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## Perceptions Relating to Exercise in Rheumatoid Arthritis

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### 1. Introduction

Historically, the recommendation of exercise for patients with rheumatoid arthritis (RA) has been avoided by clinicians due to fears that such activity may contribute to joint damage and result in worsening of disease. Hence, previous treatment of active RA has included bed rest and splinting of the affected joints (Partridge & Duthie, 1962). Over recent decades however, the numerous physiological advantages of exercise have become well-established and include improved cardiovascular health, increased muscular hypertrophy and increased bone mineral density. Enhanced physical function and psychosocial advantages have also been shown in followers of a continued exercise programme (Baillet et al., 2009; Bilberg et al., 2005; de Jong et al., 2003, 2004; Hakkinen et al., 2001; Lemmey et al., 2009; Marcora et al., 2005; Melikoglu et al., 2006; Van Den Berg et al., 2006; van den Ende et al., 1996, 2000). Importantly, it has also been found that high-intensity exercise training is of superior effectiveness, with no detrimental effect on disease activity. This has been confirmed in patients with controlled (Ekdhahl et al., 1990; Lemmey et al., 2009; van den Ende et al., 1996) and active RA (van den Ende et al., 2000). Furthermore, as advances in pharmacological treatment work to effectively control disease, this patient group are now able to tolerate regular, progressive and intensive exercise (Lemmey, 2011). A recent systematic review also provides further information as to the benefits, effectiveness and safety of exercise in RA (Hurkmans et al., 2009).

Patients with RA are also at an increased risk for cardiovascular disease (Metsios et al., 2008), cachexia (Walsmith & Roubenoff, 2002) and osteoporotic fracture (Van Staa et al., 2006). Therefore, the aforementioned improvements associated with exercise are vital in limiting the negative consequences inherent to the disease. Furthermore, physical activity has been found to be a significant predictor of the number of hospital admissions and the length of hospitalisation in RA (Metsios et al., 2011). In light of this evidence, exercise is now considered an essential component within the management of this condition. However, despite this it is apparent that RA patients are less physically active than the general population (Sokka et al., 2008), and greater medical costs are coupled with this inactivity (Wang et al., 2001). Therefore it is important for those involved in the care of RA patients to be aware of factors that may positively and negatively affect the uptake and maintenance of an exercise prescription for this patient group.

This chapter will discuss the perceptions of patients and health professionals in relation to exercising with RA, alongside the implications and recommendations for patient care. Many of these issues have been highlighted as part of our continuing research and it is the findings from these novel investigations, alongside others, which form the basis of this chapter. Illustrative quotes from patients and practitioners have been included to facilitate description of these issues.

## 2. Patient perceptions relating to exercise in RA

Understanding the perceptions of people with RA regarding exercise is vital to assist in the initiation of and adherence to effective exercise training (Cooney et al., 2011). Primarily, a positive mindset regarding exercise prescription is necessary in order to challenge the long-standing opinion that exercise exacerbates disease (Gecht et al., 1996). However, many patients harbour concerns relating to the potential detrimental effects of exercise and perceive specific barriers to uptake and participation. Furthermore, due to uncertainties about which exercises to do and how to do them without causing harm, many patients feel they are unable to exercise at all. Encouragingly however, qualitative research has revealed that patients with arthritis believe exercise to be an important factor in treatment (Lambert et al., 2000; Law et al., 2010).

Qualitative research methods, including the analysis of focus group discussions and one-to-one interviews, have been successfully utilised in the clinical setting. These methods allow the researcher to gather rich, plentiful data and enable an in-depth description of experiences, thought-processes and beliefs (Kitzinger, 1995; Ong & Coady, 2006). In patients with osteoarthritis, a qualitative study following the onset of disease revealed a subgroup of patients who had previously exercised but had stopped because of their symptoms and because they believed exercise was damaging their joints (Hendry et al., 2006). As may be expected of a condition that presents with similar symptoms (i.e. joint pain, swelling and stiffness), comparable perceptions have been confirmed in RA patients (Law et al., 2010). This study involved four moderated focus groups of RA patients (n = 18) and included both males and females of varied ages and disease duration, thus incorporating a broad range of experiences. Systematic content analysis of the discussion transcripts formed the basic meaning units for analysis. These quotes were then categorized, smaller constructs or sub-themes were grouped, and the following main themes were identified: 'Health professionals showing a lack of exercise knowledge', 'Not knowing what exercise should be done', 'Not wanting to exercise as joints hurt', 'Worry about causing harm to joints' and 'Having to exercise because it is helpful'. Following discussion and comprehensive data interrogation, an analytical model was then developed (Figure 1). These themes were then used to develop a questionnaire to collect analogous quantitative data. Preliminary results (n = 247) from this questionnaire offer confirmatory findings of the prevalence of these issues in a larger population (Law et al., manuscript in preparation).

### 2.1 Perceived benefits of exercise

Although RA patients appear to be insufficiently active (Sokka et al., 2008), research suggests they are aware that exercise is a beneficial and necessary aspect of their disease management (Lambert et al., 2000; Law et al., 2010). This notion is reflected in the theme that emerged from focus group research; '**Having to exercise because it is helpful**', indicating

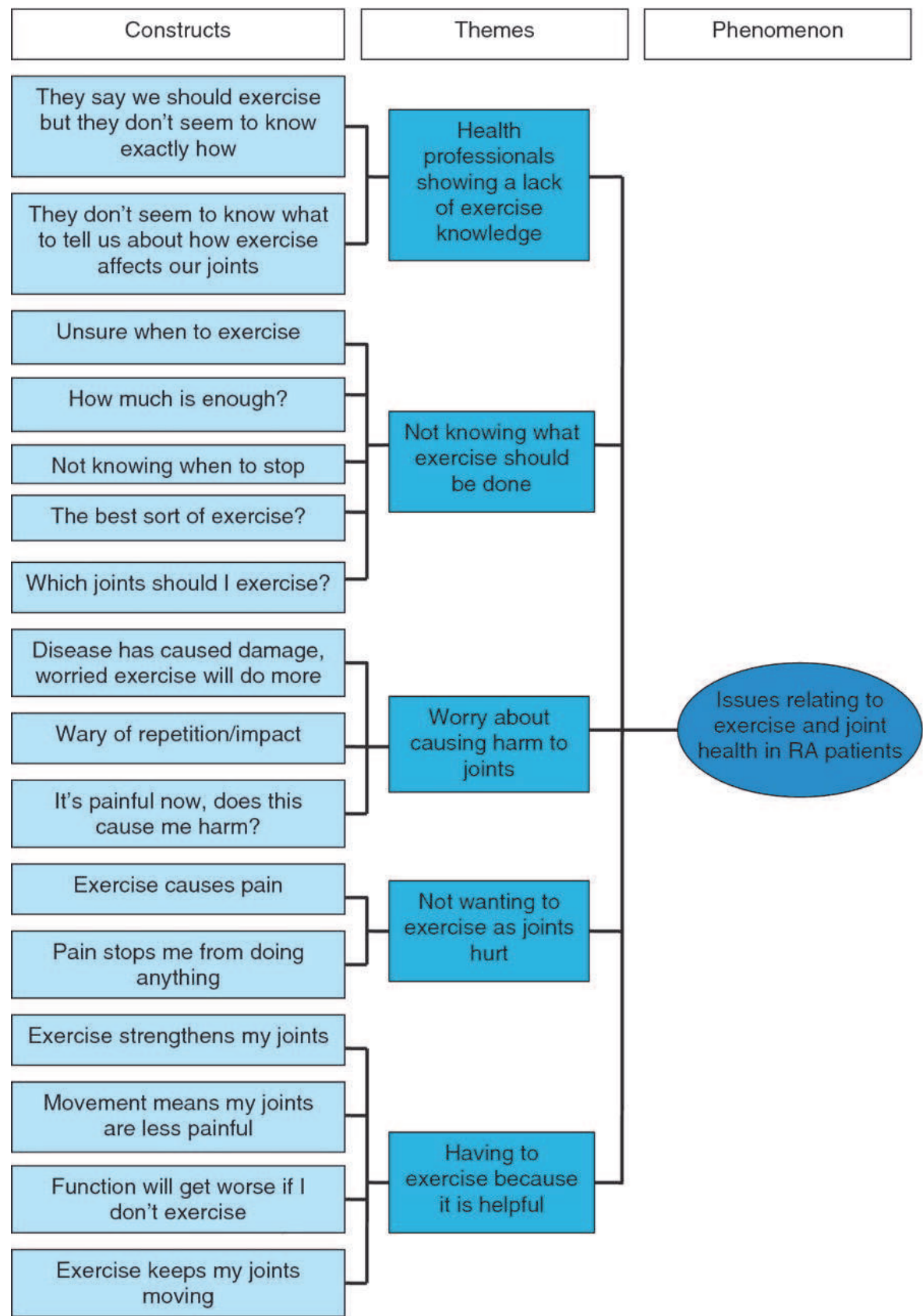


Fig. 1. Analytical model of the issues relating to exercise and joint health in RA patients (Law et al., 2010).

that patients felt they needed to exercise in order for strength, mobility, pain relief and functional benefits to occur. Example quotes are shown below:

*'I only do it [exercise] because I know it benefits me. I don't do it because I enjoy it.'* (65 year old female)

*'If you're strong where the muscles are, it helps to take the weight off the joint.'* (74 year old male)

*'...it [the exercise] improved the pain and it improved the mobility.'* (65 year old female)

*'I'm frightened that if I don't get up every morning, if I stay in bed it will become progressive.'* (66 year old female)

Additionally, the notion of having to exercise because it is helpful was upheld in our questionnaire study. Over two thirds of patients either agreed or strongly agreed with items relating to this theme. These items included statements such as 'Exercise helps to keep my joints moving' and 'I feel exercise relieves joint pain'.

However, it is important to note that not all patients considered exercise as advantageous and some felt that exercise is not 'helpful' as it causes pain or makes their condition worse. This is shown by the following quotes:

*'...you come back to this exercise business and you come back, exercise is painful...'* (67 year old male)

*'I actually find if you push yourself it makes it [RA] worse.'* (56 year old female)

These negative perceptions, alongside other barriers, will be discussed in more detail throughout this chapter. Overall however, it is apparent that patients do perceive that exercise will be of benefit. Yet, if the perception that exercise as a positive feature of RA treatment is to supersede any negative connotations, continual emphasis and education of the benefits is critical (de Jong et al., 2004; Gecht et al., 1996; Neuberger et al., 2007).

## 2.2 Barriers to exercise

Within the general population, numerous barriers to exercise have been shown to exist (Trost et al., 2002). These barriers are broad and also affect the RA population. However, there are additional barriers that exist within the RA population, arising as a result of the local and systemic characteristics of the disease. Psychosocial aspects also make significant contribution. Concerns relating to joint health and limitations in exercise prescription are also key issues and are discussed in following sections.

Specific barriers to exercise in the RA population include musculoskeletal pain and fatigue. Medications and physical capabilities have also been highlighted as factors affecting patients' exercise behaviour, alongside complications associated with additional comorbidities. Time constraints brought about by lifestyle and other commitments are factors common to both the general and RA patient population, often further compounded by the distance necessary to travel to an exercise facility, alongside limited methods of transportation. Barriers such as a lack of enjoyment, motivation and confidence have also been identified, and especially for those on a limited income, concerns about cost and a lack of adequate insurance are also prevalent amongst non-exercisers (Gyursik et al., 2009; Hutton et al., 2010; Law et al., 2010; Neuberger et al., 2007; Shutzer & Graves, 2004; Wilcox et al., 2006). Table 1 displays a summary of these barriers, highlighting in bold those that are specific to arthritis. Examples relating to enjoyment, access and fatigue are provided here; quotes relating to pain will be provided later:



*'Even on days when I do have time, I think I'd rather be doing something else'* (65 year old female)

*'You want something there [somewhere to exercise], something you can access easily.'* (58 year old female)

*'...you get very tired with this. Sometimes in a week you might feel exhausted, doing nothing'.* (46 year old female)

Physical	Psychological/ behavioural	Social	Environmental
Pain before exercise	Lack of time	Lack of encouragement	No arthritis-specific facilities
Pain during exercise	Lack of enjoyment	Lack of acknowledgement of arthritis	Weather/surfaces
Pain after exercise	Not a priority	Lack of information from healthcare provider	Cost
Fatigue	Feeling that 'physically can't'	Nobody to exercise with	Transportation
Impaired mobility	Lacking in skills	Competing roles and responsibilities	
Co-morbid conditions	Fear of a flare-up		
Joint swelling/stiffness	Stress		
Muscle/joint pain	Perceived negative outcomes		
	Perceived lack of positive outcomes		
	Worry about putting health at risk		

Table 1. Summary of barriers to exercise in arthritis (adapted from der Anian et al., 2006; Gyursik et al., 2009; Hutton et al., 2010; Law et al., 2010; Wilcox et al., 2006;). Those specific to arthritis are shown in bold.

This summary table has been created based upon our focus group research and the work of four other groups exploring barriers to exercise in patients with arthritis. Wilcox et al., (2006) conducted twelve focus groups including 68 adults with arthritis and described differences in barriers to exercise between 'exercisers' and 'non-exercisers'. Various barriers to exercise were identified, many of which were similar to those that have been described by the general population (Troost et al., 2002). However, as shown in bold in Table 1, others were unique to people with a chronic disease such as arthritis. Those patients who were already exercising indicated barriers similar to those who were not, but these did not

prevent them from exercising. This was mainly because they felt able to make modifications and accommodate physical limitations.

Research by der Anian et al., (2006) also investigated barriers to exercise amongst individuals with arthritis and included a subgroup of patients who were defined as 'insufficiently active'. These patients felt that they could not perform any more exercise because of their pain and because they did not know which exercises were safe or appropriate to do. In addition, they appeared to lack the knowledge necessary to modify exercise routines. It was also more common for these 'insufficiently active' individuals to express the need for more detailed advice.

The Obstacles to Action study (New Zealand) (Hutton et al., 2010) used a questionnaire to investigate factors influencing exercise participation for individuals with self-reported arthritis. These authors also compared participants defined as 'active' with those who were 'insufficiently active'. Arthritis, fatigue, and discomfort were ranked by both groups as the top three barriers. Further confirming the findings by Wilcox et al., (2006), the active participants reported significantly lower impact scores for these barriers than the inactive group, with these findings persisting after adjustments for occupational status, body mass index, and co-morbidities. They also revealed that active people with arthritis believed more strongly in the benefits of physical activity, reported significantly higher levels of encouragement from others, and had greater overall levels of self-efficacy when compared with the less active participants.

Gyursik et al., (2009) used a web-based survey to explore the frequency of barrier occurrence and extent of limitation brought about by barriers to exercise. Arthritis-specific personal barriers such as pain (reported by 50% of the sample) and fatigue (reported by nearly 40% of the sample), were more commonly reported than generic barriers (e.g. lack of time, bad weather). Interestingly, barrier frequency did not predict physical activity, further suggesting that it is the individual perception of the impact of the particular barriers and the ability to overcome these that is important. Coping strategies, such as thinking about the disease-specific health benefits and activity modification, were also reported in this study.

The barriers to exercise that exist in the general population also affect individuals with RA. However, our qualitative research highlighted further barriers specific to this patient group, including those relating to joint health, limited exercise prescription and pain. Similar to that of previous researchers, it appears that those patients who were attendees of a specialised exercise class perceived these barriers to exercise as less of a hindrance (Law et al., 2010). Nevertheless, and especially for those patients with no prior exercise experience, methods of overcoming these barriers are essential to ascertain and implement. This will be discussed in later sections.

### **2.3 Perceptions relating to exercise and joint health**

RA is often associated with impaired joint health, including joint inflammation, pain and damage, and it appears that these physical manifestations create additional barriers to exercise for RA patients. Corresponding with this, the perception that exercise may have detrimental effects on joint health has been found to exist in many patients with RA (Law et al., 2010). In particular, joint pain has been highlighted as a definitive barrier and has also been perceived as a prominent factor in determining patients' exercise behaviour (der Anian

et al., 2006; Gyursik et al., 2009; Hutton et al., 2010; Wilcox et al., 2006;). The negative influence of pain on patients' exercise behaviour was also described during our focus groups, forming the theme '**Not wanting to exercise as joints hurt**'. This was discussed in terms of disease-related pain before, during and after exercise. Example quotes are shown below:

*'There's only one word that affects my exercise behaviour and that's pain.'* (66 year old female)

*'I mean you can't exercise if you are in pain can you. You can't really do anything.'* (57 year old female)

*'...if it hurts you don't want to move.'* (46 year old female)

This patient described how she felt in terms of her RA in the days after exercising:

*'Immediately it would ache for a bit, then ease off and then the day after, it would still be, I know that was what aggravated it.'* (40 year old female)

An interesting contrast is also provided with regards to this theme, with some patients (especially those who had previously been involved in exercise), suggesting that they would continue exercising even if it was painful as they felt it was '*worth the risk*' (69 year old male). Furthermore and as previously mentioned, perceptions indicating that patients have experienced feelings of reduced pain have been noted (Wilcox et al., 2006). This was also indicated in our focus group research, as shown by the following quote:

*'...best way to relieve pain is to do something and it [exercise] seems to soothe it and it goes away.'* (67 year old male)

As became clear in our focus group study, it is evident that patients with RA have concerns about the effects of exercise on joint health. Empirical evidence from a randomised controlled trial investigating the effects of a 2 year, high-intensity exercise programme also brought attention to this issue (de Jong & Vliet Vlieland, 2005). Whilst there was no evidence of further damage to the small joints of the hands and feet (de Jong et al., 2003), radiological evidence from a subgroup of exercisers indicated accelerated progression in large joints which had extensive, pre-existing damage (Munneke et al., 2005). However, the authors have since retracted this conclusion after a follow-up study at eighteen months was not able to confirm this trend (de Jong et al., 2009). Nonetheless, apprehension felt by patients in our focus groups regarding joint damage as a consequence of exercise was reflected in the theme '**Worry about causing harm to joints**'. The dialogue below provides an example:

*'The worry is whether you are damaging yourself really.'* (66 year old male)

*'Yeah.'* (44 year old female)

*'Am I going to be worse as a result of it?'* (73 year old male)

*'That's a significant anxiety for me.'* (66 year old male)

As highlighted in the following quotes, it also became clear that previous damage and pain provoked additional concern:

*'You can do all the exercises out, it won't affect what's at the back of your head saying, if I do that, will I do any damage to what's already been damaged?'* (67 year old male)

*'...if you do something and it's that painful, it must be doing your joints some damage.'* (66 year old female)



On the other hand, qualitative research has revealed that some patients *feel* that their joints benefit from exercise, with quotes indicating the view that joints are ‘lubricated’ as a result of movement and patients have expressed that they feel more agile (Kamwendo et al., 1999; Law et al., 2010). This is demonstrated by the quote below:

*‘...it helps to keep them lubricated doesn’t it. It helps keep you moving, exercise. If you don’t they seize up...’* (65 year old female)

Overall, however, as factors salient to individual beliefs regarding the effects of exercise, patient perceptions relating to joint health, pain and damage are important to consider when addressing the issue of exercise for this population. Moreover, just under half of the patients involved in our follow-up questionnaire study indicated agreement with items relating to the themes ‘worry about causing harm to joints’ and ‘not wanting to exercise as joints hurt’ (Law et al., manuscript in preparation). Therefore, it is evident that RA patients need continued reassurance and encouragement that exercise is a vital part of disease management and that the aforementioned benefits are achievable *without* unfavourable effects for joint health or disease activity.

## 2.4 Perceptions relating to exercise prescription

The pharmacological treatment of RA involves a clear and specific prescription for medication. However, despite recommendations by the British Society for Rheumatology (BSR; Luqmani et al., 2006; 2009), National Institute of Health and Clinical Excellence (NICE, 2009), European League Against Rheumatism (EULAR; Combe et al., 2007) and the American College of Sports Medicine (ACSM; Nelson et al., 2007), that exercise should be incorporated into the treatment of people with RA, specific recommendations are less clear. Corresponding with this limited clarity, research suggests that a perceived uncertainty about which exercises to do, and how to do them, may be inhibiting patients from participating in regular exercise (Lambert et al. 2000, Law et al. 2010). Emerging from our focus group research, the theme ‘**Not knowing what exercise should be done**’ reflects patients’ concerns about not knowing enough about exercise with respect to their disease. Patients discussed doubts about the best forms of exercise to undertake and were unclear how much exercise they should do. Discussion relating to sufficient exercise intensity and heart rate also took place, with questions arising as to whether fast walking would be enough, and how breathless they should feel. Example quotes are provided below:

*‘If you do it fast it does raise your heart rate. And how much do you need to raise your heart rate, you don’t know how much. Do you raise your heart rate until you can’t breathe?’* (65 year old female)

*‘...It’s just the type of exercise that you do. Obviously not something too strenuous, but sometimes you need reassurance as well before you do something. You think well, is that good for me or is that bad for me?’* (23 year old female)

*‘Do you think you have to do different exercises for muscle to joints?’* (65 year old female)

*‘Do you know, I haven’t got a clue’* (56 year old female)

Furthermore, patients also showed concern about the possibility that they might do something wrong. This is demonstrated by the following quotes:

*‘Yeah, it’s, what is the exercise about. How do I do it, will it affect my worse little bits. You’ve got to go through the bit about it, you’ve got to read what the exercise is, you’ve got to look at what the exercise is, will I be alright with it ...’* (67 year old male)

*'It's difficult to know where to draw the line between 'oh for goodness sake, give it a bit of effort' ... or 'you know this is harmful, it's time to stop.'* (57 year old female)

*'Only if you do too much I think.'* (62 year old male)

*'Or if you do the wrong thing as well, I think you could easily do the wrong thing.'* (46 year old female)

Furthermore, repetitive, impact-based exercise and pain provoked additional concern as shown in the quotes below:

*'....got to be careful of a repetitive move.'* (58 year old female)

*'I think impact is really disastrous ...'* (66 year old female)

*'....I don't think weight impact, I don't think that would be very helpful.'* (62 year old male)

As previously mentioned, high-intensity exercise is now considered to provide the greatest benefit. However, in a study by Munneke et al., (2003), the outcome expectations of patients for a high-intensity exercise programme were found to be significantly less positive when compared to a conventional exercise programme. In this study, conventional exercise was described as 'calmly performed exercises for the joints not leading to tiredness, e.g. bending and stretching of the arm' and high-intensity exercise as 'individually tailored and supervised physical fitness and strength training exercises for the whole body leading to tiredness'. As will be discussed later, it was found that health professionals also held the view that conventional exercise was preferable for a patient with RA. Despite this however, the majority of patients indicated that they thought an intensive exercise programme would be attainable for at least half of their patient group.

An additional theme that emerged from our focus groups offered further insight into patient perceptions relating to exercise prescription. The theme **'Health professionals showing a lack of exercise knowledge'** reflected patient perceptions that, while health professionals advocated exercise, there were uncertainties regarding the specifics of exercise prescription. Furthermore, when exploring this issue on a larger scale, our questionnaire study revealed that less than 20% of patients agreed that health professionals showed exercise knowledge. Patients were also unsure whether or not current disease state (i.e. pain and fatigue levels) affected the overall benefit of exercise. As previously mentioned, further uncertainties were perceived in relation to concerns within the health profession about exercise and joint health. These views are demonstrated in the following extract:

*'...if I do that sort of thing and I get pain, I can go on doing it, now my next question [to a health professional] is am I doing myself harm if I get pain?' (66 year old male)*

*'...mmmm'* (73 year old male)

*'Yeah'* (44 year old female)

*'[The health professional] can't tell me, right'* (66 year old male)

*'No, that's what worries me'* (65 year old female)

*'Nobody knows'* (66 year old male)

These perceptions relating to exercise prescription suggest that patients require education to include specific exercise recommendations that are of sufficient intensity to provide

beneficial effects. Furthermore, there is a perception amongst patients that health professionals lack clarity and certainty regarding exercise, especially in relation to joint health. This perception of health professionals is also an important area to explore in order to determine if and where uncertainties exist, alongside the best way to deliver a clear and consistent message to the patient population. It may be that a firm and assertive approach to recommending exercise is important when prescribing exercise to people with RA.

### 3. The impact of the health professional

The health professional has an important role when prescribing exercise to a patient with RA. Due to the nature of their condition, RA patients are in frequent contact with their healthcare team and place great value on the information they provide (Lambert et al., 2000; Kamwendo et al., 1999). Hence, this regular contact forms an integral part of patient perceptions relating to exercise. However, evidence suggests that this is not a source from which they consistently get appropriate information (Lambert et al., 2000; Law et al., 2010). For example:

*'I would really like to know what they call exercise and whether or not it conforms to what I think is exercise'* (66 year old male).

On the other hand, health professionals are increasingly involved in conducting or referring to an exercise programme and those focus group patients who attended a specialised exercise class (an 8-week circuit-based exercise programme of 8–12 stations) demonstrated more experiential and education-derived knowledge of the types of exercise they could do. This is also consistent with findings comparing the views of active and inactive people with arthritis, with the active patients found to have additional exercise knowledge and the ability to draw from past experiences (Wilcox et al., 2006). An example is provided in a quote from a 65 year old female patient:

*'There are lots of exercises that you can do at home...I'll go to the stairs and spend 10 minutes as fast as I can up one step down, up down. Just that little exercise that we did.'* (65 year old female patient)

In contrast, the knowledge of non-attendees appeared to be mainly speculative. Nonetheless, whilst exercise class attendees did not highlight disadvantages to the same extent, queries relating to pain and its link with harm were still expressed, especially regarding exercises of a higher intensity. Therefore, it remains necessary that health professionals address these concerns, even with those who are currently exercising or have done so in the past.

It is also important to note further ways in which the health professional may impact upon patient perceptions and exercise behaviour. Unfortunately, interventions designed to provide advice and support for increasing physical activity levels have been largely unsuccessful in increasing long-term participation (Hillsden et al., 2002; van der Bij et al., 2002). Iversen et al. (2004a) examined the predictors of exercise behaviour in RA patients at six months following consultation with their rheumatologist and found that patients were more likely to be engaged in exercise if their rheumatologist was currently performing aerobic exercise themselves. This research also concluded that discussions

about exercise were four times more likely to occur when the rheumatologist initiated exercise discussion (Iversen et al., 2004a). These findings draw attention to the significance of health professionals and the influence they have on the exercise perceptions of this patient group.

### 3.1 Perceptions of health professionals

When working towards a successful exercise prescription, it is important to consider the perceptions of health professionals involved in the care of people with RA. Common barriers cited for a lack of exercise-based intervention have included a lack of time during the patient visit, limited reimbursement, lack of training and perceived ineffectiveness as a behavioural counsellor (Calfas et al., 1996). In the study by Iversen et al. (1999), many rheumatologists felt that exercise prescription would take more time than they had available and also doubted their patients' interest in and ability to comply with an exercise programme. Further research by this group indicated that only 51% of rheumatologists reported feeling confident that they knew *when* exercises were appropriate for their patients with RA with only 22% reporting that they felt confident to instruct patients as to appropriate exercises (Iversen et al., 2004b).

The perceptions of health professionals in relation to exercise type may also be limiting recommendation and consequent uptake of exercise. Rheumatologists have reported negative attitudes towards aerobic exercise, with 29% of the belief that aerobic exercises were *rarely* useful in the management of RA (Iversen et al., 1999; 2004a). Furthermore and as previously mentioned, the outcome expectations of rheumatologists and physiotherapists for high intensity exercise have been found to be significantly less positive than those for a conventional exercise programme. Despite this, the majority of rheumatologists (and patients) felt that a high-intensity exercise programme would be attainable. Interestingly, the physiotherapists in this study were even more conservative than rheumatologists regarding high-intensity exercise with only a minority of physiotherapists of the view that intensive exercise would be attainable for half of all RA patients (Munneke et al., 2004).

Limitations within the existing literature may partially explain these perceptions as reservations regarding exercise and joint health were in existence (Munneke et al., 2005). However, as previously discussed, the most recent study by de Jong and colleagues (2009) refuted this, offering further substantiation of the earlier studies that showed no exacerbation of joint damage with prolonged, high-intensity exercise (Hakkinen et al., 1994; 2001; 2004; Nordemar et al., 1981). Consequently, it may be that supplementary education for health professionals involved in the treatment of patients with RA is necessary to ensure they are sufficiently informed with respect to current scientific evidence (Munneke et al., 2004). Furthermore, it appears that further research and information dissemination, with the aim of addressing deficiencies in knowledge of specific exercise prescription for this population is required. As shown in the quotes below, our ongoing research investigating the perceptions of health professionals with regards to exercise has given an initial insight into the difficulties of providing an exercise prescription to individuals with RA.

*'I don't know specific recommendations for aerobic exercise in RA because journal articles on this never specify or describe exactly what exercise was prescribed...'* (Rheumatologist)



*'...patients are given a lot of conflicting advice and I am not sure how good the evidence is for advising exercise or exercise avoidance. It would be good to have clear advice/evidence/guidelines...exercise is good for RA patients especially when inflammation is controlled but I expect that it is much more difficult when disease is active'* (Rheumatologist)

*'...never prescribe, often recommend.'* (Rheumatologist)

The following quote demonstrates some of the considerations when deciding how to approach an exercise prescription for this patient group:

*'...The amount of pain a patient is in, whether synovitis is present and if there is joint damage will all affect the type, duration and number of 'reps' of exercise I would prescribe.'* (Physiotherapist)

Despite the superior effectiveness of intensive exercise (de Jong et al., 2003; Ekdahl et al., 1990; Hakkinen et al., 2001; Lemmey, 2009; van den Ende et al., 1996, 2000;) and a lack of detrimental consequences for disease activity and progression (deJong et al., 2003; Hakkinen et al., 2001; Lemmey et al., 2009; Strenstrom & Minor, 2003), it appears that health professionals may still struggle with the concept of recommending high-intensity exercise to patient with RA. Considering the increased risks to this population in terms of cardiovascular health, bone mineral density and rheumatoid cachexia, it is important to foster positive perceptions for both strength and aerobic-based exercise amongst health professionals. Thus, improved education is necessary to overcome any existing negative perceptions and enhance overall confidence to make a worthwhile exercise recommendation for health.

#### **4. Recommendations for improving patient perceptions**

It is evident that perceptions relating to exercise need to be improved in order to increase physical activity levels amongst RA patients and enhance the success of exercise recommendations. At present however, overall exercise education is insufficient and further support is required to overcome the physical, psychological, social and environmental barriers common to this patient group. The model previously discussed (Figure 1) presents the issues indicated by patients in relation to exercising with RA and Table 1 summarises the barriers to exercise for this patient group. On the other hand, Table 2 summarises the and factors that could be used encourage patients with arthritis to exercise. In addition to the pivotal role of the rheumatologist in influencing exercise prescription (Iversen et al., 1999; 2004a and 2004b), these implications are also relevant to other health professionals involved in the treatment of RA patients (i.e. nurse specialists, physiotherapists, occupational therapists).

Continual emphasis and communication of the known benefits of exercise for RA patients is necessary. It is also important to acknowledge the challenges that are faced by patients when attempting to exercise appropriately. For example, especially at the onset of their disease, it is important for patients to understand and feel able to make decisions about how to modify their exercise according to their fluctuating symptoms (Iversen et al., 1999). It is also important to consider methods of overcoming potential barriers when promoting the maintenance of an exercise programme. For example, working towards strengthening patient beliefs that they are able to continue exercise outside of the healthcare environment may be valuable (Swardh et al., 2008).



Physical	Psychological/ behavioural	Social	Environmental
Reduced pain	Increased independence	Enjoyment of exercising with others	Water exercise
Reduced stiffness	Experiencing positive emotion	Encouragement	Programmes for people with arthritis
Increased energy	Increased enjoyment	Motivated by someone to exercise with	Low cost
Improved mobility and function	Goal-setting/self-motivation	Want others to approve	Available equipment
Easier activities of daily living	Making exercise a priority		
Improved strength and flexibility			
Increasing muscle mass, reducing fat mass			

Table 2. Summary of benefits and factors encouraging a patient to exercise in arthritis (adapted from der Anian et al., 2006; Gyursik et al., 2009; Hutton et al., 2010; Law et al., 2010; Wilcox et al., 2006).

Factors encouraging patients to exercise are also important considerations. Low cost, easy access, and weight reduction have been highlighted, alongside receiving assistance from instructors and the opportunity for social interaction. Examples quotes are provided from our focus group research:

*‘...that for me was the secret. Was to find a good instructor and be in the company of others...’* (58 year old female)

*‘...there’s a lot of people at the moment complaining of the cost...’* (65 year old female)

*‘That’s another thing it [exercise] does, it helps you to keep the weight off.’* (62 year old male)

It is also evident from our research that difficulties arise as a result of incomplete information being provided, with health professionals advising exercise but lacking a definitive explanation of how to do so. It is also important that efforts are made to ensure that a consistent message is given. For example, during our focus group study, patients were introduced to the quote ‘Many people are afraid to exercise because they believe that it will cause further damage to their joints’. The discussion extract below was from a patient in response to this:

*‘...a symptom of misinformation and no information. That’s why people believe that. They are not educated on Day 1 to believe that things are possible with the right help ...’* (58 year old female).

This highlights the importance of emphasising the benefits of exercise and giving specific exercise recommendations early in treatment. Furthermore, within the Obstacles to Action study (Hutton et al., 2010) 'insufficient advice from a healthcare provider' was a theme for the insufficiently active individuals, with queries relating to the type, frequency, and intensity of appropriate exercise. These correspond with recommendations by the American College of Sports Medicine, who describe exercise prescription using the 'FITT' principle (Swain, 2010). This incorporates the following: how often per week the patient should exercise (Frequency), how energetically or vigorously the patient should exercise (Intensity), how long the patient should exercise to obtain benefits (Time) and what type of exercises should be prescribed to the patient (Type) (Tancred & Tancred, 1996). This acronym offers a useful and simple framework upon which to base an exercise prescription.

An interesting point also stems from the quote below, indicating that means of continuing assessment and feedback may benefit patients.

*'...I would love to have some measurement that shows me that it's doing me some good.'* (66 year old male)

However, whilst working to develop these areas would be worthwhile, barriers for the health professional also exist. As previously mentioned, limited knowledge may hinder their ability and confidence to discuss the topic of exercise. Moreover, the time constraint of a standard appointment often means that medication and symptom control is prioritised (Calfas et al., 1996). In a study by Podl et al. (1999) involving family physicians, it was highlighted that an average of 45 seconds of consultation time involved conversation about exercise. This lack of consultation time was confirmed by Iversen et al., (1999) who found that when a medical regime was more complicated, there was less talk about exercise. Therefore, quick and effective means of prescribing exercise and providing continual follow-up and feedback would be of benefit. Future direction could also include referral to a trained clinical exercise physiologist, who would possess the skills to make physiological assessments and prescribe exercise. Additionally, as local communities vary widely in the availability of resources and programmes for individuals with arthritis (Wilcox et al., 2006), incorporating home-based recommendations may be of value.

In summary, clear exercise guidelines and prescription advice is necessary to address the fact that RA patients are often faced with ambiguous and incomplete information. This may mean that further information for those health professionals involved in the care of this patient group is necessary to instil the confidence and allegiance required to positively shape the perceptions of this patient group.

## 5. Conclusions

The benefits of continued, regular exercise of a sufficient intensity for RA patients are clear. Furthermore, it appears that many patients are aware that exercise forms an advantageous part of their disease management. However, negative perceptions relating to joint health, pain and the clarity of exercise prescription for this patient group add to the barriers to exercise uptake that already exist in the general population. Therefore, to improve patient perceptions, the benefits require continual emphasis and the additional concerns regarding joint health, pain symptoms the specificity of exercise recommendations need to be acknowledged and addressed. Initiation of exercise discussion by the health professional

alongside a motivational and assertive approach to exercise prescription is also important to implement.

Further research and use of evidence-based practice within the health profession will address limitations in current exercise knowledge. The most effective method of enhancing transfer of this information and educating patients and health professionals in this area needs to be utilised, an area which may also require further investigation. With more specific exercise information and an effectual method of education and delivery, exercise can become akin to a medical prescription. Working to build upon perceptions that exercise is an essential part of disease management and lifelong health promotion will facilitate this process.

## 6. Acknowledgment

The authors would like to thank Dr. Jeremy Jones, Mrs. Anne Breslin, Dr. Emily Oliver, Lauren Mawn and Serena Halls for their valued contributions.

## 7. References

- Baillet, A, Payraud, E, Niderprim, V-A, Nissen, MJ, Allenet, B, Francois, P, Grange, L, Casez, P, Juvin R & Gaudin, P. (2009). A dynamic exercise programme to improve patients' disability in rheumatoid arthritis: a prospective randomized controlled trial. *Rheumatology*, vol. 48, no. 4, pp. 410-415.
- Bilberg, A, Ahlmen, M, Mannerkorpi, K. (2005). Moderately intensive exercise in a temperate pool for patients with rheumatoid arthritis: a randomized controlled study. *Rheumatology*, vol. 44, no. 4, pp. 502-508.
- Calfas KJ, Long BJ, Sallis JF, Wooten, WJ, Pratt, M & Patrick, K. (1996). A controlled trial of physician counseling to promote the adoption of physical activity. *Preventative Medicine*, vol. 25, pp. 225-33.
- Combe, B, Landewe, R, Lukas, C, Bolosiu, HD, Breedveld, F, Dougados, M, Emery, P, Ferraccioli, G, Hazes, JMW, Klareskog, L, Machold, K, Martin-Mola, E, Nielsen, H, Silman, A, Smolen, J & Yazici H. (2007). EULAR recommendations for the management of early arthritis: report of a task force of the European Standing Committee for International Clinical Studies Including Therapeutics (ESCISIT). *Annals of the Rheumatic Diseases*, vol. 66, pp. 34-45
- Cooney, JK., Law, R-J, Matschke, V, Lemmey, AB, Moore, JP, Ahmad, Y, Jones, JG, Maddison, P & Thom, J. (2011). Benefits of Exercise in Rheumatoid Arthritis. *Journal of Aging Research*, Vol. 2011, available at:
- de Jong Z & Vliet Vlieland TPM. (2005). Safety of exercise in patients with rheumatoid arthritis. *Current Opinion in Rheumatology*, Vol. 17, pp. 177-182.
- de Jong, Z, Munneke, M, Jansen, LM, Runday, K, van Schaardenburg, DJ, Brand, R, van den Ende, CHM, Vliet Vlieland, TPM, Zuijderduin, WM & Hazes, JMW. (2004). Differences between participants and nonparticipants in an exercise trial for adults with rheumatoid arthritis. *Arthritis Care & Research*, vol. 51, No. 4, pp. 593-600.
- de Jong, Z, Munneke, M, Kroon, HM, van Schaardenburg, D, Dijkmans, BAC, Hazes, JMW & Vliet Vlieland, TPM. (2009). Long-term follow-up of a high-intensity exercise

- program in patients with rheumatoid arthritis. *Clinical Rheumatology*, vol. 28, no. 6, pp. 663–671.
- de Jong, Z, Munneke, M, Lems, WF, Zwinderman, AH, Kroon, HM, Pauwels, EKJ, Jansen, A, Runday, KH, Dijkmans, BAC, Breedveld, FC, Vliet Vlieland, TPM & Hazes, JMW. 2004. Slowing of bone loss in patients with rheumatoid arthritis by long-term high-intensity exercise: Results of a randomized, controlled trial. *Arthritis & Rheumatism*, Vol. 50, No. 4, pp. 1066–1076.
- de Jong, Z, Munneke, M, Zwinderman, A, Kroon, H, Jansen, A, Runday, K, Van Schaardenburg, D, Dijkmans, BAC, Van den Ende, CH, Breedveld FC, Vliet Vlieland, TPM & Hazes, JMW. (2003). Is a long-term high-intensity exercise program effective and safe in patients with rheumatoid arthritis? Results of a randomized controlled trial. *Arthritis & Rheumatism*, vol. 48, No. 9, pp. 2415–2424.
- der Ananian D, Wilcox S, Saunders R, Watkins K & Evans A. (2006). Factors that influence exercise among adults with arthritis in three activity levels. *Preventing Chronic Disease*, Vol. 3, No. 3, pp. 1–16.
- Ekblom B, Lövgren O, Alderin M, Fridström M & Sätterström G. (1975). Effect of Short-Term Physical Training on Patients with Rheumatoid Arthritis. *Scandinavian Journal of Rheumatology*, Vol. 4, No. 2, pp. 80–86.
- Ekdahl, C, Andersson, SI, Moritz, U & Svensson, B. (1990). Dynamic versus Static Training in Patients with Rheumatoid Arthritis. *Scandinavian Journal of Rheumatology*, Vol. 19, No. 1, pp. 17–26.
- Forestier, R, André-Vert, J, Guillez, P, Coudeyre, E, Lefevre-Colau M-M, Combeg B & Mayoux-Benhamouh M-A. (2009) Non-drug treatment (excluding surgery) in rheumatoid arthritis: Clinical practice guidelines. *Joint Bone Spine*, Vol. 76, No. 6, pp. 691–698.
- Gecht MR, Connell, KJ, Sinacore, JM & Prohaska, TR. (1996). A Survey of Exercise Beliefs and Exercise Habits Among People with Arthritis. *Arthritis Care & Research*, Vol. 9, No. 2, pp. 82–8.
- Gyurcsik NC, Brawley LR, Spink KS, Brittain DR, Fuller DL & Chad K. (2009). Physical activity in women with arthritis: Examining perceived barriers and self-regulatory efficacy to cope. *Arthritis Care & Research*, Vol. 61, No. 8, pp. 1087–1094.
- Häkkinen A, Hannonen P, Nyman K, Lyyski T & Häkkinen K. (2003). Effects of concurrent strength and endurance training in women with early or longstanding rheumatoid arthritis: Comparison with healthy subjects. *Arthritis Care & Research*, Vol. 49, pp. 789–797.
- Häkkinen A, Sokka T, Kotaniemi A & Hannonen P. (2001). A randomized two-year study of the effects of dynamic strength training on muscle strength, disease activity, functional capacity, and bone mineral density in early rheumatoid arthritis. *Arthritis & Rheumatism*, Vol. 44, No. 3, pp. 515–522.
- Hakkinen, A, Hakkinen, K & Hannonen, P. (1994). Effects of strength training on neuromuscular function and disease-activity in patients with recent-onset inflammation arthritis. *Scandinavian journal of rheumatology*, Vol. 23, No. 5, pp. 237–242.
- Hakkinen, A, Sokka, T, Kautiainen, H, Kotaniemi, A & Hannonen P. (2004). Sustained maintenance of exercise induced muscle strength gains and normal bone mineral

- density in patients with early rheumatoid arthritis: a 5 year follow up. *Annals of the Rheumatic Diseases*, Vol. 63, No. 8, pp. 910-6.
- Hansen, TM, Hansen, G, Langgaard, AM & Rasmussen, JO (1993). Longterm physical training in rheumatoid arthritis. A randomized trial with different training programs and blinded observers. *Scandinavian Journal of Rheumatology*, vol. 22, No. 3, pp. 107-112.
- Harkcom, TM, Lampman, RM, Banwell, BF & Castor, CW. (1985). Therapeutic value of graded aerobic exercise training in rheumatoid arthritis. *Arthritis and Rheumatism*, Vol. 28, No. 1, pp. 32-39.
- Hendry M, Williams NH, Markland D, Wilkinson C & Maddison P. (2006). Why should we exercise when our knees hurt? A qualitative study of primary care patients with osteoarthritis of the knee. *Family Practice*, Vol. 23, No. 5, pp. 558-567.  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3042669/pdf/JAR2011-681640.pdf>
- Cairns AP & McVeigh JG. (2009). A systematic review of the effects of dynamic exercise in rheumatoid arthritis. *Rheumatology International*, vol. 30, pp. 147-158.  
<http://www.nice.org.uk/nicemedia/pdf/CG79NICEGuideline.pdf>
- Hurkmans, E, van der Giesen, FJ, Vliet Vlieland, TPM, Schoones, J, Van den Ende, ECHM. (2009). Dynamic exercise programs (aerobic capacity and/or muscle strength training) in patients with rheumatoid arthritis. *Cochrane Database of Systematic Reviews*, No. 4. Art. No.: CD006853. DOI: 10.1002/14651858.CD006853.pub2.
- Hutton, I, Gamble, G, McLean, G, Butcher, H, Gow, P & Dalbeth, N. (2010). What is associated with being active in arthritis? Analysis from the obstacles to action study. *Internal Medicine Journal*, Vol. 40, No. 7, pp. 512-520.
- Iversen MD, Eaton HM & Daltroy LH. (2004a). How Rheumatologists and Patients with Rheumatoid Arthritis Discuss Exercise and the Influence of Discussions on Exercise Prescriptions. *Arthritis & Rheumatism (Arthritis Care & Research)*, Vol. 51, No. 1, pp. 63-72.
- Iversen MD, Fossel AH, Ayers K, Palmsten A, Wang HW & Daltroy LH. (2004b). Predictors of Exercise Behaviour in Patients With Rheumatoid Arthritis 6 Months Following a Visit With Their Rheumatologist. *Physical Therapy*, Vol. 84, No. 8, pp. 706-716.
- Iversen, MD, Fossel, AH & Daltroy, LH. (1999). Rheumatologist-Patient communication about exercise and physical therapy in the management of rheumatoid arthritis. *Arthritis Care & Research*, Vol. 12, No. 3, pp. 180-192.
- Kamwendo, K, Askenbom, M & Wahlgren, C (1999). Physical activity in the life of the patient with rheumatoid arthritis. *Physiotherapy Research International*, Vol. 4, No. 4, pp. 278-292.
- Kitzinger, J. (1995). Qualitative Research: Introducing focus groups. *British Medical Journal*, Vol. 311, No. 7000, pp. 299-302.
- Lambert, BL, Butin, DN, Moran, D, Zhao, SZ, Carr, BC, Chen, C & Kizis, FJ. (2000). Arthritis care: comparison of physicians' and patients' views. *Seminars in Arthritis and Rheumatism*, Vol. 30, No. 2, pp. 100-110.
- Law R-J, Breslin A, Oliver EJ, Mawn, L, Markland, DA, Maddison, P & Thom, JM. (2010). Perceptions of the effects of exercise on joint health in rheumatoid arthritis patients. *Rheumatology*, Vol. 49, No. 12, pp. 2444-2451.

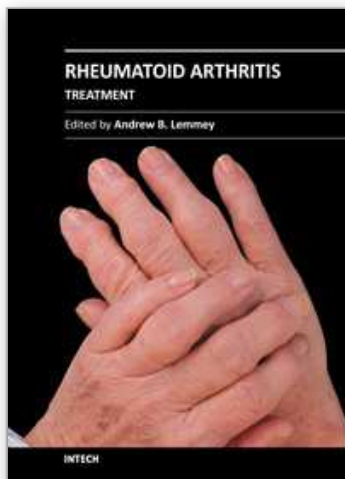


- Lemmey AB, Marcora, SM, Chester, K, Wilson, S, Casanova, F & Maddison, PJ. (2009). Effects of high-intensity resistance training in patients with rheumatoid arthritis: a randomized controlled trial. *Arthritis Care and Research*, Vol. 61, No. 12, pp. 1726–1734.
- Lemmey, A. (2011). Efficacy of progressive resistance training for patients with rheumatoid arthritis and recommendations regarding its prescription. *International Journal of Clinical Rheumatology*, Vol. 6, No. 2. ISSN 1758-4272.
- Luqmani, R, Hennell, S, Estrach, C, Birrell, F, Bosworth, A, Davenport, G, Fokke, C, Goodson, N, Jeffreson, P, Lamb, E, Mohammed, R, Oliver, S, Stableford, Z, Walsh, D, Washbrook, C & Webb, F. (2006). British Society for Rheumatology and British Health Professionals in Rheumatology Guideline for the Management of Rheumatoid Arthritis (the first two years). *Rheumatology*, Vol. 45, No. 9, pp. 1167–1169
- Luqmani, R, Hennell, S, Estrach, C, Basher, D, Birrell, F, Bosworth, A, Burke, F, Callaghan, C, Candal-Couto, J, Fokke, C, Goodson, N, Homer, D, Jackman, J, Jeffreson, P, Oliver, S, Reed, M, Sanz, L, Stableford, Z, Taylor, P, Todd, N, Warburton, L, Washbrook C & Wilkinson, M. (2009). British Society for Rheumatology and British Health Professionals in Rheumatology guideline for the management of rheumatoid arthritis (after the first 2 years). *Rheumatology*, Vol. 48, No. 4, pp. 436–439.
- Marcora SM, Lemmey AB & Maddison PJ. (2005). Can progressive resistance training reverse cachexia in patients with rheumatoid arthritis? Results of a pilot study. *Journal of Rheumatology*, Vol. 32, No. 6, pp. 1031–9.
- Melikoglu, MA, Karatay, S, Senel, K & Akcay, F. (2006). Association between dynamic exercise therapy and IGF-1 and IGFBP-3 concentrations in the patients with rheumatoid arthritis. *Rheumatology International*, Vol. 26, No. 4, pp. 309–313.
- Metsios, GS, Stavropoulos-Kalinoglou, A, Treharne, GJ, Nevill, AM, Sandoo, A, Panoulas, VF, Toms, TE, Koutedakis, Y & Kitas, GD. (2011). Disease activity and low physical activity associate with number of hospital admissions and length of hospitalisation in patients with rheumatoid arthritis. *Arthritis Research & Therapy*, Vol. 13, No. 3, doi:10.1186/ar3390. Available at: <http://arthritis-research.com/content/pdf/ar3390.pdf>
- Metsios, GS, Stavropoulos-Kalinoglou, A, Veldhuijzen van Zanten, J JCS, Treharne, GJ, Panoulas, VF, Douglas, KMJ, Koutedakis, Y & Kitas, GD. (2008). Rheumatoid arthritis, cardiovascular disease and physical exercise: a systematic review. *Rheumatology*, Vol. 47, pp. 239–248.
- Munneke, M, de Jong, Z, Zwinderman, AH, Rooday, HK, van den Ende, CHM, Vliet Vlieland, TPM, Hazes, JMW. (2004). High intensity exercise or conventional exercises for patients with rheumatoid arthritis? Outcome expectations of patients, rheumatologists, and physiotherapists. *Annals of the Rheumatic Diseases*, Vol. 63, No. 7, pp. 804–808.
- National Institute for Health and Clinical Excellence. (2009). Rheumatoid arthritis: The management of rheumatoid arthritis in adults. *National Collaborating Centre for Chronic Conditions*, Guideline 79, Available from:
- Nelson, ME, Rejeski, WJ, Blair, SN, Duncan, PW, Judge, JO, King, AC, Macera, CA & Castaneda-Sceppa, C. (2007). Physical Activity and Public Health in Older Adults: Recommendation from the American College of Sports Medicine and the American Heart Association. *Circulation*, Vol. 116, pp. 1094–1105.

- Neuberger GB, Aaronson LS, Gajewski B, Embretson SE, Cagle PE, Loudon JK, Miller, PA. (2007). Predictors of exercise and effects of exercise on symptoms, function, aerobic fitness, and disease outcomes of rheumatoid arthritis. *Arthritis Care & Research*, Vol. 57, No. 6, pp. 943-952.
- Nordemar, R. (1981). Physical training in rheumatoid arthritis: a controlled long-term study. II. Functional capacity and general attitudes. *Scandinavian Journal of Rheumatology*, Vol. 10, No. 1, pp. 25-30.
- Ong, BN & Coady, DA. Qualitative research. Its relevance and use in musculoskeletal medicine. *Topical reviews: an overview of current research and practice in rheumatic disease*. Chesterfield: Arthritis Research Campaign, 2006; Series 5: Number 9:1-8.
- Partridge, REH & Duthie, JR. (1963). Controlled trial of the effect of complete immobilization of the joints in rheumatoid arthritis. *Annals of Rheumatic Diseases*, Vol. 22, pp. 91-99.
- Podl, TR, Goodwin, MA, Kikano, GE & Stange, KC. (1999). Direct observation of exercise counseling in community family practice. *American Journal of Preventive Medicine*, Vol. 17, No. 3, pp. 207-210
- Schutzer, KA & Graves, BS. (2004). Barriers and motivations to exercise in older adults. *Preventive Medicine*, vol. 39, no. 5, pp. 1056-1061.
- Sokka T, Häkkinen A, Kautiainen H, Maillefert JF, Toloza S, Hansen TM, Calvo-Alen, J, Oding, R, Liveborn, M, Huisman, M, Alten, R, Pohl, C, Cutolo, M, Immonen, K, Woolf, A, Murphy, E, Sheehy, C, Quirke, E, Celik, S, Yazici, Y, Tlustochowicz, W, Kapolka, D, Skakic, V, Rojkovich, B, Müller, R, Stropuviene, S, Andersone, D, Drosos, AA, Lazovskis, J, Pincus, T. (2008). Physical inactivity in patients with rheumatoid arthritis: Data from twenty-one countries in a cross-sectional, international study. *Arthritis Care and Research*, Vol. 59, No. 1, pp. 42-50.
- Staa TPV, Geusens P, Bijlsma JWJ, Leufkens HGM, Cooper C. Clinical assessment of the long-term risk of fracture in patients with rheumatoid arthritis. *Arthritis & Rheumatism* 2006; 54(10):3104-12.
- Stenstrom, CH & Minor, MA. (2003). Evidence for the Benefit of Aerobic and Strengthening Exercise in Rheumatoid Arthritis. *Arthritis & Rheumatism (Arthritis Care & Research)*, Vol. 49, No. 3, pp. 428-434.
- Swain, DP. (2010). Cardiorespiratory exercise prescription. In Ehrman JK ed. *ACSM's resource manual for Guidelines for Exercise Testing and Prescription*. 6<sup>th</sup> Edition. Philadelphia: Lippincott Williams and Wilkins, pp. 448-462.
- Swardh, E, Biguet, G & Opava, CH. (2008). Views on exercise maintenance: variations among patients with rheumatoid arthritis. *Physical Therapy*, Vol. 88, No. 9, pp. 1049-1060.
- Tancred B & Tancred G. (1996). Implementation of Exercise Programmes for Prevention and Treatment of Low Back Pain. *Physiotherapy* 1996;82(3):168-173.
- Trost, SG, Owen, N, Bauman, A, Sallis, J & Brown, W. (2002). Correlates of adults' participation in physical activity: review and update. *Medicine & Science in Sports & Exercise*, Vol. 34, No. 12, pp. 1996-2001.
- van den Berg, MH, Runday, HK, Peeters, AJ, Le Cessie, SF, Van Der Giesen, J, Breedveld, FC & Vliet Vlieland TPM. (2006). Using internet technology to deliver a home-based physical activity intervention for patients with rheumatoid arthritis: a randomized controlled trial. *Arthritis Care and Research*, Vol. 55, No. 6, pp. 935-945.

- van den Ende CH, Hazes JM, le Cessie S, Mulder WJ, Belfor DG, Breedveld FC, et al. Comparison of high and low intensity training in well controlled rheumatoid arthritis. Results of a randomised clinical trial. *Ann Rheum Dis* 1996;55(11):798-805.
- van den Ende CHM, Breedveld FC, le Cessie S, Dijkmans BAC, de Mug AW, Hazes JMW. Effect of intensive exercise on patients with active rheumatoid arthritis: a randomised clinical trial. *Ann Rheum Dis* 2000; 59(8):615-621.
- van der Bij, AK, Laurant, MGH & Wensing, M. (2002). Effectiveness of physical activity interventions for older adults: a review. *American Journal of Preventive Medicine*, Vol. 22, No. 2, pp. 120-133.
- Walsmith J, Roubenoff R. Cachexia in rheumatoid arthritis. *International Journal of Cardiology* 2002;85(1):89-99.
- Wang G, Helmick, C G, Macera, C, Zhang, P and Pratt, M. Inactivity-associated medical costs among US adults with arthritis', . *Arthritis Care and Research* 2001;45:439-445.
- Wilcox S, Ananian C, Abbott J, Vrazel J, Ramsey C, Sharpe P, Brady T. Perceived exercise barriers, enablers, and benefits among exercising and nonexercising adults with arthritis: Results from a qualitative study. *Arthritis Care & Research* 2006;55(4):616-627.

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## **Rheumatoid Arthritis - Treatment**

Edited by Dr. Andrew Lemmey

ISBN 978-953-307-850-2

Hard cover, 366 pages

**Publisher** InTech

**Published online** 18, January, 2012

**Published in print edition** January, 2012

The purpose of this book is to provide up-to-date, interesting, and thought-provoking perspectives on various aspects of research into current and potential treatments for rheumatoid arthritis (RA). This book features 17 chapters, with contributions from numerous countries (e.g. UK, USA, Canada, Japan, Sweden, Turkey, Bosnia and Herzegovina, Slovakia), including chapters from internationally recognized leaders in rheumatology research. It is anticipated that Rheumatoid Arthritis - Treatment will provide both a useful reference and source of potential areas of investigation for research scientists working in the field of RA and other inflammatory arthropathies.

### **How to reference**

In order to correctly reference this scholarly work, feel free to copy and paste the following:

Rebecca-Jane Law, David Markland, Peter Maddison and Jeanette M. Thom (2012). Perceptions Relating to Exercise in Rheumatoid Arthritis, Rheumatoid Arthritis - Treatment, Dr. Andrew Lemmey (Ed.), ISBN: 978-953-307-850-2, InTech, Available from: <http://www.intechopen.com/books/rheumatoid-arthritis-treatment/perceptions-relating-to-exercise-in-rheumatoid-arthritis>

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