

RheumaMap

**A Research Roadmap to transform
the lives of people with Rheumatic
and Musculoskeletal Diseases**

Prepared by a European League Against Rheumatism Taskforce

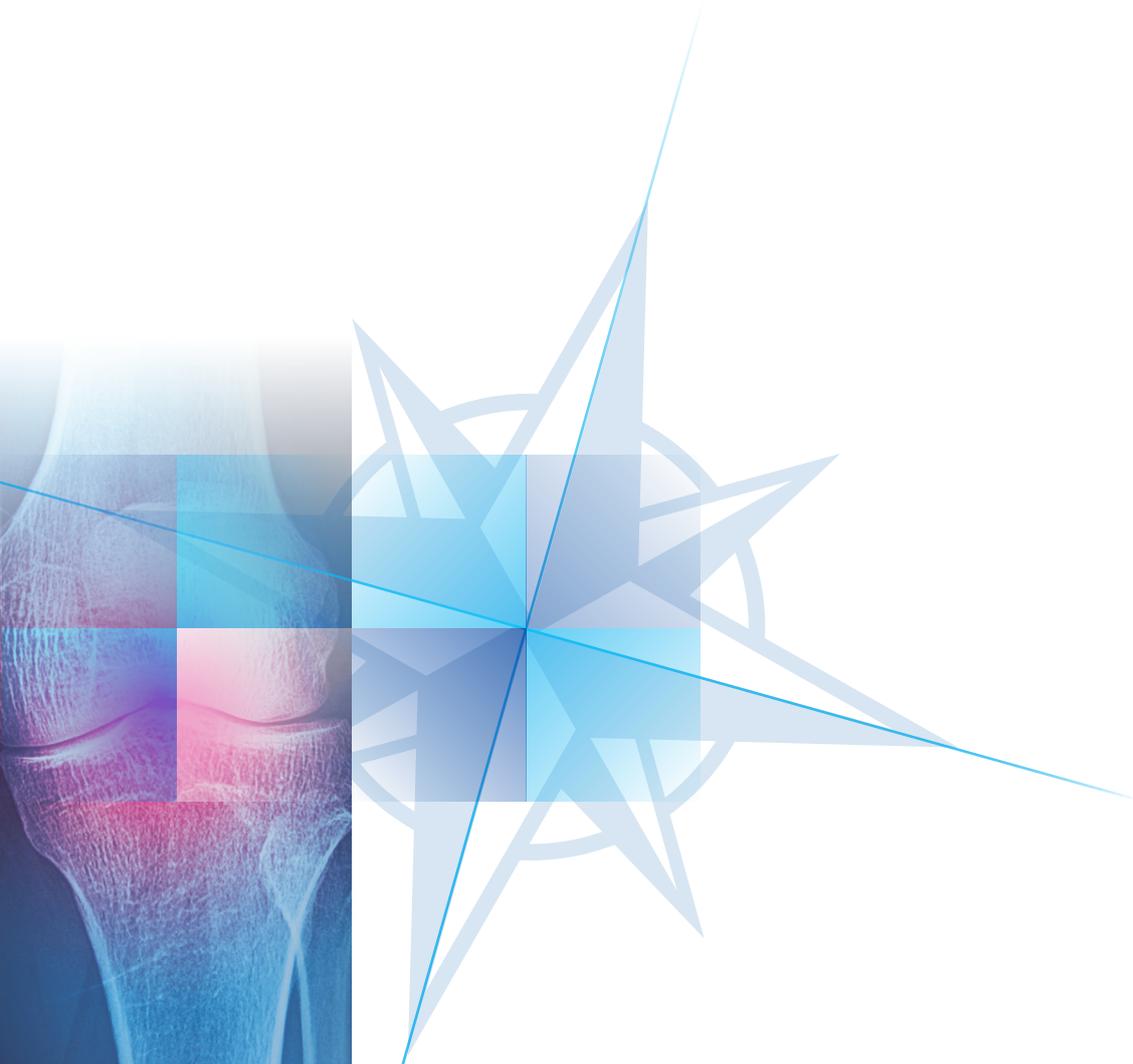
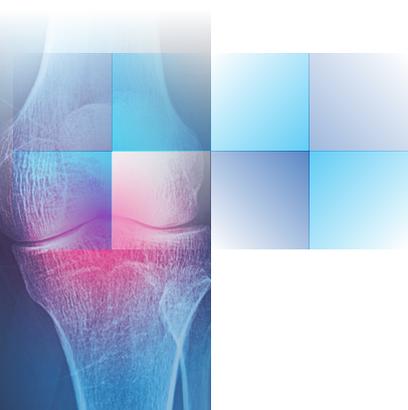


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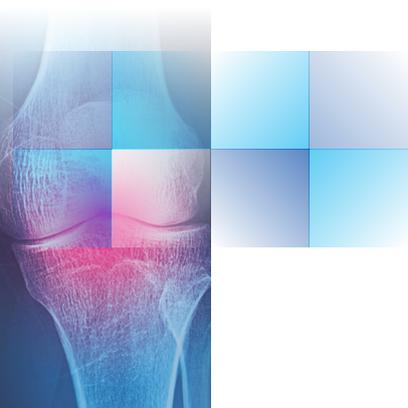


Key purpose

To provide a concise overview of the unmet needs that require research in Rheumatic and Musculoskeletal Diseases (RMDs) in Europe. RheumaMap aims to inform policy makers, funding institutions, the broad scientific community and stakeholders about the challenges and opportunities in RMD research.

Overview – key points

- RMDs comprise one of the major challenges to human health across Europe and on a global basis, particularly with the changing demographics of an ageing population.
- RMDs can affect people of all ages from early childhood to later years and thus impact health across the entire life span.
- The consequences of RMDs include chronic pain, disability, reduced quality of life, social exclusion, loss of employment and reduced productivity, together with increased financial burden on the individual and society.
- In the last decade there has been remarkable progress in understanding the biological processes that lead to several RMDs. Critically, however, the causes of RMDs are not yet known. As such, prevention is currently challenging or impossible.
- The foregoing biological discoveries have yielded new therapies that have brought significant improvements in some RMDs. However, many unmet clinical needs remain, and no cures exist. The costs of ongoing treatment are significant and rising for both the individual and society, and are unsustainable.
- A rigorous, dynamic and insightful research programme ranging from the molecule to the population is urgently required to inform the next steps in transforming the lives of people with RMDs. Engagement of, and participation by a broad range of experts will be critical. Patients should be included at every step of the process.
- Herein, EULAR presents a 'research roadmap' that defines the key issues which relate to the most common RMDs, and which should receive priority for intellectual and funding resources over the next decade. They should also contribute to social policy decisions across the health care spectrum.



Introduction

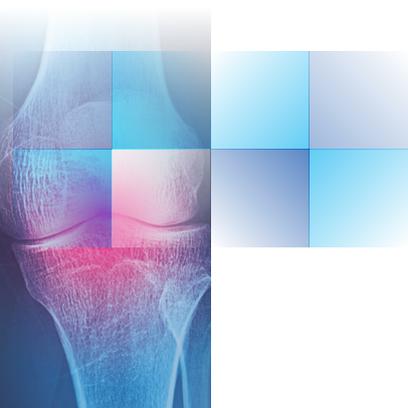
Rheumatic and musculoskeletal diseases (RMDs) are among the most prevalent, disabling and burdensome, non-communicable diseases in Europe eliciting high costs for European healthcare and social security budgets. The causes of more than 200 RMDs (including a number of rare diseases) are unknown and there are still no cures.

Research and innovation is crucial for improving our understanding of the causes and characteristics of RMDs and to therefore develop better prevention strategies and therapies. Research into RMDs, however, while focussing on a few areas quite successfully, is lacking coordination and integration with respect to long-term planning in many major areas. Research in Europe remains dispersed; scientific institutions are willing to cooperate, but depend on short-term project funding, limiting them to collaboration in often rather narrow areas. EU Member States and other European countries are promoting research into these diseases to very different degrees, and without sufficient cooperation, while priorities are often defined in total isolation across distinct states or regions.

Scarcity of funding resources, but also the need to foster scientific excellence throughout the continent, leads to the conclusion that strategic coordination for a field as important as RMDs would be of great added value. Furthermore, long-term strategic coordination will provide both the scientific community and funding organisations at international, EU and national levels with orientations for long-term investment – and inspire strategic prioritisation during the next decade.

In order to contribute to the development of the strategic coordination, the European League Against Rheumatism (EULAR) has proposed the European Roadmap for Research in Rheumatic and Musculoskeletal Diseases (RheumaMap) initiative. EULAR represents scientific societies, patient organisations and health professional associations from all European countries. This document has been developed in close collaboration with all EULAR stakeholders to include the range of relevant perspectives. This document presents the first version of RheumaMap, which will be further developed in the coming months and years, thereby serving as a 'living document' to best serve the dynamic and emerging needs of people with RMDs.

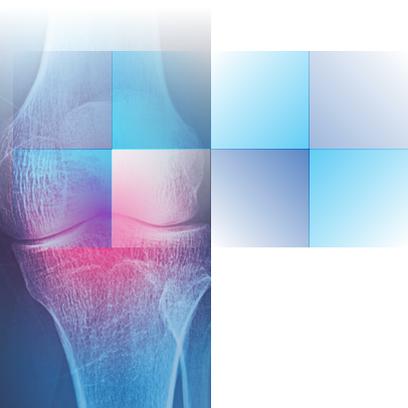
The roadmap identifies unmet needs and main challenges in research and innovation in RMDs, proposing key areas where long-term strategic efforts should focus over the mid/term in order to help reduce the enormous burden of these conditions in Europe. In this sense, the aim of RheumaMap is to guide scientific and policy efforts and investments in order to achieve substantial policy goals, as illustrated herein.



RheumaMap goals

- To **prevent** the onset of RMDs.
- To promote higher levels of early **diagnosis of RMDs**:
- To promote higher levels of secondary prevention (or mitigation of impact once established) of RMDs;
 - thereby to raise **visibility and recognition** of RMDs in patients, healthcare providers, and policy makers.
- **To optimise care of people with existing RMDs**:
 - Perform research that will move towards cure of those with RMDs (ideally drug-free or otherwise drug-maintained).
 - In the absence of the foregoing, to reduce the severity and duration of episodes of disease, leading to a novel concept of RMD secondary prevention.
 - To maximise strategies to reduce the impact of RMDs on quality of life, working across the entire societal spectrum.
 - To ensure outstanding, equitable outcomes through delivery of state-of-the-art care.
 - To generate excellent and highly cost-effective models for delivery of RMD care that can be applied across the EU and other European countries.
 - To enhance the relationship between the management of RMDs and employability, social inclusion and participation.
 - To enhance patient education and provision of information, extending this to inclusion of the family.
 - To understand those pathways and enact approaches thereafter that ensure optimal patient experiences of care and patient safety.
 - To reduce **morbidity** and **mortality** in people with RMDs.
- **To reintegrate individuals into society** built upon the benefits of treatment and encourage active participation of people with RMDs in the family, workplace and wider social life.

RheumaMap is expected to serve as a foundation for communicating with decision makers, the broad scientific community, funding institutions and key stakeholders on what to prioritise in order to better reduce the burden of RMDs in Europe.



About RMDs

Rheumatic and Musculoskeletal Diseases (RMDs) cover a wide range of painful medical conditions, affecting joints, bones, cartilage, tendons, ligaments and muscles. RMDs are typified by pain and a consequent reduction in the range of motion and function in one or more areas of the musculoskeletal system, which provides form, support, stability and movement to the body. Nevertheless, RMDs can also affect internal organs. They range from those that arise suddenly and are short-lived to life-long disorders. Typical examples of RMDs are osteoarthritis, rheumatoid arthritis, gout, osteoporosis, low-back and neck pain, fibromyalgia and systemic autoimmune diseases such as systemic lupus erythematosus.

RMDs pose a further significant risk to the population by virtue of accelerating a number of **co-morbidities** including increased rates of some cancers, cardiovascular disease, gastrointestinal disease, diabetes and increased rates of mental health disorders. As such RMDs comprise a major part of the rapidly increasing emergence of **multi-morbidity** whereby people present with more than one chronic illness, each impacting on the treatment and outcome of the other.

While RMDs occur at all ages, including in children and young adults, some RMDs such as rheumatoid arthritis and especially osteoarthritis preferentially appear in older people. RMDs affect both genders although the prevalence in women is generally higher, particularly in diseases such as osteoarthritis or osteoporosis.

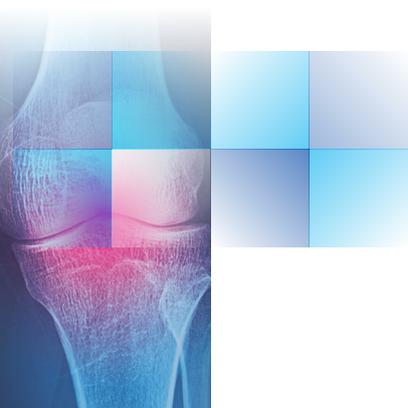
Many risk factors for RMDs are common for all chronic diseases. Obesity is known to increase the risk and progression of RMDs. Smoking, dietary factors and physical inactivity have been shown to be major preventable risk factors for several RMDs. Genetics often play a significant role in disease development and progression. Increasingly there is evidence for a role of the microbiome in the gut and the lung in RMD initiation and propagation. Moreover, there is evidence that RMDs can be caused or aggravated by work-related risk factors, such as repetitive movements, shifting heavy loads and prolonged standing or walking.

The burden of RMDs

It is now broadly recognised that RMDs represent one of the more burdensome chronic conditions affecting European societies. The high prevalence of RMDs as well as their disabling consequences impose an enormous burden not only on individuals and families, but also on our societies as a whole, particularly in terms of work and productivity loss as well as in terms of costs for our health care and social security systems.

RMDs affect around **25 percent of the overall EU population** (that is more than 120 million citizens) and a third of all people will be affected at some point during their lifetime.

Similarly, **RMDs are the number one cause of disability in Europe**. According to the Global Burden of Disease Study, RMDs are responsible for almost 30 percent of Years Lived with Disabilities (YLDs) in Europe (see figure 1).



The burden of RMDs

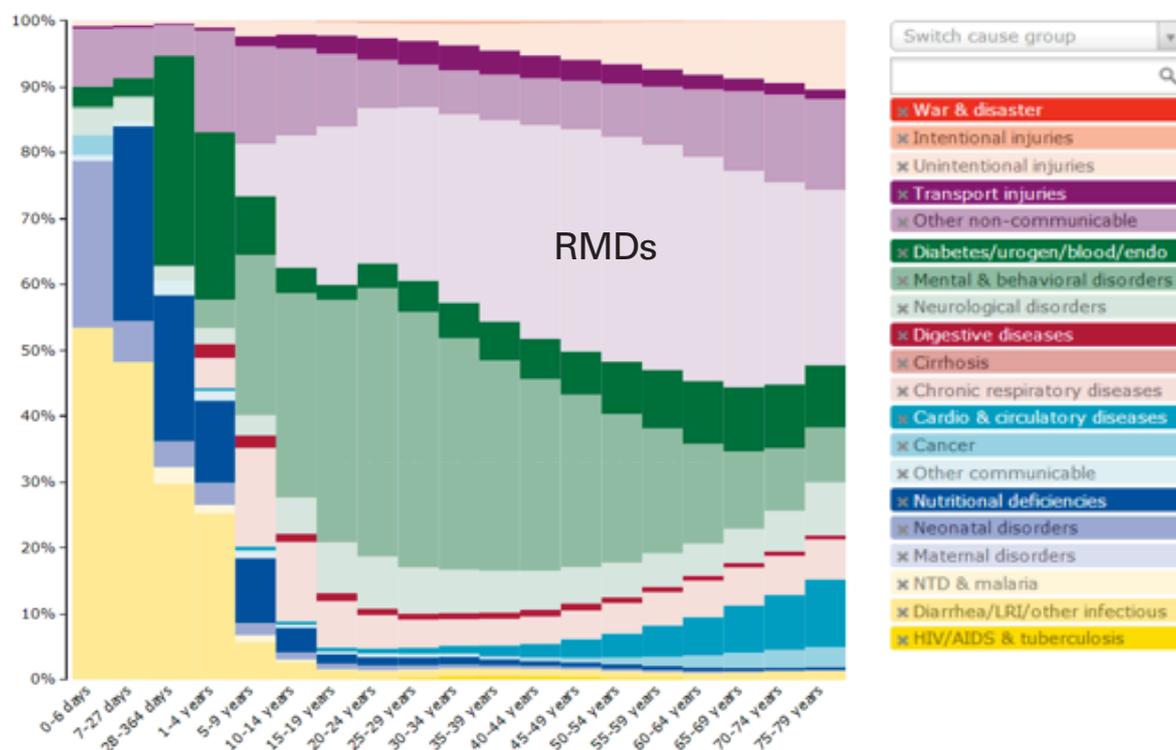
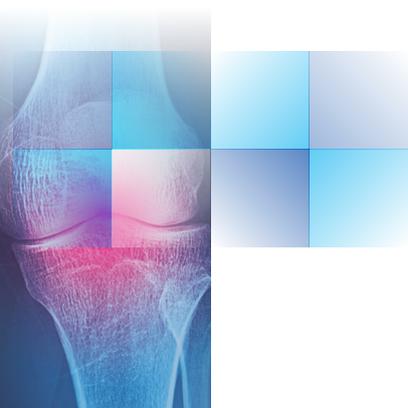


Figure 1 Years Lived with Disability (YLDs) in percent: EU & EFTA countries by cause (Murray, et al., 2010)

At the level of the individual, RMDs pose severe limitations on activities of daily living for a large proportion of the population. RMDs are often long-term remitting and relapsing conditions, bringing high direct and indirect costs to individuals and their families (including medical care, extra transportation or adjustments to the home environment, but also work loss or a need to change jobs to adapt to loss of function). In addition, RMDs often have an impact on emotional wellbeing and mental health, causing significant intangible costs. Commensurate with the co-morbidities described above, the prevalence of clinical anxiety and clinical depression in those with RMDs is about twice that seen in the general population. Despite this impact, the psychosocial aspect of RMDs is often overlooked when assessing the burden on patients and drawing up a tailored care plan.

Beyond the impact on individuals and families, RMDs impose an enormous burden on European societies, particularly in terms of productivity loss as well as in terms of health care and social security costs. RMDs currently represent a burden of EUR240 billion to European countries every year, while direct costs are estimated to represent 2 percent of the gross domestic product. The increasing number of older people and other changes in lifestyle across the age spectrum mean that the burden on people and society is set to increase dramatically.



In terms of productivity, RMDs can lead to significant work loss and inability to participate in preferred activities, thereby creating substantial indirect costs. RMDs are a major cause of productivity loss according to the European Agency for Health and Safety at Work (EU-OSHA),¹ either due to presenteeism (lost productivity while at work because of diminished capacity), absenteeism (time off work due to sick leave), work disability (permanent partial or complete disablement for work purposes), early retirement, premature death (income loss and reduced taxation revenue) as well as compensation for household work performed by others. The following figures depict the impact of RMDs on work and productivity loss:

- RMDs are the most prevalent occupational diseases at the European level, representing 38,1 percent of all occupational conditions.
- RMDs are the most common medical cause of long-term absence and the second only to respiratory disorders as a cause of short-term sickness absence (less than two weeks).
- The percentage of sick leave days attributed to RMDs ranges from 19 percent in Slovenia (2006) to 40 percent in Belgium (2008).
- Up to 60 percent of people taking early retirement or long-term sick leave in Sweden claimed RMDs as the reason.
- Within 10 years of RA disease onset, at least 50 percent of patients are unable to maintain a full-time job; patients who develop RA at a younger age (before 45) are more likely to become severely disabled than those who develop RA at a later stage (over 70).
- In Germany the **total productivity loss** as a result of RMDs stands at EUR8.5 billion, which represents 0.4 percent of Germany's gross national product.²

RMDs also represent one of the most important risks to the sustainability of health care and social security systems:

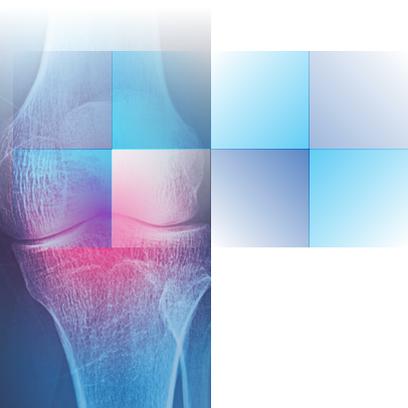
- RMDs are a major cause of disability and therefore lead to significant costs in terms of disability pensions and benefits. Disability pensions and allowances granted to people with RMDs are the most important ones (e.g. 35 percent in Austria in 2003; 30 percent in the Netherlands in 2010).³
- In the EU 24 percent of people report long-term treatment as a result of longstanding troubles with muscles, bones and joints.⁴
- RMDs are in the top 5 diagnostic groups in Europe in terms of healthcare costs.
- RMDs rank second as most common reason for consulting a doctor and for most countries they correspond to 10-20 percent of primary care consultations (In the UK, in 2003, the estimated cost of GP consultations for diseases of the musculoskeletal system was the third-highest of all disease groups at GBP1,340 million).

1. European Agency for Health and Safety at Work (EU-OSHA) (2010): OSH in figures: Work-related musculoskeletal disorders in the EU - Facts and figures, Luxembourg: Publications Office of the European Union.

2. *Ibid*

3. eumusc.net (2010)

4. European Commission (2007): Special Eurobarometer. Health in the European Union.

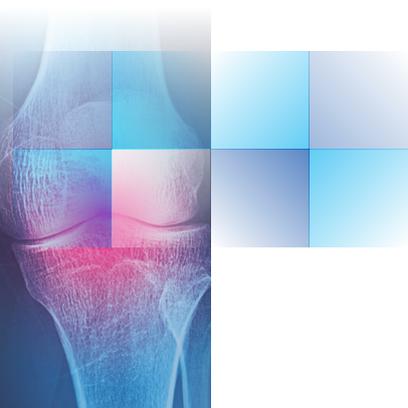


Roadmap for Research in Rheumatic and Musculoskeletal Diseases

Reducing the burden of RMDs in individuals and societies requires comprehensive and coordinated actions at different levels (European, national and regional) as well as in different policy areas such as public health and health care and employment and social affairs, but also medical research. Strengthening research and innovation in RMDs will ensure better, more efficient and more accurate prevention strategies and therapies. *RheumaMap* aims to contribute to the reduction of the burden of RMDs in individuals and societies by identifying priorities and main challenges that should inform RMD research and innovation.

Some common themes exist across RMDs: Across all of the RMDs, we propose a unifying imperative unmet need, which is to seek **preventative measures** for RMDs that will include for example identification of risk factors that can be modified, or earlier medical interventions based on early disease detection that can cure. Crucially, reduction in RMDs will **increase levels of physical activity** and in turn impact favourably on a range of other chronic disorders including cardiovascular disease, diabetes, cancer, Alzheimer's disease, depression and others. In addition, EULAR increasingly recognises that RMDs are reciprocally associated with an increased co-morbid burden including for example cardiovascular disease, depression and diabetes in those afflicted. A common research focus across RMDs is therefore to **understand, identify and treat aggressively co-morbid conditions that occur with RMDs**.

RheumaMap defines the key unmet needs across all RMDs – rigorous attention to this research agenda will provide for amelioration and eventually prevention of RMDs to the benefit of individuals and society at large. Below is a series of key point summaries defined within the major RMD that highlight their compelling unmet needs and research priorities.



Osteoarthritis

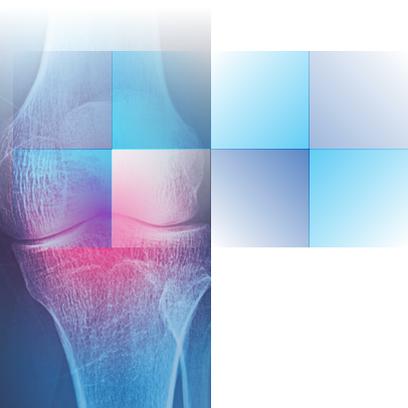
Osteoarthritis (OA) is considered the most prevalent chronic joint disease. The incidence of osteoarthritis is rising due to ageing populations, the epidemic of obesity and cardiometabolic syndrome. Pain and loss of function are the main clinical features that prompt treatment, including non-pharmacological, pharmacological, and surgical approaches. Osteoarthritis is a disorder involving movable joints characterised by cell stress and extracellular matrix degradation initiated by micro- and macro-injury that activates maladaptive repair responses including pro-inflammatory pathways of innate immunity. The disease manifests first as a molecular derangement (abnormal joint tissue metabolism) followed by anatomic, and/or physiologic derangements (characterized by cartilage degradation, bone remodelling, osteophyte formation, joint inflammation and loss of normal joint function) that can culminate in illness that is clinically obvious.

Current unmet needs

- There are no effective disease-modifying treatments
- Imaging and biochemical diagnostic and prognostic biomarkers are sub optimal
- Better phenotyping of OA patients to implement a precision medicine approach is required

Recommended research focus areas

- Identify and elucidate the role of genetic variants and epigenetics in OA phenotypes
- Identify and elucidate the role of epidemiologic factors including life style, occupational and other modifiable risks
- Identify markers for early OA, OA phenotypes, disease activity, disease progression, and of therapeutic response
- Understand tissue communication in OA (between cartilage, subchondral bone, synovium, blood vessels, adipose tissue)
- Understand non-cartilage pathology in OA
- Understand the mechanisms of mechanical joint injury and the translation to inflammation and repair
- Understand the relationship between synovitis, radiographic progression and pain
- Understand the relationship between ageing, gender and OA
- Understand the role of systemic factors in OA and also the mechanisms by which co-morbidities influence the OA process (e.g. fat and glucose metabolism)
- Identify and validate targets for therapy (to ameliorate pain and structure loss and improve function)
- Explore the impact of physical activity and life style changes on the progression of OA



There are many causes of inflammatory arthritis that can occur across the age groups. They are described in their distinct diagnostic categories below. They are unified by the common theme of the inflammatory / immune system attacking musculoskeletal tissues leading to pain, damage and loss of function.

Crystal Arthropathies

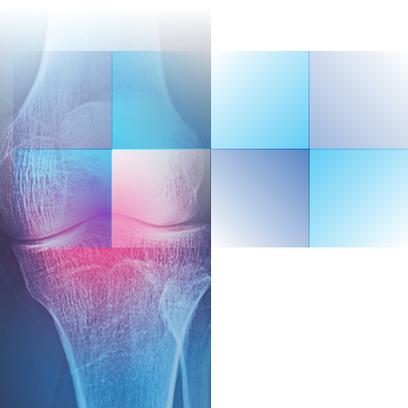
The two main crystal arthropathies are gout and calcium pyrophosphate crystal deposition (CPPD). Gout is highly prevalent, associates with multiple comorbidity, and is potentially “curable”. Chronic elevation of uric acid above the saturation point for sodium urate crystal formation is the main cause of gout. Gout is the most common form of inflammatory arthritis worldwide, and its incidence and prevalence are rising, largely due to increased longevity and the increased prevalence of cardiometabolic syndrome, of which hyperuricaemia is an integral part. Gout therefore affects 1 – 2.5 percent of the population within Europe. The unique characteristic of this RMD is that it is fully reversible by reducing serum urate levels to normal using currently available drugs and by addressing modifiable risk factors for hyperuricaemia. Gout associates with, and is a risk factor for, both cardiovascular disease and chronic kidney disease. An acute attack of gout prompts direct management, but in the long-term chronic urate-lowering treatment (ULT) is the challenge, since this is offered to the minority of people with gout, often at an insufficient dose, and without adequate explanation which results in poor adherence and lifelong suffering from gout (only <1 in 10 people with gout are “cured”).

Current unmet needs

- Failure to detect gout remains a common problem amongst general medical communities
- Once detected there is still too little adherence to guidelines and to maximising the impact of available therapies

Recommended research focus areas

- Delineate those genetic and epigenetic factors involved in the development of gout
- Understand disease pathogenesis thereby developing novel therapeutic leads to initiate preventative medicine approaches
- Develop strategies to improve the care of people with gout, which currently is worse than suboptimal and infrequently involves appropriate use of ULT
- Understand when best to treat asymptomatic hyperuricaemia
- Understand the pathogenesis (and best treatment options) of the acute gout attack
- Understand the interaction between gout, uric acid and cardiovascular disease
- Determine whether ULT improves cardiovascular and CKD outcomes, and reduces mortality
- Further development and continuous improvement of diagnostic and treatment algorithms as EULAR recommendations

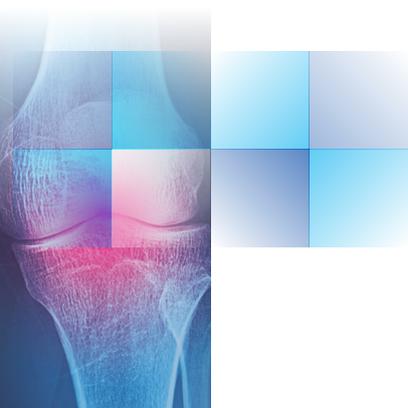


Rheumatoid Arthritis

Rheumatoid arthritis (RA) is an inflammatory arthritis that affects people from childhood to later years. Its prevalence is around 1 percent and as such it is the commonest inflammatory cause of disability. Whereas its causes are not yet known, it is associated with a strong genetic component, reflected in a frequent family history of disease, particularly implicating genes of the immune system. Environmental factors also increase risk particularly smoking and related lung diseases, and changes in the microbial make-up of the gut. Other lifestyle factors including obesity, vitamin D deficiency, lower educational attainment and lower alcohol consumption are also implicated. The last decade has seen remarkable progress in several key areas. *First*, we have developed several new 'biologic' (injected) therapies based on our increased understanding of the pathogenesis of disease – key exemplars include inhibitors of TNF and IL-6 receptor, together with drugs targeting key cells of the immune response such as B and T cells. More recently new small molecule (oral) drugs have been developed that offer significant benefits. *Second*, we have established that regardless of drug choice the key strategies of treating early and with a defined disease activity target will significantly improve outcomes. Thus, it has become imperative to make an early diagnosis and to treat judiciously to reduce the risk of damage that typically ensues upon uncontrolled joint inflammation. Damage of joints in turn leads inexorably to loss of function and long-term disability. Finally, we now appreciate that RA is associated with other co-morbidities particularly those that affect the vascular system (such that heart attacks and strokes are more common), the brain (leading to increased rates of depression), bone (leading to increased osteoporosis and fracture risk) and to increased rates of some cancers (especially lung and lymphoma).

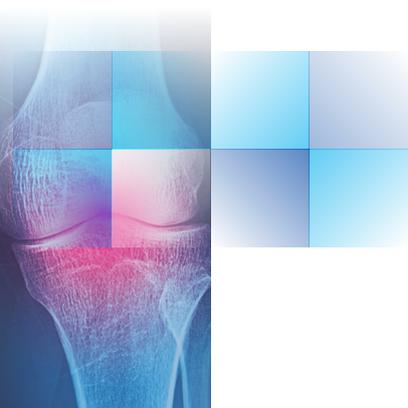
Current unmet needs

- Treatment-free remission, ie. we require a cure for RA
- New therapeutics that address those who are no longer or have never responded to existing therapies. Implicit is understanding of non-response to our current medications
- Repair of damage to joints, ligaments and tendons caused by RA – it is important to better manage the large number of people already affected by the disease
- Explanation of the various causes of pain in RA, such that pain management strategies can be improved
- Fatigue is poorly understood and not well treated
- Predictors, or biomarkers for prognosis, therapeutic stratification, safe withdrawal of therapy and of true remission are not yet available and would permit 'stratified medicine'
- Emotional / psychological support remains sub optimal
- Patient education e.g. in managing side effects of treatment and to promote self-management techniques require improvement



Recommended research focus areas

- Understand how epidemiologic and lifestyle factors promote onset and perpetuation of RA
 - Identify and elucidate the role of genetic variants and epigenetics in RA phenotypes
 - Identify markers for early RA – extending to better definition of pre-RA. Thereafter to develop therapeutics that can prevent RA once the risk has been quantified
 - Identify markers for distinct end types (subgroups) of RA that might be amenable to guiding treatment options or risk of toxicity, and also to predict disease progression and natural remission, and for true remission
 - Identify and validate new targets for inflammatory disease based on improved pathogenesis understanding, especially in those not responding to existing therapeutics
 - Develop medicines capable of resetting immune function and thus leading to ‘cure’ of those already with disease
 - Better understand the molecular and cellular basis of remission when it is achieved, and flare when that occurs
 - Better distinguish inflammatory and non-inflammatory causes of pain in the context of RA
 - Develop improved imaging modalities for the characterisation of RA
 - Identify the causes of fatigue in RA
 - Identify the key pathways that drive co-morbidities that reduce life expectancy and accelerate poor function and disability
 - Share new learning across diseases of the potential for regenerative medicine for reparative purposes in joints, ligaments and tendons
 - Understand the needs for, and the best means of delivery of emotional and psychological support
 - Develop effective patient education / self-management programmes
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Spondyloarthritides

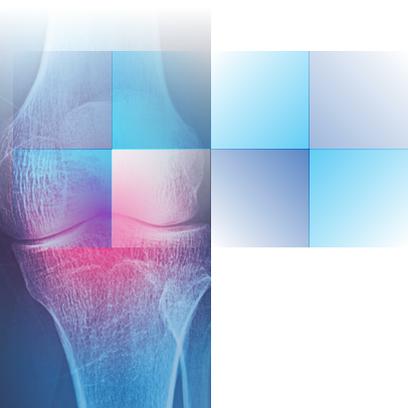
Spondyloarthritis (SpA) describes a group of chronic inflammatory diseases with a heterogeneous presentation. They may mainly affect the spine, associated with inflammatory back pain or peripheral joints leading to arthritis, enthesitis and dactylitis. In severe cases, this may result in a complete fusion of the spine. Frequently, SpA is associated with symptoms in the skin (psoriasis), gastrointestinal tract (inflammatory bowel disease) or eye (acute anterior uveitis). These distinct pathologies can be present in various combinations. There is a strong genetic relationship with immune genes, particularly HLA-B27. Onset of the disease is normally in early adulthood and affects males and females. Prevalence of the disease is around 1 percent. This imposes a major burden for patients, their families and societies.

Current unmet needs

- Pathogenesis understanding remains poor, including particularly the relationship between inflammation and bone remodelling
- Novel diagnostic tests are urgently required
- Long-term outcome for patients without structural damage are not clear
- Treatments inhibiting bone formation are lacking
- Treatment strategies require to be defined to optimise care

Recommended research focus areas

- Understand disease pathogenesis including understanding of discrete tissue manifestations (including eye, skin and gut) and the role of contributing genetic and epidemiologic factors
- Understand mechanisms of bone proliferation and bone loss, even occurring in the same patient
- Optimise use of imaging techniques (MRI, CT-scan) for diagnosis, outcome assessment and monitoring
- Identify markers for distinct endotypes of SpA that might be amenable to guiding treatment options or risk of toxicity, and also to predict disease progression, organ involvement and natural remission, and for true remission
- Define the effect of early treatment on treatment response and long-term outcome.
- Perform treat to target strategy trials including various biologicals and new emerging oral therapeutics
- Facilitate appropriate early recognition of SpA and better referral strategies
- Curate long-term cohorts that start with sufficiently early disease as to be informative
- Refine diagnostic algorithms
- Generate novel diagnostic tests
- Explore the impact of physical activity and life style changes on the progression of SpA



Psoriatic Arthritis

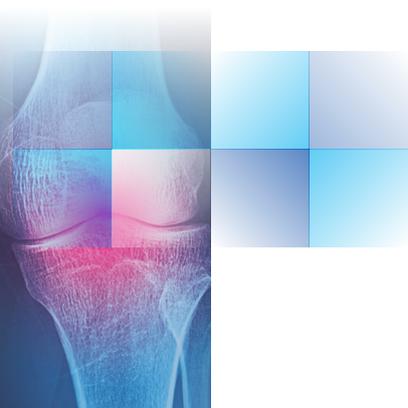
One third of people with psoriasis also develop a chronic, potentially disabling arthritis – termed psoriatic arthritis (PsA). PsA presents with symptoms of pain and swelling in peripheral joints but also may involve tendon insertions, spinal joints and whole digits (dactylitis). PsA is associated with severe nail disease and comorbidities including obesity, depression, heart disease and diabetes. In addition to high levels of pain and reduced mobility, PsA sufferers experience poor quality of life, high rates of healthcare utilization and significantly reduced work productivity. PsA pathogenesis is characterised by several genetic factors and immune system disturbance, with increased activation of inflammatory pathways specifically relating to T-cells and associated cytokines e.g. IL17, in addition to TNF. Blood vessel function and growth is also significantly disrupted. Physical and psychological stress also appear to be significant factors.

Current unmet needs

- Over 50 percent of sufferers are unrecognised and untreated
- High levels of progressive disease go unchecked
- Personalized medicine strategies are not available
- Poor understanding of disease pathogenesis remains a block to new therapeutic developments
- High levels of comorbidities are especially troublesome and impact significantly on quality of life

Recommended research focus areas

- Advance our understanding of disease pathogenesis based on genetic, epidemiologic and comparative tissue studies
- Immune system dysfunction needs to be measured in humans such that immune homeostasis can be re-established
- Identify biomarkers of disease and response to therapy and potential toxicities
- Define the role and impact of imaging in the treatment of PsA including MRI and ultrasound
- Better organise health care programmes to combine expertise of rheumatologists and dermatologists in the management of the disease to provide integrated decision making.
- Develop a 'Precision medicine' strategy



Juvenile Idiopathic Arthritis (JIA)

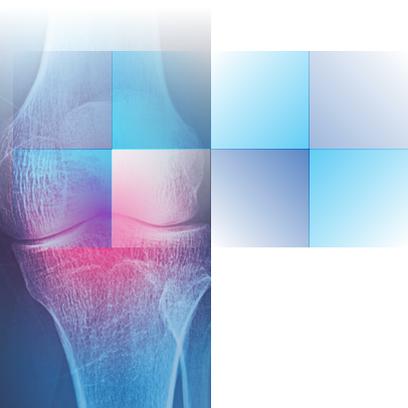
JIA is the most common childhood chronic rheumatic disease. It is one of the most common chronic diseases in childhood, leading to significant morbidity and long-term disability. In Western countries, it has an incidence varying from 2 to 20 and a prevalence between 16 to 150 per 100,000. JIA represents a group of diseases rather than a single disease entity and remains classified based on general clinical features. A pathophysiology based classification system is still lacking. Though JIA has obvious similarities with adult Rheumatoid Arthritis, the comparison does not hold in many other aspects. Critical differences exist not only in clinical expression, but also in genetic susceptibility and inheritance, prognosis, presence and absence of auto-antibodies, and treatment response. To date, treatment of JIA is based on therapies developed for adult RA. However, based on the striking differences between them it is unlikely that the optimal treatment of both diseases is the same. The need for a novel approach to develop innovative therapies in JIA is pressing: Despite increased efforts and investments into R&D, the output of new anti-inflammatory, disease-modifying medicines is disappointing. Even successful interventions with key inflammatory pathways with so-called biological agents fail to permanently restore the immune balance, necessitating life-long treatment. Such life-long treatment may interfere with growth and development of children and thus represents a real risk of long-term, yet unknown adverse events. Biomarkers that could help to mitigate these risks though prediction of disease course, response to therapy and potential side effects of treatment are lacking.

Current unmet needs

- The interplay of genetic and environmental factors in disease pathophysiology is poorly understood
- Biomarkers to predict disease prognosis, true (biological) disease remission and long-term side effects are lacking
- A pathophysiology based classification system is required
- Network of expertise and information in JIA throughout Europe is not optimally established

Recommended research focus areas

- Create detailed pathogenesis discovery programmes focussed specifically on childhood inflammatory arthritis
- Biomarker development for different endotypes of JIA and for disease trajectory prediction
- Precision Medicine strategies
- Build networks to facilitate broad ranging research collaboration
- Develop strategies and methodologies to share information (Registries & best practices) throughout Europe
- Develop an immune pathophysiology-based new classification system of JIA
- Identify the potential for psychosocial support systems for the patient and the family in addressing chronic disease in young people
- Identify optimal mechanisms to ensure education attainment and subsequent lifelong productive employment
- Understand the optimal approach to physical activity maintenance
- Identify strategies to ensure optimal growth and achievement of developmental milestones



Osteoporosis

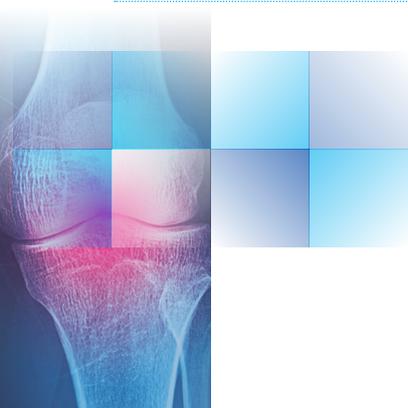
Currently it is estimated that over 200 million people worldwide suffer from osteoporosis, therefore this disease is considered a serious public health concern. Approximately 30 percent of all postmenopausal women have osteoporosis in the United States and in Europe. At least 40 percent of these women and 15 - 30 percent of men will sustain one or more fragility fractures in their remaining lifetime. (<http://www.iofbonehealth.org>). As the population ages, the rates of osteoporotic fractures will increase. Osteoporosis occurs as either a primary or a secondary form. Primary osteoporosis is age related and occurs in postmenopausal women and in men in the absence of an underlying disease. Secondary osteoporosis is defined as low bone mass with micro architectural alterations in bone leading to fragility fractures in the presence of an underlying disease and/or medication. Glucocorticoid-induced osteoporosis (GIOP) is the most common form of secondary osteoporosis. Although endogenous hypercortisolism or Cushing's syndrome can be associated with bone loss, most of the patients suffering from GIOP receive glucocorticoids for the treatment of a variety of diseases, including RMDs such as rheumatoid arthritis, vasculitides, and connective tissue diseases.

Current unmet needs

- The burden of osteoporosis is growing, but there is a declining pattern of osteoporosis testing and treatment
- Available data describing frequency and severity of secondary forms of osteoporosis such as GIOP are fragmentary
- There is poor understanding of osteoporosis pathogenesis, particularly with regard to the relationship between inflammation, treatment with glucocorticoids & other anti-rheumatic drugs, and osteoporosis
- Even after a fracture, osteoporosis is often neither discussed with patients nor treated appropriately (although fractures are associated with subsequent fractures)
- Long-term outcome of patients with rheumatic diseases with regard to bone/osteoporosis are lacking
- Laboratory markers and technical measurements allowing more exact quantitation of bone quantity, quality and microarchitecture are needed in order to better predict fracture risk
- Novel treatments are required
- Improved treatment care strategies are required

Recommended research focus areas

- Advance our understanding of disease pathogenesis, especially that of secondary osteoporosis forms including that arising from glucocorticoids
- Analyse the interplay between rheumatic disease, treatment of this disease, bone quality/quantity/microarchitecture and osteoporosis
- Learn more about interactions between immune system and bone, and anti-rheumatic treatments and bone
- Identify reliable biomarkers and better technical measurements for diagnosis of osteoporosis and/or assessing response to therapy of osteoporosis
- Tailor osteoporosis management to patient characteristics in order to identify and treat as early as possible patients who are at highest fracture risk



Systemic Autoimmune Diseases (including connective tissue diseases)

These comprise a range of inflammatory disorders that have the capacity to target a variety of tissues and this may lead to a very wide range of symptoms and signs. By corollary, their impact can be very profound indeed e.g. by involving major organs such as the heart, kidney and/or brain and leading to rapid onset of disability and premature death. Collectively they pose significant unmet needs defined as follows. Thereafter we lay out disease specific research needs.

Current unmet needs

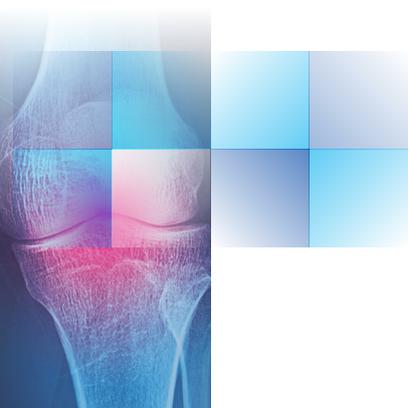
- Disease modifying therapies that can reduce the clinical burden across a wide range of tissues are currently absent or suboptimal
- There is an urgent need for improved imaging and biochemical diagnostic biomarkers
- There is need for better phenotyping of the various CTD to allow a more pathogenesis focussed approach to their treatment

Systemic Lupus Erythematosus

Limited epidemiological data estimate a prevalence of Systemic Lupus Erythematosus (SLE) in the range 8 - 20 per 100,000 within Western Europe with a higher prevalence people of Asian and African ancestry. It is a prototypic systemic autoimmune disease with a female preference (80 percent) and enhanced mortality leading to premature death of 5 - 8 years. Many tissues can be targeted by the disease including the skin, joints, kidneys brain nerves, heart, blood vessels and lungs. With the exception of belimumab, recent advances of targeted therapies have only moderately improved patients' care in SLE.

Recommended research focus areas

- Epidemiology studies across different European ethnic backgrounds to understand the polygenic basis and environmental influences on disease phenotypes
- Identify immunopathogenic aspects of distinct genetic backgrounds including deep sequencing, immunologic and serologic characteristics of clinical subgroups
- Understand early SLE with a view to prevention of disease or disease progression
- Re-evaluate classification criteria and early diagnosis of SLE to further improve treatment strategies
- Develop treatment guidelines for best use of currently available therapeutics
- Trial new drugs in defined SLE subgroups on smaller scale and using surrogate endpoints. Such work will likely require further outcome measure developments.
- Trial immunosuppressive drugs previously not tested in SLE (e.g. repository trials)
- Improve understanding and management of non-immunological manifestations, such as fatigue and depression of SLE
- Understand the mechanisms and optimal treatment of comorbidities in SLE

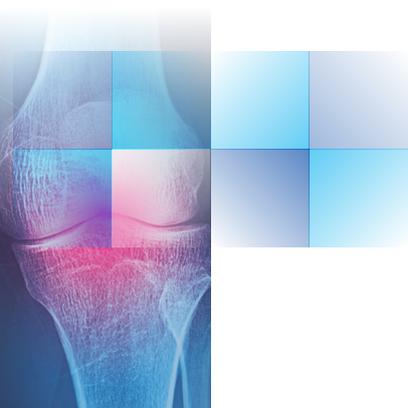


Antiphospholipid Syndrome

An autoimmune disease with high health economic burden related to acquired thrombo-embolic events and obstetric complications, i.e. recurrent abortions (about 20 - 30 percent of all recurrent abortions). This syndrome, initially considered as part of SLE, is a key example that a distinct pathophysiology, such as hypercoagulation, represents a distinct clinical entity with defined clinical treatment consequences – this syndrome responds to anticoagulation but not to immunosuppression.

Recommended research focus areas

- Define immunopathogenic aspects of distinct factors leading to arterial, venous occlusions versus obstetric complications
- Perform epidemiology studies assessing the prevalence of APS as cause of acute myocardial infarctions, cerebrovascular events and venous thrombosis/lung embolism among the overall entities
- Understand the genetic basis and environmental influences on emerging disease phenotypes
- Perform trials assessing safety and efficacy of antiplatelet therapy versus oral anticoagulation with vitamin K antagonists and newer oral anticoagulants for the treatment of cerebrovascular and venous thromboembolic events
- Improve understanding of the role of endothelial activation in APS
- Prospectively evaluate the risk of antiphospholipid antibody-positive individuals to develop vessel complications

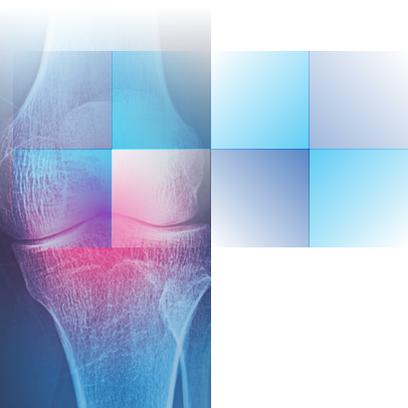


Vasculitis

Vasculitis, immune mediated inflammation of the blood vessel wall, can occur independently, (e.g. granulomatosis with Polyangiitis, Giant Cell Arteritis) or as part of another RMD, such as rheumatoid arthritis or SLE. The aetiology of vasculitides is unknown, but is clearly multifactorial, including ethnicity, genes, gender, and environmental factors. Vasculitis might be localised to a single organ, but is more often generalised. Location of the vasculitis determines its symptoms. The systemic vasculitides are a heterogeneous group of relatively rare conditions (less than 3 per 1000 persons) involving blood vessels of various size, from the aorta and its branches (as seen in giant cell arteritis - GCA) to small vessels as the primary site of inflammation. Related to GCA is polymyalgia rheumatic, that is characterised by pain, aching and morning stiffness in the shoulder girdle, pelvic girdle and neck; incidence increases with age (up to 1percent >60 years) and, as in most RMDs, women are more often affected than men. The different forms of vasculitis may be organ or even life threatening, and intensive immune suppression is warranted in order to prevent permanent disability and death. Glucocorticoids are still essential in treating vasculitis; however, they have significant side effects such as osteoporosis, diabetes and cardiovascular disease. Classic immunosuppressive drugs, and increasingly biologicals are used to reduce the burden caused by steroids.

Recommended research focus areas

- Delineate genetic and epigenetic factors involved in the development of the different forms of vasculitis
- Increase understanding of disease pathogenesis, thereby developing novel therapeutic leads to initiate preventative and precision based medicine approaches
- Perform investigation of potentially triggering bacterial and virus infections and their interaction with the Immune system
- Develop novel therapeutic approaches and treatment strategies for both induction and maintenance therapy of vasculitides to reduce the adverse event burden of standard treatment (e.g. glucocorticoids, cyclophosphamide, mycophenolate)
- Explore early detection of polymyalgia rheumatic and giant cell arteritis in order to save sight and prevent (other) ischemic complications
- Improve early diagnosis of vasculitides
- Further development and continuous improvement of diagnostic and treatment algorithms as EULAR recommendations; develop care strategies involving different medical disciplines and health professions



Autoimmune Myositis

Polymyositis and dermatomyositis together with inclusion body and necrotic myositis (less frequent), carry a substantial burden of co-morbidities and increased mortality. They manifest as weakness of major muscle groups and can be complicated by skin, lung and nervous system abnormalities.

Recommended research focus areas

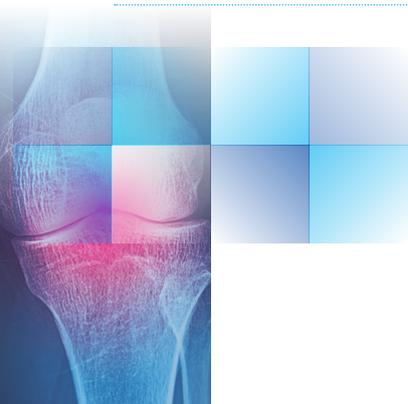
- Delineate genetic and immunopathogenic differences of the four distinct clinical entities
- Perform comprehensive epidemiology research (in collaboration with neurologists) to assess the prevalence, clinical characteristics including comorbidities of autoimmune myositis subtypes and support international registries of these infrequent entities
- Identify the key pathogenetic effector pathways by studying human disease ex vivo and in refined model systems of disease
- Perform trials assessing safety and efficacy of new immunosuppressive agents and otherwise available compounds not yet tested in these diseases
- Developing and continuous improving treatment algorithms as EULAR recommendations

Primary Sjögren's Syndrome

The hallmark primary Sjögren's syndrome (pSS) is a generalized dryness of the eyes and mouth, skin and vagina, which is known as sicca syndrome. Besides sicca pSS can affect other organs of the body, including the muscles, peripheral nervous system, kidneys and lungs. Patients with pSS have a notably higher incidence of malignant non-Hodgkin's lymphoma. Most reported problem by patients is however a substantial and overwhelming fatigue. pSS is a common rheumatic conditions with an estimated prevalence of 0.5 percent. There is a female prevalence of 9:1. The cause of pSS is unknown but is clear that genetic and epigenetic factors are implicated. There is no effective therapy for pSS and trials are hampered by a lack of robust response criteria reflecting disease response in all its facets.

Recommended research focus areas

- Delineate genetic and epigenetic factors involved in the development of pSS
- Increase the understanding of disease pathogenesis thereby developing novel therapeutic leads to initiate preventative medicine approaches
- Identify the earliest molecular changes in the blood and exocrine glands in pre-clinical disease (non-Sjogren sicca) leading to autoimmune exocrinopathy (gland disease)
- Develop novel treatment strategies
- Understand the cause of fatigue and tissue dryness in pSS patients
- Develop biomarkers for the identification of early disease opening avenues for disease interception (leading to preventative medicine)
- Develop biomarkers for disease progression and/or complications most specifically to identify those patients at risk for developing malignancy
- Further development and continuous improvement of diagnostic and treatment algorithms as EULAR recommendations

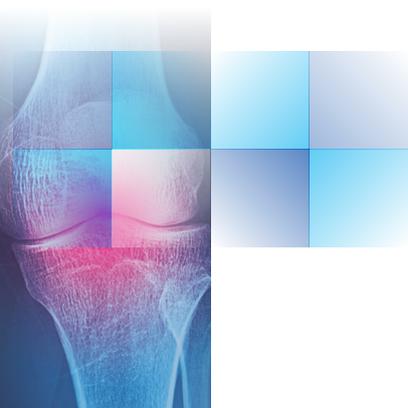


Systemic Sclerosis

Systemic sclerosis (SSc) is an autoimmune fibrotic disorder where a multitude of genetic and epigenetic as well as environmental factors lead to disease. The earliest phase of SSc is typified by ongoing inflammation and microvascular remodelling (resulting in progressive loss of capillaries) somehow culminating in fibrosis of skin, lungs, heart and other organs. The most feared complications are pulmonary arterial hypertension, renal crisis and pulmonary fibrosis that account for most SSc related deaths. SSc still has a 10-year survival of only ± 50 percent. Although SSc is a rare condition affecting 0.01 percent of the population with a clear predominance for females, it is seen as an exemplar fibrotic condition that if understood, could lead to clear insights into other fibrotic conditions. As SSc is usually preceded by the presence of Raynaud's phenomenon, this provides the opportunity to investigate the earliest damage on the microvasculature (endothelial cell damage) together with immunological changes (specific autoantibodies) leading up to full blown disease.

Recommended research focus areas

- Delineate genetic and epigenetic factors leading to disease development from the earliest phases of pre-clinical disease
- Increase the understanding of disease pathogenesis thereby developing novel therapeutic leads to initiate preventative medicine approaches
- Develop biomarkers and test new diagnostic tools that investigate the early microvascular damage for the identification of early disease opening avenues for disease interception (preventative medicine)
- Develop biomarkers for disease progression and/or complications and prognosis



Soft tissue rheumatic diseases

Typically, the term soft tissue RMDs (STRMD) is applied to a group of conditions that are not marked by systemic disease but with a local or regional presentation involving muscles, tendons, ligaments or bursae. Typical STRMDs include mechanical back pain, tendinitis and bursitis, peripheral regional presentations such as soft tissue shoulder pain, and conditions related to specific activities such as sports or occupational participation. In some cases, such as with Benign Joint Hypermobility Syndrome, Fibromyalgia or Chronic Regional Pain Syndrome the distinction can be blurred, either with an underlying systemic syndrome increasing the risk of soft tissue rheumatic symptoms or the absence of a clear aetiology despite significant symptoms. The impact of soft tissue rheumatic diseases can be profound, both in terms of the significance to the individual but also in terms of workplace injuries and disabilities with a high prevalence of these conditions in the population. Furthermore, it is important to consider the relationship between STRMD conditions and the multiple comorbidities that often co-exist.

Local soft tissue disorders result in significant demand in primary and secondary care services. This group of conditions is characterized by features that require special consideration in research planning. There are important risk factors for these disorders including mechanical exposure and workforce demands (repetition, high workplace demands with poor control and support). Over 40 million workers in Europe are affected by musculoskeletal conditions attributed to their work. Despite the great burden imposed on the health economy they are often associated with poor clinical definition and diagnostic criteria, resistance to objective measurement and require treatments that are often physical in nature and therefore susceptible to bias in the conduct of randomized clinical trials.⁵

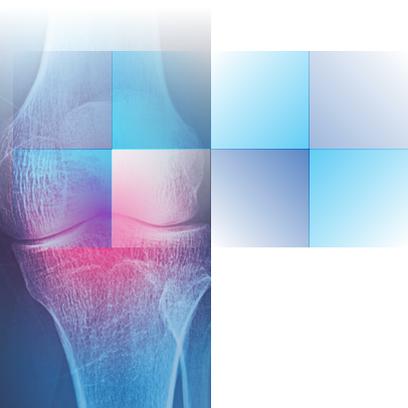
Current unmet needs

- Effective treatments for most STRMDs are lacking
- There is little understanding of the underlying pathology of these conditions
- There is often a fractured approach to their diagnosis and management between primary and secondary care and across health professional groups

Recommended research focus areas

- Promote research which captures cutting edge methodology to understand pathogenesis
- Thereby understand the pathogenesis of common soft tissue rheumatic disorders at a cellular or molecular level
- Develop useful outcome measurements
- Focus on health economics and cost effectiveness in clinical trials to capture the scale of these conditions in the population
- Investigate specific and non-specific treatment effects of given interventions
- Understand the contextual effects of care
- Develop intervention models that match the natural history of common RMDs

5. Fit for work? Musculoskeletal disorders in the European workforce; Bevan S, Quadrello T, Mc Gee R, Mahdon M, Vavrovsky A, Barham L (2009) <http://www.theworkfoundation.com/Reports/224/Fit-for-Work-Musculoskeletal-Disorders-in-the-European-Workforce>



Pain

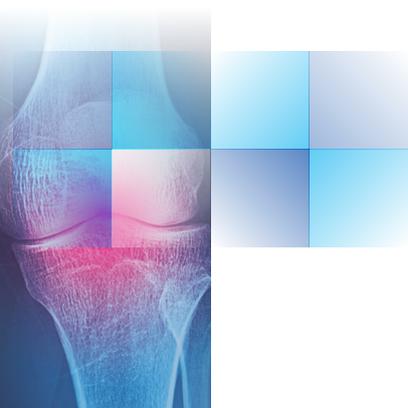
1 in 5 people throughout Europe have persistent moderate or severe pain. Of these people, around half will be in constant pain. Few are managed by pain specialists and a sizeable minority (40 percent) have inadequate management of their pain. Most of pain reported is musculoskeletal in origin, the most common sites being low back, shoulder/neck, hip and knee pain. However, pain is a common feature of almost all RMDs and (together with fatigue) is a crucial determinant of patients' quality of life, function and the ability to remain in work. Outcome of patients presenting to general practice with pain, is most strongly influenced by psychosocial factors.

Current unmet needs

- Most patients with chronic pain do not have access to pain management specialists
- Chronic regional pain especially of the neck can be associated with an additional burden arising from neurological and neuromuscular symptoms imposed on top of the local presentation
- Interventions are often complex, targeting components of the musculoskeletal system, the neurological system and less well understood pain sensitization pathways
- Pharmacological management for chronic pain generally results in modest improvements and patients will often experience important, quality of life influencing side effects
- Non-pharmacological management is equally important but even those demonstrated to be effective, although leading to increased quality of life, result in relatively modest improvements in pain

Recommended research focus areas

- Investigate tailored management to patient characteristics and likely prognosis or therapeutic response patterns
- Identify those patients that benefit most from behavioural therapies. Can behavioural therapies be delivered at lower cost either through training of non-specialist staff, delivered in new ways (e.g. online) and/or delivering to groups of patients?
- Identify whether combined pharmacological and non-pharmacological approaches to management are more effective than single modality management
- Understand prescribing patterns of opioid therapy, determine the medical and social consequences associated with opioid therapy and determine effective ways to reduce or stop opioids in such patients
- Determine what aspects of a healthcare system optimise outcome for patients with complex chronic pain conditions



Given its importance in most patient surveys, and omnipresence in the majority of RMDs, we offer regional dissection of the major impact of pain as follows:

Mechanical back and neck disorders

Non-specific back pain (as opposed to inflammatory back pain) affects approximately one third of the adult population each year, and approximately 1 in 15 people access public health care as a consequence. Standardised pathways exist for the management of mechanical back pain and in the first instance are directed at stratifying risk and directing patients toward self-management or more interventionist approaches. Self-mediated exercise and activity, accompanied by behaviour modification are known to be helpful in a large proportion of cases. This can be supplemented by physical therapy intervention although the effect of 'dose' is poorly understood and is often impacted by pressures within the health care system. Braces and splints are generally not well-tolerated and other device-based interventions such as laser, TENS and h-wave have yielded conflicting evidence for effectiveness. Direct injection can provide short-term relief and there is a growing body of evidence around the use of pharmacological agents that act on the pain pathways. Invasive options vary and are associated with generally similar long-term outcomes to non-surgical interventions.

Recommended research focus areas

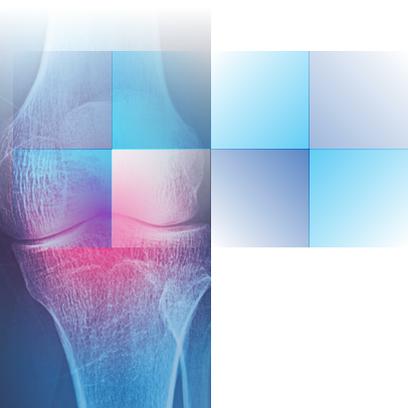
- Perform international studies to investigate the health and economic benefits of stratified back care pathways
- Develop a better understanding of the role of supported self-mediated exercise and activity in low risk mechanical back pain
- Investigate the dose-response relationship for physical therapies
- Evaluate the effectiveness of invasive procedures such as facet joint injection and radiofrequency lesioning
- Perform trials comparing the effects of manipulation, anti-inflammatory drugs and injections in neck pain
- Generate pan-European approaches to delivering programmes to reduce injury and reduce recurrent absences from work

Foot pain

Foot pain has a similar level of impact as does hip and knee pain although there are fewer definitive treatment options. Footwear advice and modification is of demonstrated benefit in some presentations and provision of insoles, orthoses or specialist footwear may also help in some cases. Physical therapies can be of some benefit. Injectable and surgical interventions for non-specific soft tissue foot pain are of variable efficacy.

Recommended research focus areas

- Evaluate the effectiveness of insoles in the management of non-specific foot pain
- Evaluate the role of footwear in management (risk factor, prognostic factors, and possible treatment)
- Define the role of exercise and other interventions for heterogeneous foot presentations
- Identify the value of early footwear assessment and management in reducing referrals for knee replacement surgery
- Evaluate the role of the multi-disciplinary team in the targeted regional management of foot pain



Shoulder pain

Shoulder pain interventions are often complex, combining elements of strength, mobility, neuromuscular control, behavioural change as well as directly targeted invasive interventions such as manipulation under anaesthetic, injections with agents such as corticosteroid or platelet rich plasma, and lithotripsy for calcific tendinitis. Surgical options are numerous with approaches including tenoplasty, patch grafting and joint reconstruction.

Recommended research focus areas

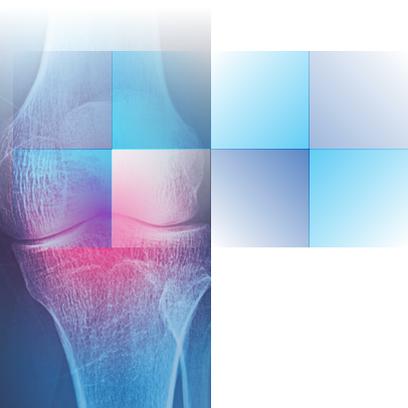
- Understand the pathogenesis of the variety of causes of shoulder pain e.g. tendinopathy
- Investigate the development and testing of stratified care for shoulder disorders
- Develop targeted care pathways
- Promote collaborations between research groups to ensure larger trials with wider applicability to clinical practice
- Perform direct comparison of glucocorticoid injection, or other locally injected therapeutic entities or cell based preparations and physical therapy interventions
- Clarify the use of ultrasound and MRI to improve diagnosis and surgical interventions
- Develop novel therapeutic targets to define more appropriate medical interventions

Carpal tunnel / wrist pain

Carpal tunnel syndrome (CTS) is a nerve entrapment syndrome affecting the wrist and hand, and is often associated with local as well as radiating pain and symptoms. It is of political significance because of its association with workplace activities. CTS affect between 1 - 3 people per 1000 per year and is difficult and costly to treat. There is controversy over the effectiveness of surgical intervention compared to conservative care although surgery is becoming more widely accepted. Existing studies into the conservative management of carpal tunnel/hand/wrist pain can be grouped into four main areas: behaviour, education and exercise (with limited evidence); physical devices for which there is some supportive evidence; pharmacological (including injections), which are advocated prior to any surgical intervention; and other (including complementary therapies). Carpal Tunnel release is the most common surgical intervention for CTS, performed either through an open incision or endoscopically.

Recommended research focus areas

- Understand the basic pathogenesis of CTS
- Promote collaborations between research groups to ensure larger trials
- Perform investigations of workplace options for modification of activity

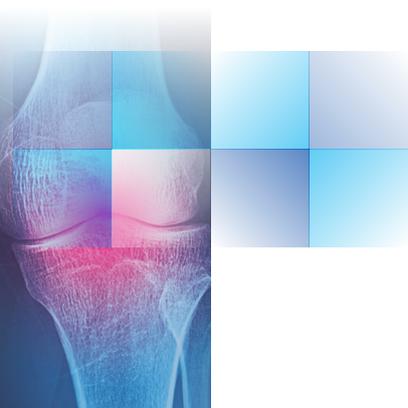


Fibromyalgia

Fibromyalgia syndrome is characterized by chronic widespread pain and a variety of associated symptoms. The precise pathogenesis is not known but altered pain system function has been shown in some patients. The healthcare utilization by patients with FMS is high (EUR2000 per patient per year). Existing EULAR guidelines recommend combined approaches of behaviour/activity modification with additional psychological input. Some physical therapies (for example, heated pool) have been shown to be effective. Direct interventions using device-mediated (electrical and magnetic) interventions are of unknown benefit. There is some evidence of benefit of pharmacological interventions targeting pain pathways and anxiety.

Recommended research focus areas (in addition to what is mentioned under pain - see above)

- Understand the pathogenesis of fibromyalgia
- Elucidate the extent of contribution of CNS dysfunction
- Better understand the physical / psychological interactions that may contribute to the disorder
- Investigate multi-system interventions including activity, behavioural and pharmacological approaches



Conclusion – RheumaMap

Rheumatic and musculoskeletal diseases (RMDs) place an enormous burden on European society. 120 million people are already affected, a number that will rise sharply as populations age. Those afflicted suffer pain, disability and socioeconomic deficit as individuals. The collective impact of RMDs challenges the sustainability of health care and social security systems whilst hindering the productivity of European economies as a whole.

Furthering research and innovation in the field of RMDs is therefore crucial. We urgently require evidence based policies, such as improving access to timely, high quality health care and improvement of working conditions, if we are to improve treatment and eventually prevent RMDs. People with RMDs deserve to lead independent lives, remain active in the labour market and fully participate in the fabric of our community. There is thus both a duty and an overwhelming business case for supporting the economic and social participation of people with RMDs. However, the impact of these policies will be limited without a better understanding of the aetiology and antecedents of RMDs, more accurate diagnostic tools, more effective therapies to limit and prevent their disabling consequences and, eventually, a pathway to a cure. It will be best achieved by facilitating full participation of people with RMDs in the prioritisation of research topics and the design and conduct of research.

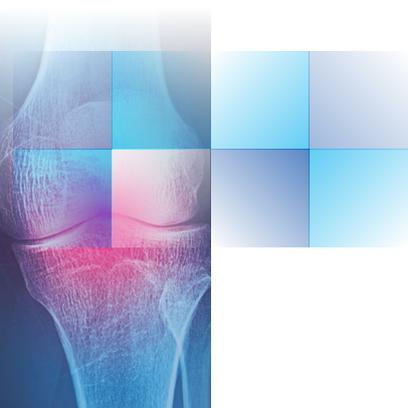
Research in the field of RMDs, particularly in Europe, has advanced significantly in recent years. Substantial unmet needs in the area of research, highlighted in the RheumaMap, will however require an altogether higher level of commitment and innovation. Implementation of the distinct elements contained in RheumaMap will rely on scientists, patients and health professionals. Equally, it will require an unwavering, strong commitment from policy makers across Europe and at the national level, as well as the support of international organisations, industry and other stakeholders.

The good news is that the means to success are clearly laid out before us. A multi-faceted approach that includes a clear policy dimension can, if properly implemented, generate a positive evolution in the management of RMDs along the entire pathway, from therapeutic innovation to treatment and rehabilitation to prevention.

Prioritising the unmet research needs for RMDs as laid out in the RheumaMap will require a long-term perspective. The tremendous potential for benefit will only arise when Member States of the EU, other European countries, and European institutions develop new ways of working together to address the challenge of RMDs. All parties now have the opportunity to develop a jointly owned, long-term strategy to extend the level and effectiveness of RMD research and to ensure that outcomes translate into societal benefit at scale. A new form of co-operation is therefore required to maximise cost effectiveness whilst increasing equality of outcomes for citizens.

With RheumaMap, EULAR and the RMD community anticipates, and stands ready to support, such commitments and collaboration. We see this roadmap as a 'living document', to be updated as the respective unmet needs are addressed and the research agenda evolves accordingly.

EULAR envisages a unique opportunity to create a bright future and hereby invites policy-makers and stakeholders to discuss, adapt and implement RheumaMap over the coming years.



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EULAR would like to thank the Task Force and the many other individuals involved in this project for their contributions.

Rheumatic and Musculoskeletal Diseases (RMDs)

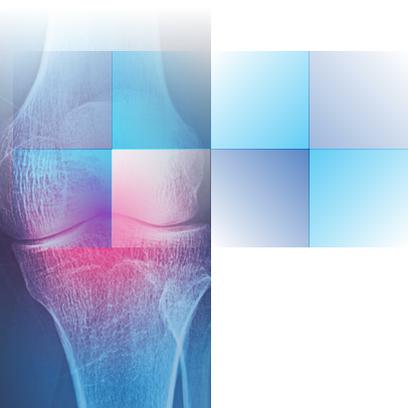
Rheumatic and musculoskeletal diseases (RMDs) are a diverse group of diseases that commonly affect the joints, but can also affect the muscles, other tissues and internal organs. There are more than 200 different RMDs, affecting both children and adults. They are usually caused by problems of the immune system, inflammation, infections or gradual deterioration of joints, muscle and bones. Many of these diseases are long term and worsen over time. They are typically painful and limit function. In severe cases, RMDs can result in significant disability, having a major impact on both quality of life and life expectancy.

About EULAR

The European League Against Rheumatism (EULAR) is the organisation which represents the people with arthritis/rheumatism, health professional and scientific societies of rheumatology of all the European nations.

The aims of EULAR are to reduce the burden of rheumatic diseases on the individual and society and to improve the treatment, prevention and rehabilitation of musculoskeletal diseases.

To this end, EULAR fosters excellence in education and research in the field of rheumatology. It promotes the translation of research advances into daily care and fights for the recognition of the needs of people with musculoskeletal diseases by the governing bodies in Europe.



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