ABSTRACT

Idiopathic inflammatory myopathies (IIM) are a group of rare, acquired, clinically heterogeneous autoimmune inflammatory muscle disorders characterised by muscle weakness and multisystem involvement. Recently, new concepts about pathogenesis, diagnosis and treatment of these complex diseases have been provided. The purpose of this manuscript is to summarise the most relevant literature contributions published over the last year.

Introduction

Idiopathic inflammatory myopathies (IIM) are a group of systemic diseases primarily involving skeletal muscle; however several internal organs can be affected, in particular lungs, heart, skin and gastrointestinal systems (1). The most recent classification allow to distinguish different subtypes of disease: adult dermatomyositis (DM), juvenile DM (JDM), clinically amyo-pathic DM (CADM), inclusion body myositis (IBM), polymyositis (PM), immune-mediated necrotising myopathy (IMNM) (2). In this manuscript, following the previous papers of this “one year in review” collection (3-11) we will provide our annual update of the recent advances in pathogenesis, diagnosis and treatment of IIM. We performed a med-line search of English language articles published from the 1st January 2015 to 31st December 2015 using the following key words: “idiopathic inflammatory myopathies” (MeSH terms and semantic search) and pathogenesis, diagnosis, clinical manifestations, therapy. We reviewed all the articles and selected the most relevant studies.

Recent insights into the pathogenesis of IIM

The pathogenesis of IIM is still largely unknown and huge efforts have been recently made aimed at clarifying IIM underlying molecular pathways. IIM clinical phenotypes are extremely heterogeneous thus reflecting the involvement of different pathogenic mechanisms; on the other hand, the presence of symmetrical proximal muscle weakness and poor muscle endurance, presented by the vast majority of the patients suggest that some pathogenic mechanisms are probably shared by all the IIM subsets (12).

Several genome wide-association (GWA) studies have lately confirmed the importance of HLA and non-HLA genes in IIM pathogenesis (13). In genetically predisposed patients, different environmental factors can contribute to the pathogenesis of these diseases too, ultimately, leading to the production of both autoimmune and non-immune mediators that contribute to IIM muscle damage and extra-muscular clinical manifestations (14).

Environmental factors

Last year, two studies have been conducted in Canada and in Sweden, to investigate the association between air pollution (15), occupational exposure (16) and IIM. However, among the different environmental factors, the major suspected agents associated with the onset of IIM remain viral infections.

Several acute and self-limited forms of IIM may be caused by Coxsackie, Echo and Influenza viruses, but their role in chronic forms is still uncertain.

Recently, Uruha et al. (17) conducted a case-control study that provided the statistical evidence of an association between IBM and HCV infection, suggesting a possible link between these two conditions. Interestingly, also vitamin D deficiency seems to represent a potential risk factor for development of IIM. According to Bodoki et al., it could be linked to...
some vitamin D receptor gene polymorphisms and haplotypes (18).

Genetic factors

IIM disease susceptibility is closely associated with human leucocyte antigen (HLA) genes, particularly with HLA class II alleles, such as HLA-DRB1*0301 and DQA1*0501 in Caucasians and DRB1*0801 in Japanese population. Moreover these alleles have been reported to be associated with the production of anti-α-manoacyl-tRNA synthetases (ARS). Two recent large studies conducted by Rothwell et al. (19) and Miller et al. (20), confirmed that alleles of the 8.1 ancestral haplotype (8.1AH) are the primary genetic risk factors associated with IIM and its main phenotypes.

Regarding non-HLA genes, a strong correlation has been recently confirmed between PTEN2 gene single nucleotide polymorphism (SNP) and IIM, especially in PM (19,20). In Chinese Han population CCL21 SNP rs951005 seems to confer genetic predisposition to PM and to IIM-related interstitial lung disease (ILD) (21), while other SNPs (rs2736340, rs7812879, rs13277113, rs2618479 and rs2254546), have been associated to an increased risk for DM (22). STAT4 and FAM167A-BLK SNPs seem to be associated to DM in the Japanese population (19).

Shinjo et al. (23) considered also the potential role of the angiotensin-converting enzyme (ACE) insertion/deletion (I/D) gene polymorphism, in particular ACE D/D, in determining the susceptibility to DM.

Regarding IBM, great attention has been given to the possible role of mitochondrial DNA and its rearrangements (24) since, in genetically predisposed individuals, oxidative stress-related activation of nuclear factor kappa B (NF-kB) may be involved in both degenerative and inflammatory mechanisms observed in IBM. In line with these observations, a great attention has been given to SNP (rs5754467) YDJC gene which seems able to amplify NF-kB activation (25).

Immunological abnormalities

Both innate and adaptive immunity are supposed to play a crucial role in IIM pathogenesis. However, although some experimental murine models have developed in order to foster the understanding of the immunopathologic processes of IIM (26-27) it remains unclear why and how muscle may become a specific target of the immune response/attack. It is widely recognised that humoral factors (antibodies and complement system) directed against endomysial capillary endothelial cells are mostly involved in DM pathogenesis while cytotoxic T cell-mediated muscle fibre injury plays a crucial role in PM and IBM. Despite their widespread localisation, the precise role of T cells in the pathogenesis of IIM remains not completely clarified (1). Espinosa-Ortega et al. (28) described an expansion of peripheral proinflammatory T cells, such as follicular helper T cells (Tfh) and T helper type 17 (TH17), as well as pro-apoptotic CD28 null cells and a deficiency of suppressor populations of regulatory T cells (Tregs) CD4+ and CD8+ in IIM patients. An increased level of some inflammatory cytokines, such as IL-15 and IL-17, as well as pro-apoptotic CD28 null cells and a deficiency of suppressor populations of regulatory T cells (Tregs) CD4+ and CD8+ in IIM patients. Particularly, IL-15 seems to promote in the skeletal muscles the effector function of memory-like CD8+ T cells, which facilitates the formation of a pro-inflammatory skeletal muscle microenvironment during myositis progression; on the contrary IL-15 seems not to be required for muscle growth and regeneration and it could be a good therapeutic target (29).

Furthermore, Rucket et al. (30) proposed a pathologcial model, where muscle cells start to express NKG2D ligand (an activating receptor on T cells implicated in autoimmune diseases). The authors noticed that interaction with CD8+ T cells leads to the generation of highly pathogenic CD8+NKG2D high T cells maintaining the local inflammatory milieu and ultimately leading to muscle cells death. From this perspective, IL-15 and NKG2D might be important in stabilising the immunological correlation between CD8+ T cells and MHC class I expressing muscle cells in IIM (31).

Another pathway that leads to the activation of NFκB is represented by the Toll-like receptors (TLRs) signalling, which represents an important link between innate and adaptive immune systems. The cytokine milieu created by the TLR activation directs T cell differentiation towards the desired subset. Several studies have demonstrated an increased expression of TLRs in muscle biopsies from IIM patients and, in a recent study, Ling et al. demonstrated that the endogenous overproduction of type I interferon (IFN) in DM may be generated by plasmacytoid dendritic cells, mainly through the TLR-9 pathway. Furthermore, also TLR-7 mediated type I IFN production may be present and TLR-3, which is expressed preferentially in peri-fascicular fibres, could be implicated in the atrophy detected in DM muscular biopsy (32).

Also the DNA-binding High-mobility group box protein 1 (HMGB1), a pro-inflammatory molecule also called “alarmin”, has been recently described as overexpressed in muscle fibres of patients with IIM. It up-regulates MHC class I expression in muscle fibres through TLR-4 pathway and it impairs calcium release from sarcoplasmic reticulum, contributing to muscle fatigue (13). According to this observation, Muth et al. examined the expression of HMGB1 and its receptor RAGE, which seem to be crucial for β-amyloid associated neurodegeneration, particularly in IBMs, and they found that alarmin contributed to the interplay between inflammation and degeneration in IBMs. The authors concluded that the HMGB1-RAGE axis could be an interesting target for future therapeutic strategies against diseases characterised by chronic inflammatory cell stress and accumulation of β-amyloid (33).

Furthermore, some studies have evaluated the potential role of HMGB (34) and of DM autoantigen transcriptional intermediary factor 1γ (TIF1 γ) (35), in IIM muscle tissue regeneration. Apparently, higher levels of autoantigens in damaged and regenerating muscle fibres could contribute to myositis immunopathology by providing an ongoing source of autoantigens able to drive and maintain the autoimmune response (35).
Recently, it was also suggested that an aberrant expression of circulating micro-RNA patterns (c-miRNAs) could play a role in IIM. Georgantas et al. proposed that the inhibition of myogenic mi-RNAs 1, 133 and 206 by inflammatory cytokines could link inflammation and muscle degeneration in adult IIM (36). Furthermore, Misunova et al. analysed circulating serum mi-RNA gene expression profile in 28 patients suffering from IIM and they found that the mi-RNA expression profile in serum of such patients was disease specific and created a disease specific signature. It is expectable that this dysregulation of miRNA molecules expression could take part in the pathogenesis of IIM (37).

Recent insights into serological manifestations of IIM

Autoantibodies and other laboratory tests

Lately, laboratory tests have gained increasing interest in the assessment of IIM patients. In particular myositis-specific autoantibodies (MSA) have been increasingly recognised as pivotal elements in supporting IIM diagnosis and in correctly identifying IIM clinical subsets. Furthermore, MSA may have a prognostic value thus predicting patients’ response to the therapy and long-term outcomes. As confirmed by Mammen et al., MSA are very specific for IIM (38): anti-Jo-1-positive patients usually present a characteristic “necrotising perifascicular myositis” (39), TIF1-γ or anti-NXP2 have a more prominent perifascicular atrophy and perivascular inflammation, Mi-2 antibodies are associated with a higher prevalence of muscular infiltrates, and anti-PM-Scl to an even higher prevalence of muscular infiltrates (40). Several studies have demonstrated that MSA vary according to different ethnicities or geographic areas. Compared to Japanese patients, in Chinese DM and clinically amyopathic DM (CADM), an higher prevalence of anti-melanoma differentiation-associated gene 5 antibodies (anti-MDA-5) and a lower frequency of anti-signal recognition particle (anti-SRP) has been reported (41). Furthermore, MSA have been correlated with peculiar clinical phenotypes: in Asian population, anti-MDA-5 positivity strictly correlates with the development of rapidly progressive (RP) ILD. These data were recently confirmed by Ikeda et al. that correlated anti-MDA-5 positivity with biomarkers of lung injury such as lower Krebs von den Lungen-6 (KL-6) and surfactant protein D (SP-D) serum levels and CD4+/CD8+ ratio in the bronchoalveolar lavage (BAL) fluid. Furthermore, high-resolution computed tomography (HRCT) frequently showed ground-glass opacity (GGO) or irregular linear opacity in the anti-MDA-5 positive group (42).

Last year, the association of anti-MDA-5 with ILD, RP-ILD and survival was specifically investigated in two groups of CADM and classic DM. The frequency of anti-MDA-5 was similar in the two groups and the authors strongly correlated anti-MDA-5 with presence and severity of ILD and RP-ILD in both groups (43). Anti-MDA-5 autoantibodies have also been associated to chemokine (C-X3-C motif) ligand 1 (CX3CL1), suggesting a role of CX3CL1 in the pathogenesis of pulmonary fibrosis in CADM (44).

Finally, anti-MDA-5 are also associated to cutaneous digital ulcers localised in DM patients (45). ARS autoantibodies have been associated to ILD as well. The most common ILD pattern at HRCT in ARS group seems to be non-specific interstitial pneumonia (NSIP) associated to a more favourable treatment response and greater survival (46). Rojas-Serrano et al. confirmed that anti-Jo1 positive patients have a better survival compared to anti-Jo-negative patients (47). The clinical severity of ILD was not significantly different in patients with ARS, in particular in anti-PL7 and anti-Jo1 positive groups, except for a higher bronchoalveolar lymphocyte ratio anti-Jo1 positive patients (48).

Very recently, new MSA directed against a four-and-a-half LIM domains protein 1 (FHL1) were identified in a subset of IIM patients with severe skeletal muscle involvement and a poorer prognosis (49). Finally, in the sporadic inclusion body myositis (sIBM) Goyal et al. explored the value of the NT5c1A antibodies. The authors reported a greater motor and functional disability and a more frequent bulbar, facial and respiratory involvement in patients with anti-NT5c1A positivity (55).

In addition to MSA, a number of novel diagnostic ad prognostic biomarkers has been extensively investigated last year. Chen et al. prospectively reported that serum KL-6, SP-A and SP-D were significantly elevated in PM/DM patients with ILD compared with those without ILD. Furthermore, KL-6 showed the highest predictive value for ILD among these markers and was particularly useful to monitor ILD progression (51). Other prognostic factors, including skin ulcerations, serum ferritin level and lymphocyte counts may also help to predict RP-ILD in patients with CADM (52). The age of onset and serum ferritin levels were apparently poor predictors for ILD outcome (53).

Recently, a Chinese study reported that higher serum levels of the heat shock 70 kDa protein 5 (HSPA5), a protein involved in the folding and assembly of proteins in the endoplasmic reticulum (ER), were associated to a higher disease activity in IIM (54). Also osteopontin (OPN), a pro-inflammatory cytokine, resulted higher in IIM patients with respect to healthy controls, particularly in DM subgroup. Osteopontin positively correlated with CK and CRP and after steroid treatment a significant decrease of OPN levels was observed (55). Adipokines resulted involved in the regulation of immune and inflammatory processes in autoimmune diseases. Among them visfatin and resistin gene expression seemed to correlate with disease activity (56).

Finally, among the putative potential biomarkers for ILD in patients with IIM a mention should be made to progranulin (PGRN) (57) and serum LIGHT, a member of the TNF superfamily (58). In conclusion, traditional and novel biomarkers have been extensively investigated in IIM; however, further research is warranted in order to validate their role in clinical practice.

Imaging in IIM

Last year, the most relevant contribut-
Chest CT remains a cornerstone for the identification and the monitoring of ILD in IIM patients. Little is known about CT features of ILD in anti-synthetase syndrome (ASS) and CADM patients. Last year, Debray et al. found that, at presentation, many ASS patients reported CT features of NSIP or OP, isolated or often in combination with consolidations, while Zou et al. demonstrated that HRCT score, together with high serum ferritin levels, were associated with poor prognosis in CADM patients with acute ILD (65-67). Finally, although the results of the studies are not definitive, muscle ultrasonography (US) has been proposed as another important diagnostic tool to investigate the muscular structure and the pathological alterations in muscular diseases. US may identify fascial thickening, which can indicate a concomitant fasciitis that may be associated with muscular activity of the disease (68). Furthermore, a peculiar US feature was described in IBM patients, consisting in a dissociation of echo intensities (EI) in the triceps surae (preferential involvement of gastrocnemius over the soleus), that could allow to differentiate IBM from PM/DM (69). Chest US with B-lines study has emerged over the last years as an alternative to HRCT to investigate ILD in patients with connective tissue diseases and the detection of pleural irregularity (PI) resulted a new US sign for the diagnosis of ILD in IIM (70).

Fluorodeoxyglucose positron emission tomography (FDG PET) is a standard tool for detecting malignancies or systemic inflammatory disorders, such as rheumatoid arthritis, vasculitis and polymyalgia rheumatica. In recent years, its usefulness in the clinical practice of PM/DM patients emerged, indeed it is able to evaluate muscle lesions using visual evaluation and standardised uptake value measurement (71). Finally, also the role of bone scan in IIM was tested by quantitatively assessing the global uptake of Tc-99 m phosphate by proximal muscle groups as a marker of disease activity (72).

**Extra-muscular manifestation**

Although the main phenotypical characteristics of IIM is muscular involve-
malignancy showed skin ulcers, periungual erythema or ragged cuticles (78).
Among clinical study published this year, another that should be mentioned
is the one by De Souza F.H.C. et al. aimed at assessing ovarian involvement
reserves in adult patients with DM. The authors performed a cross-sectional
study including 16 DM patients and
23 healthy controls, each of whom was
evaluated during the early follicular
phase, with the evaluation of IgG anti-
corpus luteum (anti-CoL), follicle stim-
ulating hormone (FSH), estradiol, inhibin B, anti-Mullerian hormone (AMH)
serum levels and determined a sono-
graphic antral follicle count (AFC). They obtained that both AMH and AFC
were reduced and the most reliable
screening test for ovarian reserve could
include both of them. Therefore, in DM
patients there is a premature reduction
of ovarian reserve but the related fac-
tors are unclear and further studies are
necessary (79).
Previous studies have demonstrated an
increased susceptibility of infections
in patients with IIM, in particular Her-
pes Zoster (HZ) infection was reported to be associated with DM or PM and
these patients should be screened for
HZ immunity and vaccinated prior to
start with immunosuppressive ther-
apies. A recent study by Shin-Yi Tsai
et al. supports the association of IIM
with a greater risk of subsequent HZ
in Taiwan IIM patients. In the study
population, a higher incidence of HZ
was observed in patients with IIM who
were predominantly female, aged older than 50 years, and had one or more co-
morbidities or those who underwent
medical treatment with immunosup-
pressants or corticosteroids (80).
Regarding the infective risk in the IIM
patients, another evaluation was made about the risk of active tuberculosis
(TB) by Ping-Hsun Wu, who conducted the first study to investigate this matter
in a large-scale cohort and demonstrated an increased risk of active TB with re-
spect to healthy subjects. Therefore, the
authors underlined the importance to
perform a TBC screening test in IIM pa-
tsients with respiratory symptoms (81).
Interestingly, some novel studies have
focused joint involvement in anti Jo-1
positive aSS and particularly the data
obtained in an international retrospec-
tive multicentric study by Cavagna et
al. The authors confirmed that joint in-
volvement could be the first aSS mani-
festation thus highlighting the impor-
tance that anti Jo-1 should be tested not
only in patients with myositis and ILD
but also in subjects with peripheral ar-
thritis, even though a diagnosis of RA
is more likely (82).

Treatment
There are not standardised therapeutic
guidelines in literature for IIM because
at present only few randomised, double-blind, controlled clinical trials have
been completed Currently, corticoster-
oids (CCs) represents the standard first
line treatment for DM and PM but the
treatment commonly used in the therapy
of IIM also include other traditional im-
munosuppressive or immunomodula-
ry agents, such as methotrexate (MTX),
azathioprine (AZA), mycophenolate
mofetil (MMF), cyclophosphamide
(CYC), cyclosporine (CYA), tacroli-
mus (TAC), intravenous immunoglobu-
linis (IVIg) or, recently, biologic agents
such as rituximab (RTX) (83-84). The
indications for the introduction of these
others immunosuppressive agents in-
clude severe refractory disease with
extramuscular features, flares on glu-
corticoid tapering or the necessity to
taper CCs as soon as possible to avoid
the development of CCs-associated
side effects (85). Thus the choice of a
secondary immunosuppressive agent is
often empirical (86-88).
Some studies have been published in
the last year in order to provide novel
treatment strategies for IIM patients
especially focusing on the early use of
immunosuppressive agents as CCs
sparring drugs (89). This represents a
hot topic and remains quite debated with studies supporting and other not
supporting the use of CCs in mono-
therapy. A recent retrospective study
reviewed 42 PM/DM patients that were
divided in 2 groups: the first one was
treated with conventional monotherapy
(prednisone) while in the second group
the patients have taken prednisone and
TAC. TAC demonstrated a corticoster-
od sparring effect, improved creatine
kinase levels, reduced the length of
hospitalisation and extended survival
reducing the occurrence of serious in-
fecions and disease relapses. Notably,
the time required for CK normalisation
and the proportion of patients who re-
quired additional immunosuppressive
medications for remission induction
was comparable in two groups, and all
patients achieved remission (90).
Johnson et al. retrospectively evalu-
ated the disease course of 100 DM pa-
tients over time in the context of treat-
ment with CCs and immunosuppressant
agents: MTX, AZA, MMF and IVIg.
By the 6-12 month follow-up period all
groups demonstrated an improvement
in muscle function. None of the im-
munosuppressive agents was shown to
provide a superior benefit over CCs in
terms of improving average composite
or proximal manual muscular testing
(MMT) scores or prednisone require-
ment at 6-12 months or 12-18 months
after the initiation of the secondary
agent (91).
Different results come from the Sec-
ond Line Agents in Myositis (SELAM)
trial. This was a RCT evaluating the ef-
effect of MTX and CYA, in 58 patients
with active IIM receiving corticoster-
oids. In comparison with placebo, nei-
ther CYA or MTX monotherapy, and
 neither CYA-MTX combination tha-
rapy showed evidence of significant ben-
efits. Moreover, the authors reported
that the immunosuppressive treatment
did not permit to reduce glucocorticoid
dose. SELAM had several limitations: patients with severe IMM were not en-
rolled, only a minority of screened pa-
tients were enrolled, only few patients
completed 12 months of treatment and
the outcome measures might have been
too insensitive (92).
Rituximab (RTX) has been widely
used as a therapeutic agent in refrac-
tory IIM. The use of RTX in myositis
has been evaluated for several years,
mainly in small case series, and ap-
peared effective in patient with refrac-
tory inflammatory myopathies (93).
The Rituximab in Myositis (RIM) trial
suggests the possible use of rituximab
in refractory PM and DM (94). Reed
et al. re-analysing the data collected in
the RIM study, tried to identify a biomarkers signature able to predict disease improvement after rituximab therapy. They observed that patients with ARS or anti-Mi2, expressing interferon chemokines (IFNCK) presented a better clinical improvement (95). A recent multicentre, open-label, phase II study evaluated the efficacy of RTX treatment in patients with refractory ASS. In this pilot study 7/10 patients had an increase of at least 4 points on MMT 10, but only 2 patients presented an improvement of at least 4 points on at least two muscle groups (primary end-point). RTX allowed a reduction of CCs doses and of immunosuppressive drugs, and reduced CK levels. Moreover 5/10 patients presented an improvement and 4 patients a stabilisation of the ILD (96). In a retrospective study RTX permitted to reach a significant improvement in both PFT (FVC, FEV1 and DLCO) and ILD extent in HRCT images, especially in patients with a disease duration <12 months (97).

Lung disease is a major cause of morbidity and mortality in myositis patients. PM and DM complicated with ILD are more aggressive and refractory to conventional treatment (98). More of 50% of patients with ILD are resistant to CCs monotherapy (99-100). From this perspective, the possible efficacy of calcineurin inhibitors, cyclosporine A (CYA) and tacrolimus (TAC) in lung involvement in IIM patients has been evaluated. In a retrospective cohort study, Dong et al. demonstrated that DM and ACAM-ILD patients that received early CYA treatment (within two weeks after the ILD diagnosis) had a better survival benefit than those in whom the treatment were delayed. The early CYA treatment showed a significantly improvement in pulmonary disease, demonstrating a favorable radiologic response (HRTC score over the 1-year follow-up) compared to the delayed CYA treatment. Delayed CYA treatment was associated with a higher mortality due to the ILD progression and complications. Therefore, early CYA treatment should be considered as first line treatment at DM-ILD diagnosis, especially in patients with a higher risk of developing RP ILD (101). Recently, two studies investigated the effect of TAC therapy in PM/DM related ILD. In a retrospective study, Kurita et al. divided 49 patients with PM/DM related ILD in two groups: one treated with TAC plus the conventional treatment (CCs) and one treated with conventional therapy alone. They did not demonstrate statistically significant differences between the two groups, probably because patients who received TAC had more severe disease. Patients treated with TAC, had significantly longer event-free survival compared with the conventional therapy alone group and they had significantly longer disease-free survival. However, the association between CYC was more frequent in the TAC group and the better prognosis in this group might be due in part to the concomitant effect of CYC (102). Morisset et al. have proposed a treatment algorithm based on the ILD severity and presentation. Patients with severe ILD, rapidly progressive disease, or respiratory failure should be treated more aggressively (high dose of CCs, CYC and/or calcineurin inhibitor). Otherwise, in patients presenting with milder disease or with a chronic stable ILD, agents with an overall safer side effect profile should be considered (CCs and MMF; AZA) (99).

Kawasumi et al. took into account the clinical manifestation of pulmonary disease and the presence of some prognostic factors including hyperferritinemia, the anti-MDA-5 and the ARS. Combination therapy with CCs, intravenous CYC pulse, and calcineurin inhibitors should be administered as soon as possible in RP-ILD, especially if there are hyperferritinemia and MDA-5 positivity. In contrast, patients with ARS show better responses to corticosteroids alone but become refractory to corticosteroid monotherapy. An association of CCs and immunosuppressant agents could be consider in chronic, mild ILD (100). Recently, some authors have suggested that also cathepsin B (CB) could have a role in the development of lung fibrosis and that CA-074Me may be the potential therapeutic target for ILD-PM (103). Finally, in PM/DM patients with lung involvement and oesophageal involve-

ment another potential option taken into consideration last year was represented by IVIg therapy. Although data about the use of IVIg in IIM are conflicting (6), IVIg can reduce the CCs dose required for maintenance, and seems to be effective in the treatment of adult patients with PM/DM and appears to be relatively well tolerated and safe (104).

Recently, an alternative route of administration, subcutaneous immunoglobulins (SC Ig), was made available. SC Ig administered weekly by a programmable pump are equally efficacious suppressing inflammatory and immune-mediated processes without an excessive immunosuppressive effect. SC Ig are also suitable and reduce the costs due to hospitalisations and surveillance (105-106).

Conclusions

In this review we provided a critical analysis of the progresses in the pathogenesis, classification and therapeutic approach of IIM of 2015. The studies cited, underline the complexity and the heterogeneity of the disease, in particular on the histopathology, positivity for myositis specific autoantibodies and prognosis. The advances in this field will hopefully allow to better classify the disease allowing to predict the response to novel therapeutic target and the prognosis of the disease.

References

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