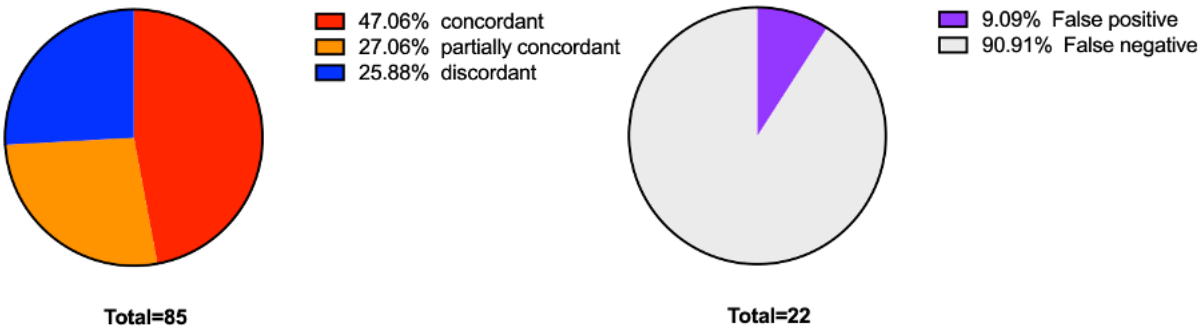
Participants: 22
Samples: 4 sera+4 cerebrospinal fluids (pairs)
Judgment: highly critical

Methods	
Assay	N/total of centres
Home made	5/22 (22.7%)
Commercial kit	11/22 (50%)
Unknown	6/22 (27.3%)

Results

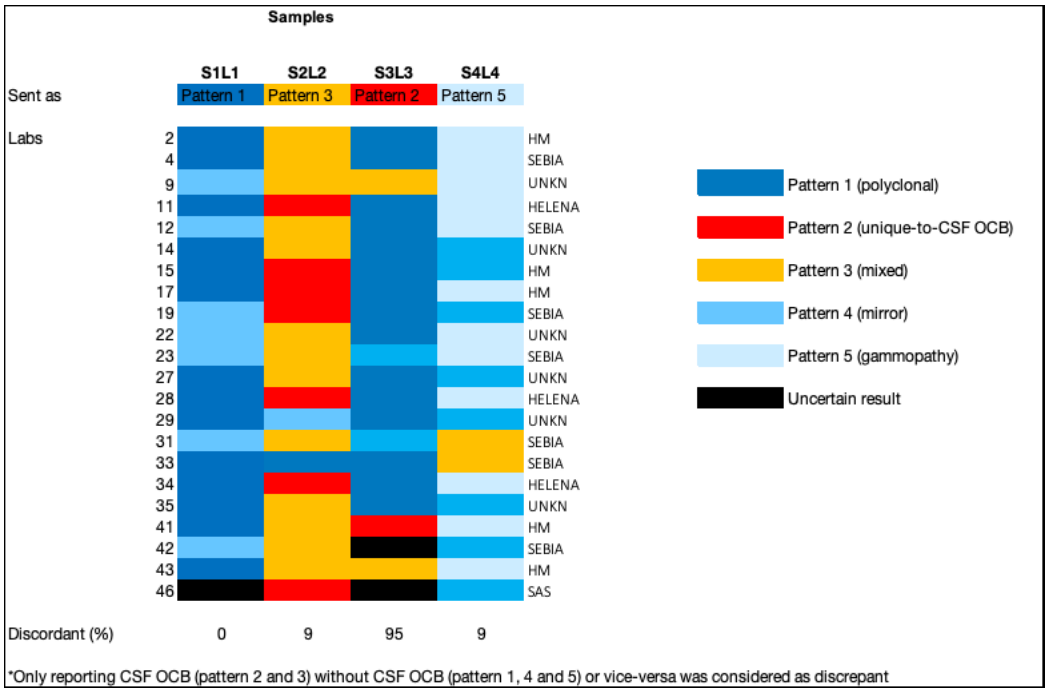
Overall concordance of all tests performed

The graph represents all tests performed within the scheme



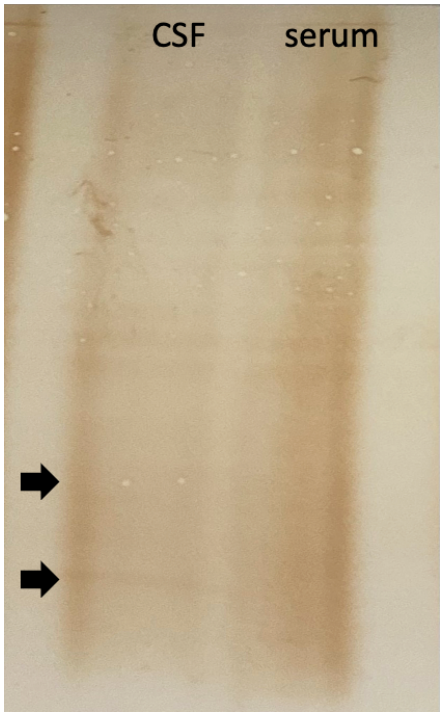
Heatmap

The graph represents the detailed results for each sample



Comments

The overall accuracy was 74.12%, and most inaccurate results could be attributed to false negatives. Only two labs reported no CSF OCB in a sample with mixed pattern (S2L2). Sample S3L3 was highly critical, as it showed faint CSF only banding that was detected only by 3/22 participants. A picture of the IEF run showing the very faint CSF OCBs is reported below.



AQP4 antibodies scheme

Partecipants: 32

Samples: 5 (3 negative, 1 strong positive and 1 low positive; all positive samples were positive on both LCBA and commercial FCBA in the reference laboratory)

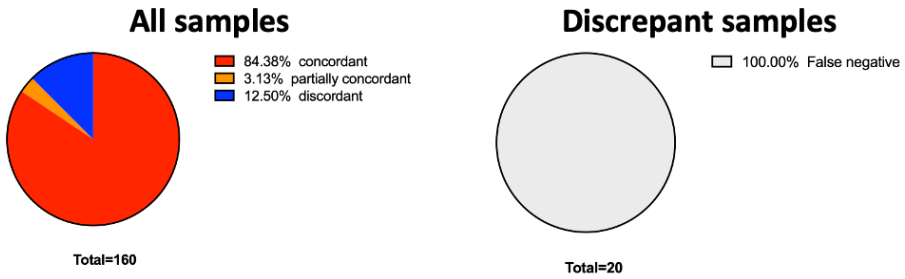
Judgment: highly critical

Methods		
Assay	N of centres	Description
LCBA	3/32 (9.4%)	Live cell based assay with M23 AQP4 isoform; assessment with fluorescent microscope or flow cytometry (in-house)
FCBA	29/32 (90.6%)	commercial fixed CBA

Results

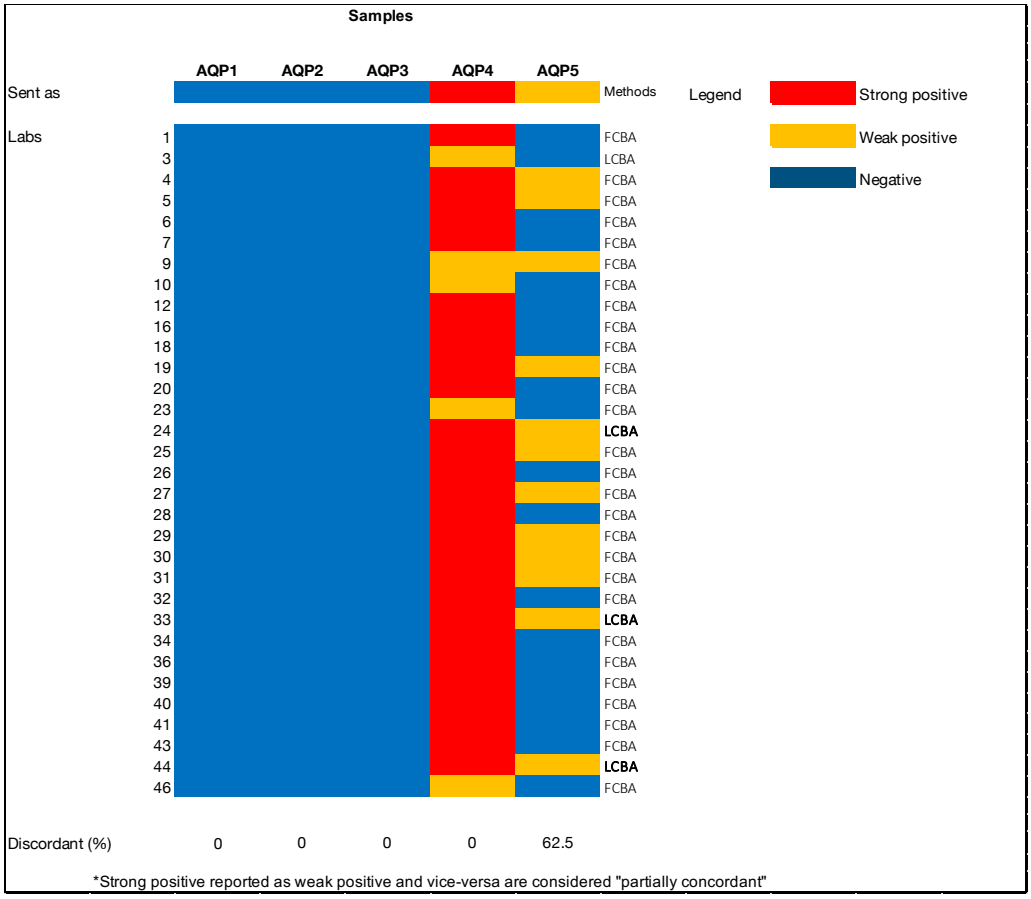
Overall concordance of all tests performed

The graph represents all tests performed within the scheme



Heatmap

The graph represents the detailed results for each sample



Comments

The overall accuracy was 87.51%. However, considering the clinical relevance of AQP4 antibodies detection, the scheme was considered highly critical. All of the discrepant results were due to 20/32 laboratories (62.5%), failing to identify sample AQP5 as a low positive. This sample in the referral laboratory could be identified with both the commercial FCBA and LCBA. Indeed, among the 12 laboratories that reported the sample as “low positive”, 9/12 used a FCBA. Interestingly, 3/4 laboratories using the LCBA properly identified the sample as “low positive”. These results suggests that in routine laboratory practice inaccurate results in AQP4 detection might still be common and, when using CBA, pertain almost exclusively to false negatives. The fact that the positive sample was identified by both FCBA and LCBA suggests that these inaccurate results might not just because of suboptimal tests, but also to difficulties in the results interpretation or (even though unlikely), by pre-analytical or analytical issues. In this scenario, laboratories performing LCBAs are more likely to have a higher expertise and to process a higher amount of samples/year. Caution should be used in reporting as negative the samples from patients with highly suggestive clinical phenotypes, for which a direct discussion with the referring neurologist and sending them to a referral lab would be ideal.

MOG antibodies scheme

Partecipants: 31

Samples: 5 (2 strong positives, 1 low positive, 2 negatives; all positive samples resulted as positive on both LCBA for total IgG, LCBA for IgG1 and FCBA in the referral laboratory)

Judgment: highly critical

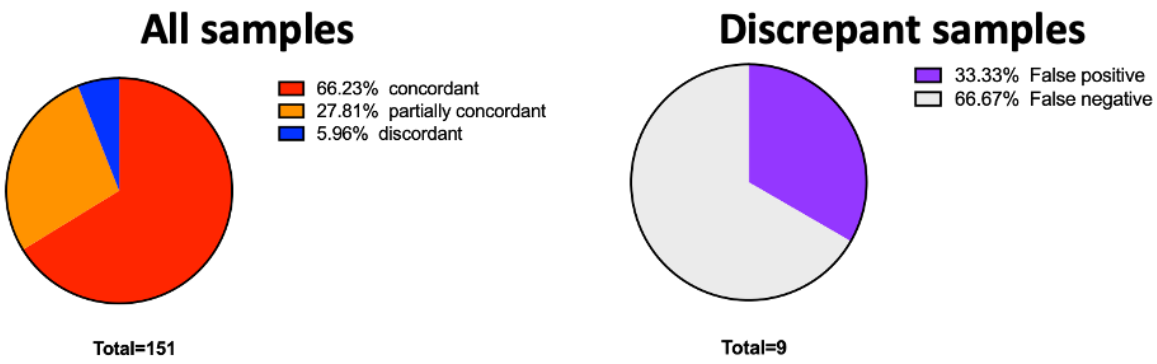
*one lab performed both methods

Methods		
Assay	N of centres	Description
LCBA	5/31 (16.1%)	Live cell based assay with full length human MOG isoform (in-house). One Lab used FACS for interpretation.
FCBA	26/31 (83.9%)	Commercial fixed cell based assay with full length human MOG isoform; anti Fc total IgG human secondary ab; assessment with fluorescent microscope

Results

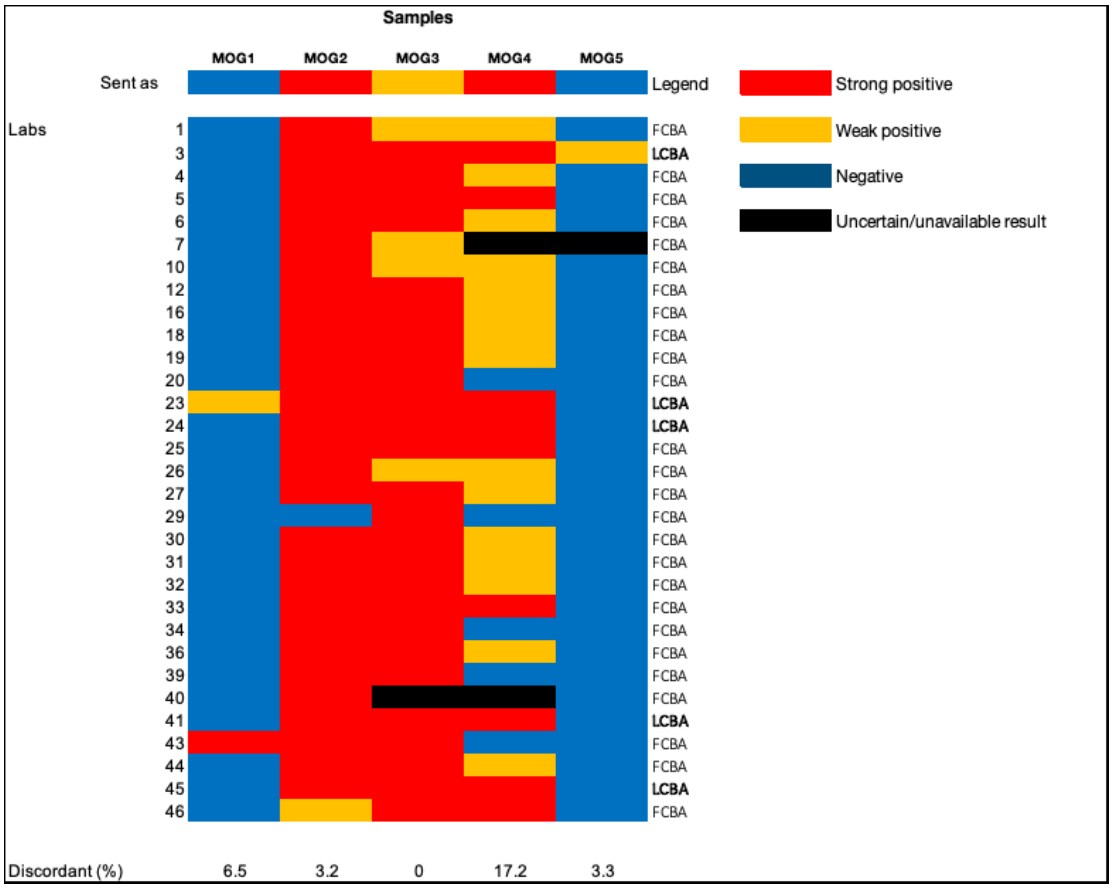
Overall concordance of all tests performed

The graph represents all tests performed within the scheme



Heatmap

The graph represents the detailed results for each sample



Comments

The overall accuracy was 93.6%. Despite the high accuracy, the scheme was still considered critical due to the high number of laboratories (7/31) that provided at least one inaccurate result. Compared to the AQP4 scheme, discrepant results were caused both by false positives (66.7%) and false negative (33.3%) results, that occurred in 4/5 samples sent. MOG4 was the most critical sample, as 5/31 laboratories failed to identify a strong positive, all using a FCBA. However, other laboratories using FCBA were able to properly classify the sample as "strong positive". False positive results occurred in 3 tests, 2 performed with LCBA and 1 performed with FCBA.

The results suggests that inaccurate results with high clinical impact might be common in MOG antibody detection. The literature recognizes LCBA to be the gold standard for MOG antibodies detection. However, these results suggest that even LCBA can provide false positive results. Heterogeneity in the protocols used for LCBA might explain at least in part these results.

Intracellular neuronal antibodies scheme

Partecipants: 28

Samples: 5 (3 positives for Yo, Ma2 and GAD and 2 negatives)

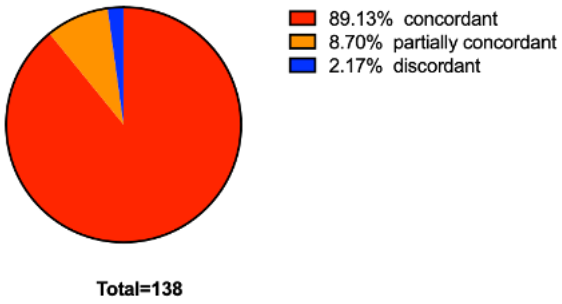
Judgment: satisfactory

Methods		
Assay	N of centres	Description
TBA+ blot	15/28 (53.5%)	Included different type of commercial or in-house tissue based assay
Blot only	10/28 (35.7%)*	Included different commercial line blots
TBA only	2/28 (5.3%)	-
Unknown	1/28 (3.6%)	

Results

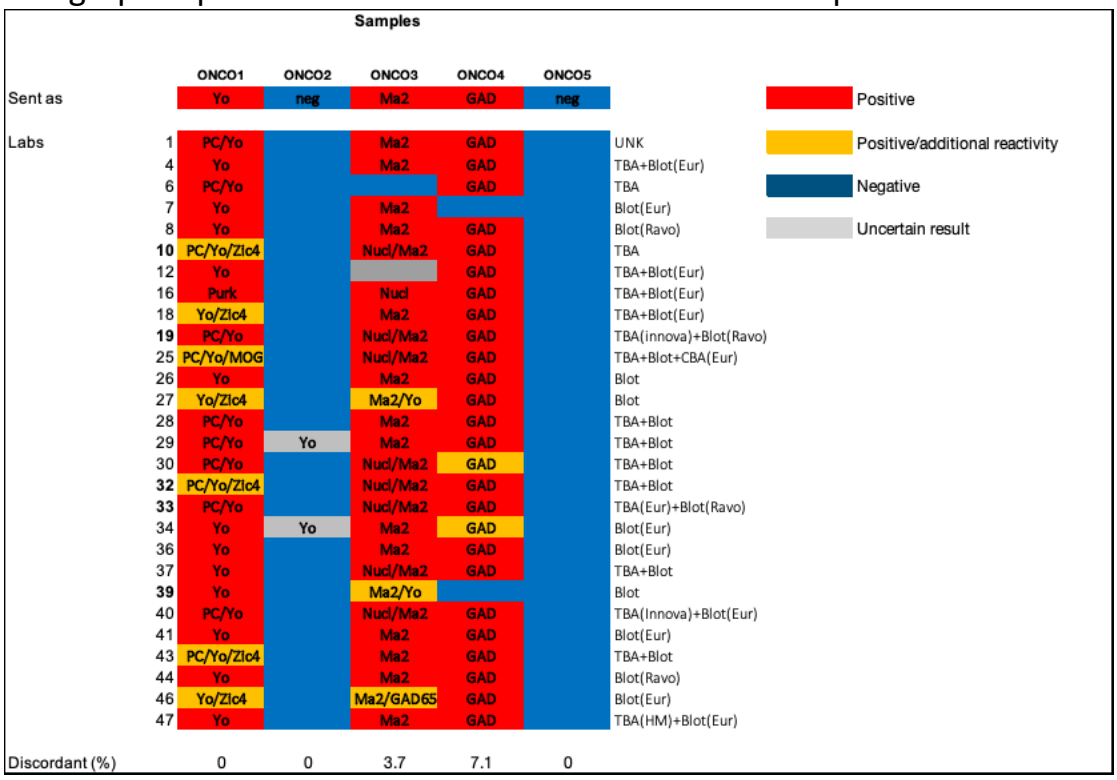
Overall concordance of all tests performed

The graph represents all tests performed within the scheme



Heatmap

The graph represents the detailed results for each sample



Comments

According to AINI recommendations, the most appropriate procedure for this scheme is the combination of tissue-based assay followed by a confirmation blot. However, a still too large proportion of laboratories (10/28) used only line blots. Results were overall satisfactory, with an accuracy of 97.9%. Only 2 laboratories failed to identify a positive sample in three separate tests. Two laboratories identified a reactivity for Yo antibodies in a negative sample only using blots, but correctly considered the sample as negative since the positivity was not confirmed on TBA. Notably, many laboratories reported, along with the correct result for positive samples, additional reactivities, in most cases detected with blots, such as Zic4. These reactivities reflect the tendency of blots to provide false positive results, especially when the bands are faint, and could be misleading to clinicians. These reactivities and their relevance should be directly discussed with the clinicians.

Neuronal surface antibodies scheme

Partecipants: 30

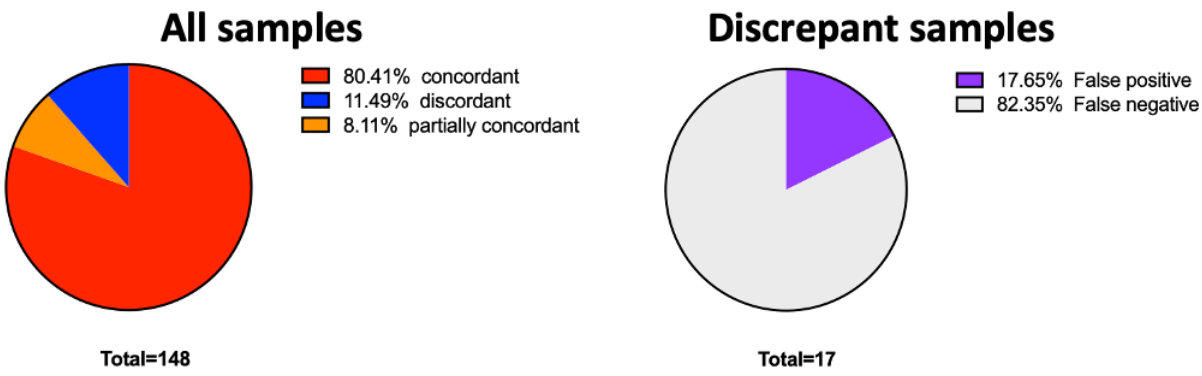
Samples: 5 (1 DPPX positive, 1 CASPR2 positive, 1 LGI1 positive, 2 negatives; all positive samples could be identified with both in-house CBA, commercial CBA and in-house TBA)

Judgment: highly critical

Methods		
Assay	N of centres	Description
Home made	4/30 (13.3%)	Combination of in-house tissue-based assay and/or home made cell-based assay
Commercial	26/30 (86.7%)	Fixed cell-based assay

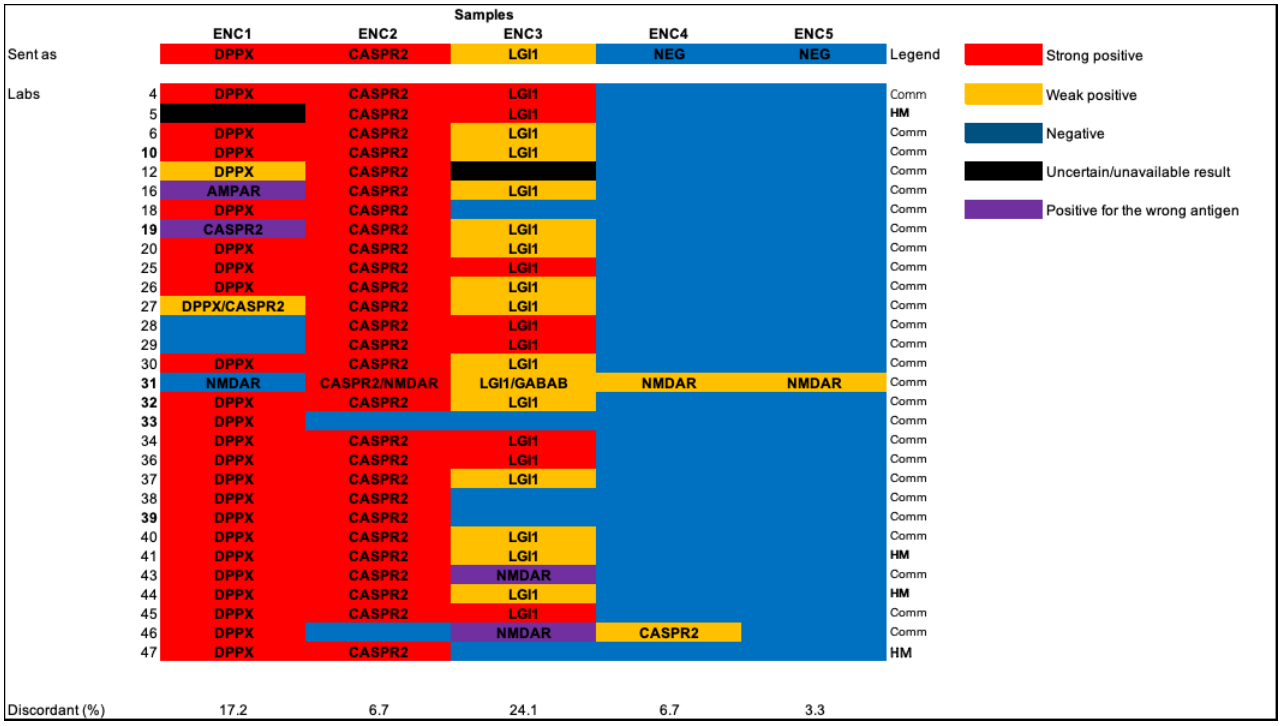
Results

Overall concordance of all tests performed



Heatmap

The graph represents the detailed results for each sample



Comments

The overall accuracy was 88.9%. Discrepant results included both false positives (17.6%) and false negatives (82.4%). Sample ENC1 and ENC3 were highly critical. Sample ENC1, which was a DPPX positive, was not identified by 5/30 laboratories. Surprisingly 4/30 laboratories reported a positivity for more than an antigen other than DPPX, such as NMDAR, AMPAR and CASPR2. The ENC3 sample, LGI1 positive, was not identified by 5/30 laboratories. Overall, a positivity for the wrong antigen was reported in 11 tests, 3 of which in negative samples and 8 in samples positives for other antigens. Sixteen/17 inaccurate results were obtained using commercial tests.

The detection of a high number of false positives is concerning and could be due to difficulties in the interpretation of the tests, and in particular to the interpretation of the mosaic biochips of the commercial tests.

Ganglioside antibodies scheme

Partecipants: 25

Samples: 3 (One GM1 IgM positive, 2 negatives)

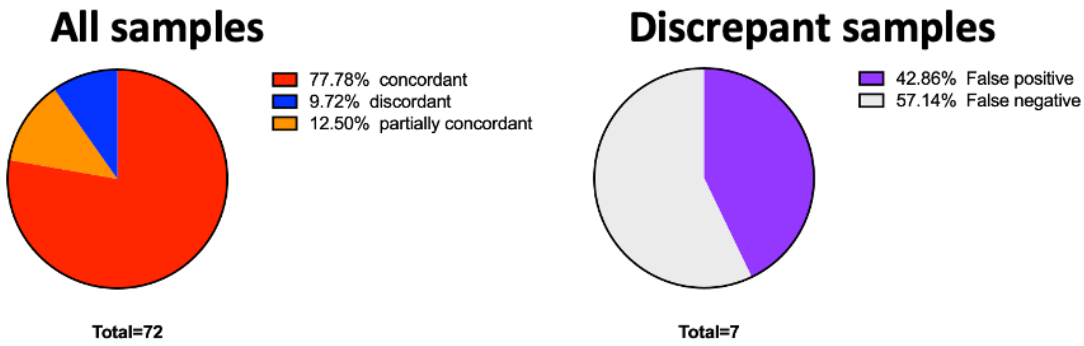
Judgment: critical

Methods		
Assay	N of centres	Description
Immunoblot	18/25 (72%)	Generic Assays immunoblot in 4 labs, Euroimmun blot in 5, not specified in the others
ELISA	6/25 (24%)	ELISA: Buhlmann in 3 labs, home made in 3 labs
Unknown	1/25 (4%)	-

Results

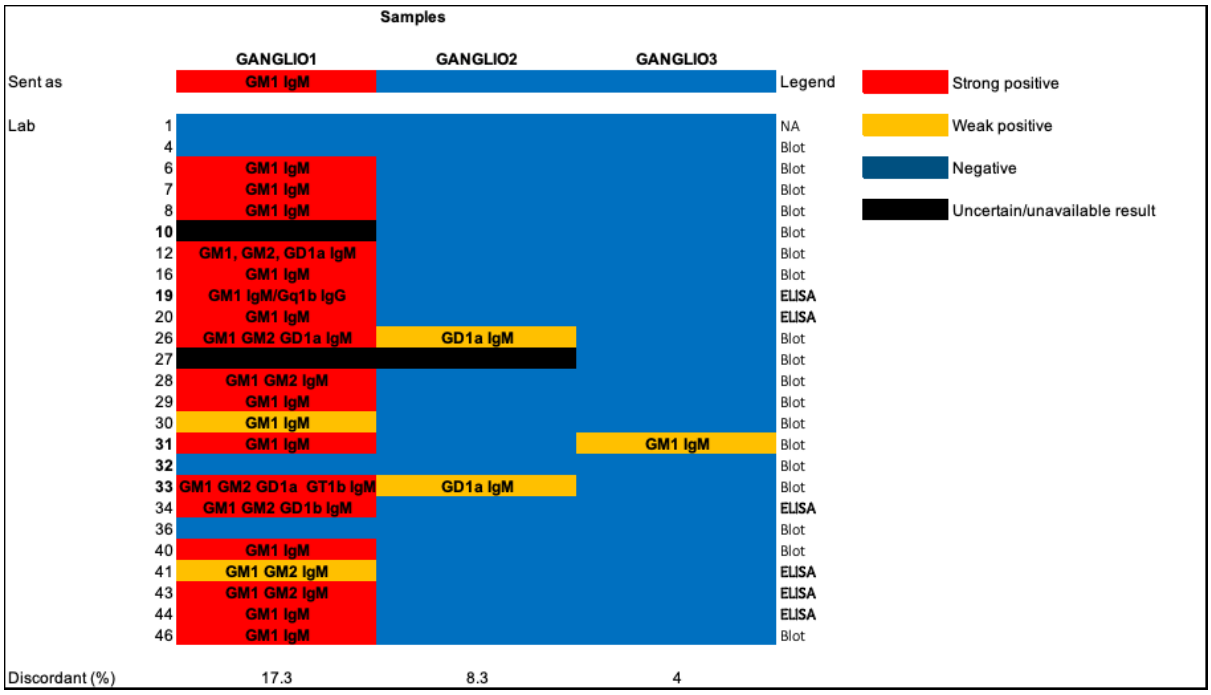
Overall concordance of all tests performed

The graph represents all tests performed within the scheme



Heatmap

The graph represents the detailed results for each sample



Comments

The overall accuracy was 91.7%. This represents a marked improvement compared to last year's performance. Only 3 laboratories used the Buhlmann ELISA, that is the recommended method according to the AINI guidelines. Only 4 laboratories failed to identify sample GANGLIO1 as a positive GM1 IgM. However, 8 laboratories identified additional reactivities that are likely to reflect the tendency of blots to provide false positive results. These results should be carefully evaluated in clinical practice, as in some cases can be highly misleading (ex: contemporary detection of GM1 IgM and GQ1b IgG). In addition to this, some laboratories provided false positive results. Given the large proportion of laboratories using potentially suboptimal tests, and the large number of non-relevant reactivities, we classified this scheme as critical.

MAG antibodies scheme

Partecipants: 18

Samples: 3 (2 strong positive, 1 negative)

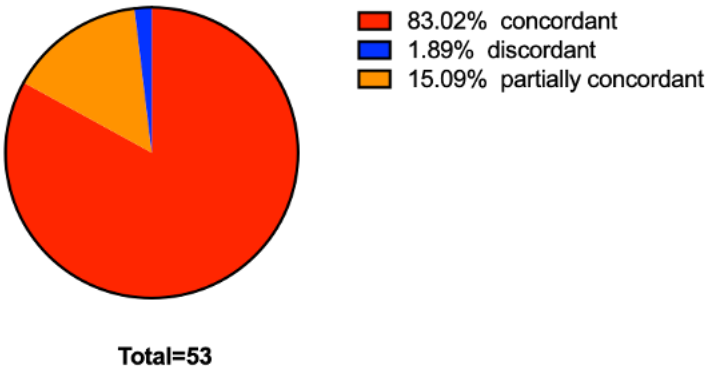
Judgment: satisfactory

Methods		
Assay	N of centres	Description
ELISA	12/18 (66.7%)	11 ELISA Buhlmann, in one case not specified
Blot	1/18 (5.6%)	Ravo
IIF	5/18 (27.8%)	Indirect immunofluorescence on sciatic nerve (in one lab confirmed with immunoblot)

Results

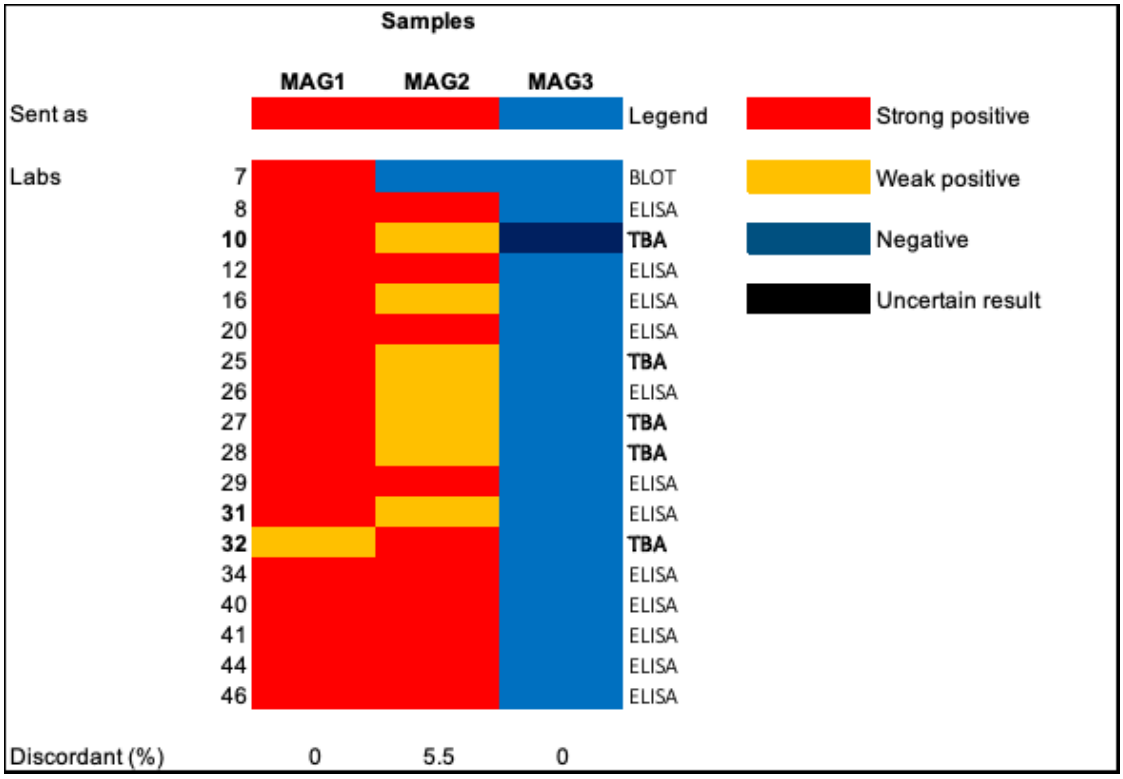
Overall concordance of all tests performed

The graph represents all tests performed within the scheme



Heatmap

The graph represents the detailed results for each sample



Comments

Results are overall satisfactory, with an accuracy of 98.2%. The only discrepant result was a false negative for sample MAG2. These excellent results were obtained despite the heterogeneity of the assays used. Indeed, up to 27.8% of centers used IIF on sciatic nerve. Considering the tendency of IIF to provide false positive results, and that only one negative sample was included in our scheme, we recommend caution in interpreting IIF results. ELISA remains the gold standard according to AINI guidelines.

Paranodal antibodies scheme

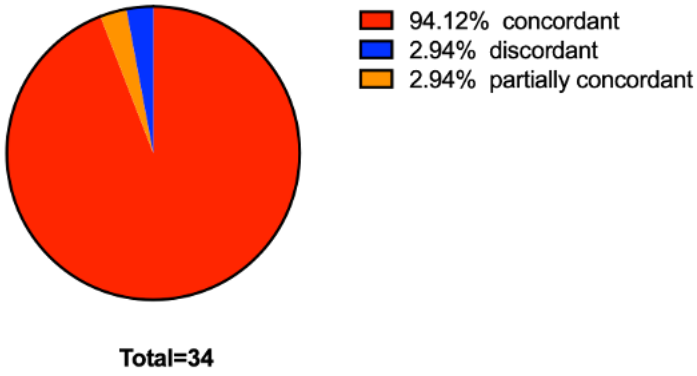
Partecipants: 7
Samples: 5 (2 CNTN1 positive, one CASPR1 possible false positive, 2 negative)
Judgment: satisfactory

Methods	
Lab	Assay
5	live CBA for CASPR1 and CNTN1; CBA and ELISA for NF155
16	ELISA (home made)
21	CBA, ELISA, and immunofluorescence on mouse sciatic nerve teased fibers
25	CBA
34	ELISA (home made)
44	in-house cell-based assay (CNTN1/CASPR1 cotransfected; live); Neurofascin155 (fixed); in-house CASPR1 ELISA
45	In house triple transfected HEK293T cells live CBA (CTN1, CASPR1, NF155) with single transfected live CBA in positive cases for antigen determination.

Results

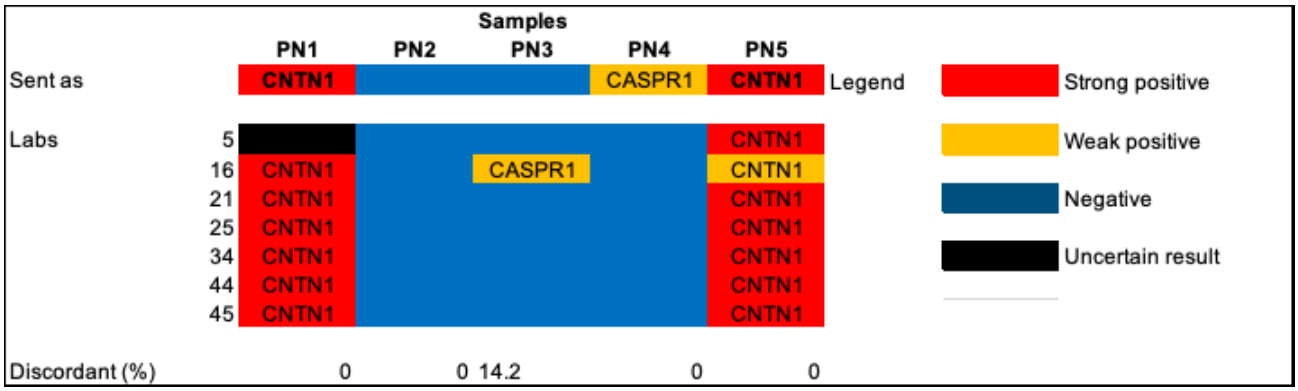
Overall concordance of all tests performed

The graph represents all tests performed within the scheme



Heatmap

The graph represents the detailed results for each sample



Comments

These was the smallest scheme in our EQAS, likely reflecting the limited number of centers performing the test. The involvement of highly specialized laboratories is likely to explain the excellent results of the scheme, with and accuracy of 97.4%. Interestingly, paranodal antibodies strategies remain heterogeneous, and include a combination of ELISA, CBA and TBA that is reported in detail in the table above.

In this scheme, one of the samples included was a sort of “pitfall”. PN4 was a sample that resulted positive on CASPR1 CBA in the referral laboratory with a 1:320 titre, but such positivity was not confirmed by TBA or ELISA. The patient was ultimately diagnosed with POEMS (Polyneuropathy, Organomegaly, Endocrinopathy, Monoclonal plasma cell disorder, Skin changes) syndrome , a diagnosis not compatible with a paranodopathy. Even challenged by this sample, all the participating laboratories ultimately reported it as negative. CASPR1 CBA, as reported in the literature, seems to show a tendency for false positives when used as the sole tests to identify these antibodies, and this is confirmed by the fact that one laboratory reported a CASPR1 false positive for sample PN3. Overall, our results identify CASPR1 as a potential critical assay. The use of multiple assays (such as the combination of ELISA and CBA) is recommended to prevent false positive results.

Nicotinic acethylcholine receptor scheme

Partecipants: 21

Samples: 5 (2 low positive, 1 strong positive, 1 negative)

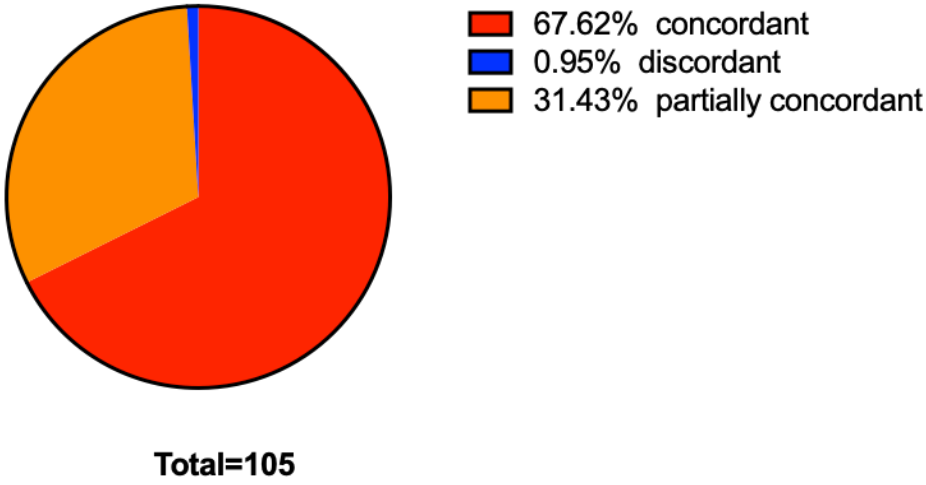
Judgment: satisfactory

Methods		
Assay	N of centres	Description
ELISA	7/21 (37.5%)	Commercial ELISA
RIA	5/21 (37.5%)	Commercial RIA
LCBA	8/21 (25%)	Cell based assay (in 3 labs home-made live CBA, in 5 commercial fixed cell based assay)
Unknown	1/21 (4.7%)	-

Results

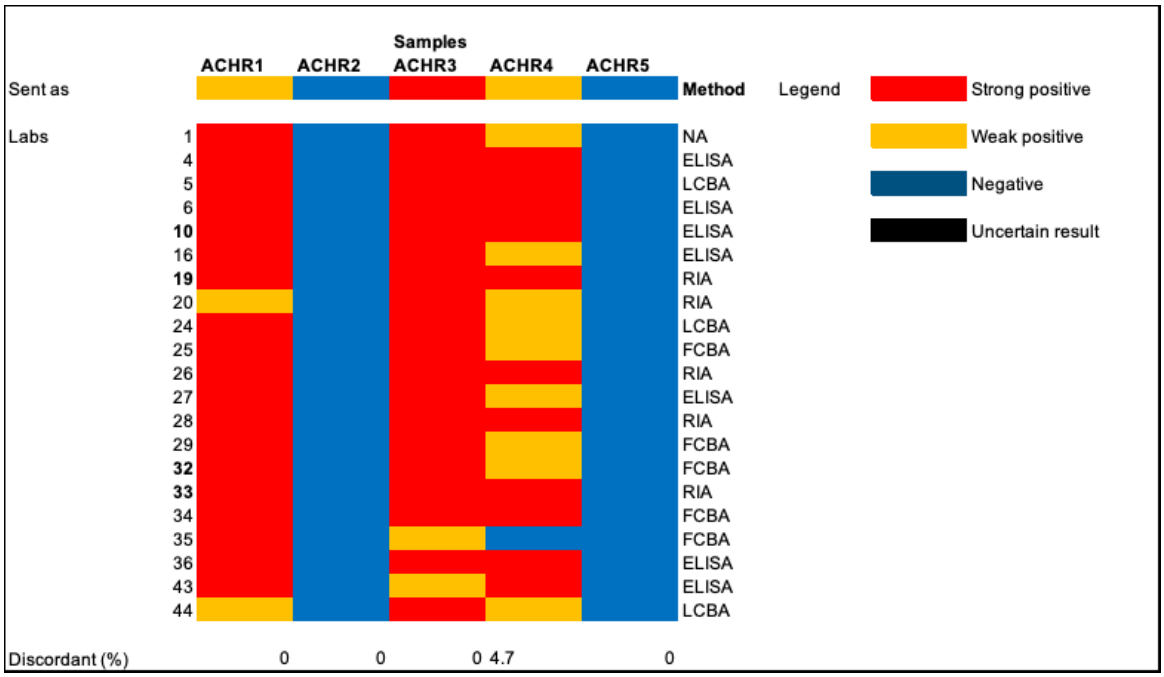
Overall concordance of all tests performed

The graph represents all tests performed within the scheme



Heatmap

The graph represents the detailed results for each sample



Comments

The assays used in this scheme reflect the modification of the diagnostic scenario. The RIA, currently considered the gold standard, was used only by 5/21 laboratories, whilst many converted to the CBA. In addition, 7/21 relied on the use of ELISA, which are considered at potential risk of false positive and negatives. Despite this heterogeneity, the performance of the scheme was excellent, with an overall accuracy of 99.05. Only one laboratory failed to identify a low positive sample using a fixed CBA, possibly highlighting difficulties in the interpretation of the assay.

MUSK antibodies scheme

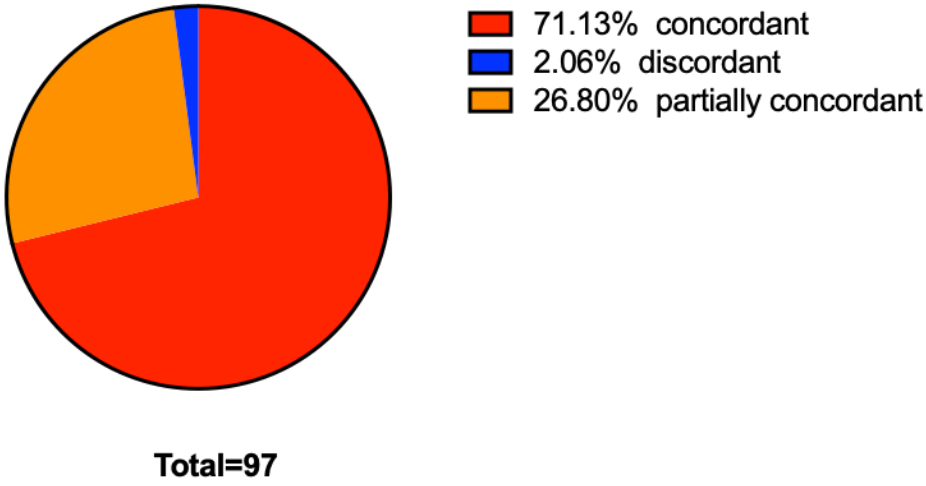
Partecipants: 19
Samples: 5 (2 strong positive, 1 low positive, 2 negatives)
Judgment: satisfactory

Methods		
Assay	N of centres	Description
ELISA	6/19 (43%)	Commercial ELISA
RIA	4/19 (29%)	Commercial RIA
CBA	9/19 (29%)	Cell based assay (in 3 labs home-made live CBA, in 6 commercial fixed cell based assay)

Results

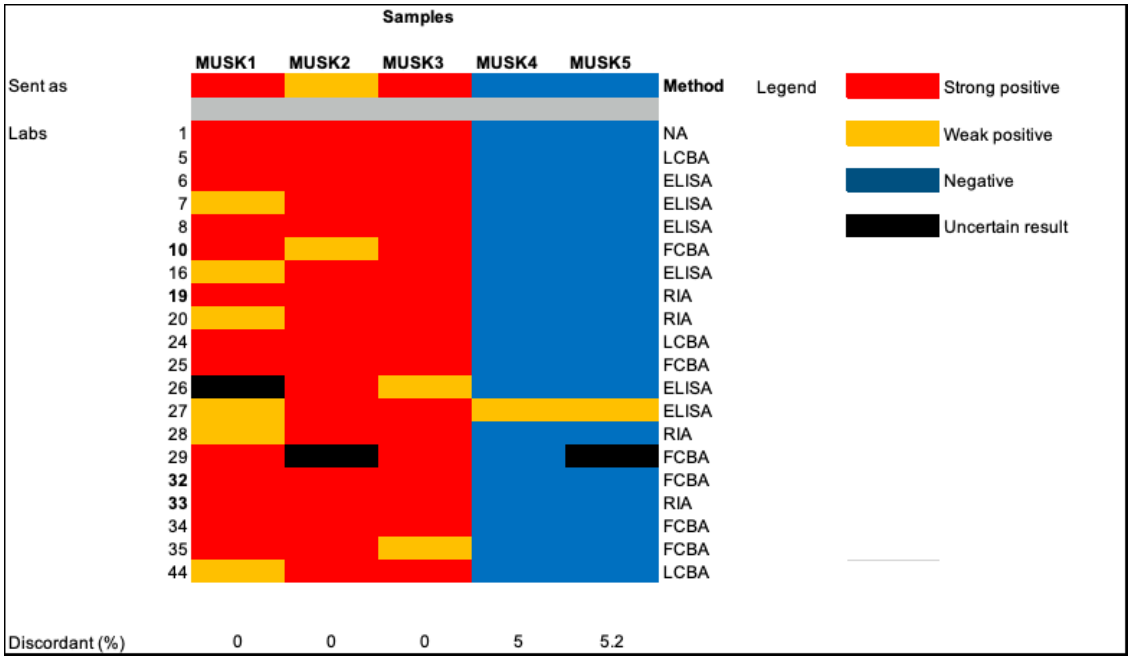
Overall concordance of all tests performed

The graph represents all tests performed within the scheme



Heatmap

The graph represents the detailed results for each sample



Comments

The assays used in this scheme largely reflect what has been described for the ACHR scheme. Again, results are excellent, with an overall accuracy of 97.9%. Only one laboratory reported a false positive in 2 samples using an ELISA. This warrants caution in the use of the ELISA for MUSK antibody detection.

Conclusions

The results of this EQAS points toward relevant issues in neuroimmunology laboratory diagnostics.
Particularly worrying are the results of AQP4, MOG and neuronal surface antibodies schemes. The detection of these antibodies is usually highly specific and allows to diagnose specific conditions that could benefit from tailored treatments. Therefore, the high proportion of false positive and negative results is not tolerable.

In the past year, AINI implemented two main strategies to address this issue.
First, AINI organized specific practical courses focused on the laboratory diagnostic in neuroimmunology. Following this tradition, we are currently organizing a 3-day course in December (Winter school of laboratory diagnostics in Neuroimmunology) that, by exploiting interactive teaching and practical activities on microscopes, will provide essential training to avoid common pitfalls in the routine diagnostic practice. This school, as many of AINI initiatives, is intended to attract both clinicians and people directly implicated in the laboratory diagnostics. More information will be available on the website www.aini.it.
Secondly, AINI has implemented the NINA-Flow project, a system for the referral of critical samples to specialized laboratories. This project, that is now active only for AQP4, MOG, ACHR and MUSK diagnostics, will provide a tool to improve the current diagnosis of patients with NMOSD, MOGAD and Myasthenia Gravis in Italy. In addition, we hope that this initiative will help to improve the performances of the participating laboratories. More information to participate can be found on the website www.nina.aini.it.
Finally, to provide support to all laboratories involved in the laboratory diagnostic in neuroimmunology, the NINA group is currently drafting an Italian consensus guidelines on “requesting, measuring and reporting neuronal autoantibodies in suspect autoimmune encephalitis and paraneoplastic neurologic syndromes”. This initiative also aims to analyze the results of a survey addressed to all laboratories in Italy, and that has been shared with the AINI network, that will provide a snapshot of the current diagnostic landscape. If you have not filled the survey yet, please check the following link:
”https://docs.google.com/forms/d/e/1FAIpQLSd89N1Gqqn-mSWrfxV5MzjnXe-pIHv6gCc4fHkerRFGR8nFUg/viewform?usp=sf_link”

We would like to thank all the Italian and European participants to this EQAS for their valuable contribution. Please feel free to contact us for any queries regarding the results discussed in this document, or to exchange additional samples. We are also extremely happy to receive your complaints and suggestion to improve our EQAS, including potential additional assays that you would like to be evaluated.
A special thanks to Elisabetta Zardini, Silvia Scaranzin, Chiara Morandi and Stine Overdall for all the work and long hours put onto the planning and realization of this EQAS.
Finally, we thank Roche for the support to this initiative.

See you next year!

Matteo Gastaldi
Diego Franciotta
Roberto Furlan

The NINA scientific Board
The AINI scientific Board

Aknowledgment: we want to thank Dr. Patrick Waters for the support in revising this report and for providing essential feedback on interpretation of the current results and useful suggestions for next year's EQAS.
We want to thank Roche for the sponsorization to the current EQAS.

Appendix: abbreviations

AINI: associazione italiana di neuroimmunologia
CBA: cell based assay
FN: false negative
FP: false positive
HM: home made
NINA: Network Italiano Neurologia Autoimmune
TBA: tissue based assay
TN: true negative
TP: true positive