



Down Syndrome Ireland involved in life-changing research into arthritis

In 2013, Down Syndrome Ireland engaged with clinicians in Our Lady's Children's Hospital, Crumlin to investigate the increased incidence of arthritis occurring amongst children with Down syndrome in Ireland. As part of this, we organised clinics in a number of our branches around the country so our young members could be screened for the condition.

As a result of the initial findings, we teamed up with Arthritis Ireland and Our Lady's Children's Hospital, Crumlin to establish a Newman Fellowship in Down's Arthritis.*

Dr Charlene Foley - along with her mentors Dr. Orla Killeen, Consultant Paediatric Rheumatologist in OLCHC, Professor Gerry Wilson, UCD Professor of Rheumatology and Professor Ursula Fearon, TCD Professor of Rheumatology conducted the largest study to date regarding Down's Arthritis.*

We are very conscious of correct terminology, Down's Arthritis is a clinical term and is not an abbreviation for Down syndrome

Here, Dr Foley presents her preliminary research findings and outlines what parents and professionals should look out for if they're concerned about arthritis.

A variety of medical conditions are associated with Down syndrome including autoimmune disorders such as diabetes mellitus, coeliac disease and thyroid dysfunction. Arthritis also occurs, but is largely under-reported in this population group.

The 'Arthropathy of Down syndrome' was first described relatively recently, in 1984. There remains a paucity of data in the literature about the occurrence of inflammatory arthritis in Down syndrome; the largest case series for reference is a retrospective chart review of nine children with Trisomy 21 and arthritis, reported in 1990. There are no published population surveys establishing the prevalence and incidence rates of DA. Crude estimates suggest that the incidence of arthritis in Down syndrome is as much as 3 to 6-fold greater than Juvenile

Idiopathic Arthritis (JIA) in the general paediatric population. Prevalence has been estimated to be 8.7/1000, compared with the JIA prevalence of 1/1000. Despite these suspected higher incidence and prevalence rates, arthritis is rarely recognised at onset, and is frequently under or misdiagnosed.

The Rheumatology Team at the National Centre for Paediatric Rheumatology (NCPR) in Our Lady's Children's Hospital Crumlin (OLCHC) have experience of caring for many children with Down's Arthritis (DA) and have seen first-hand how delayed diagnosis can lead to irreversible joint damage. This joint damage, and consequential functional impairment, is preventable if timely diagnosis and treatment is instigated. We were keen to explore Down's Arthritis in terms of its clinical and radiological features, as well as investigate the role of established biomarkers in DA.

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SCREENING

With the help and support of the members and staff of Down Syndrome Ireland, a national screening programme was set up, offering children with Down syndrome (aged 0-21 years) the opportunity to attend a local musculoskeletal screening clinic. At this appointment, a medical history was noted and a full musculoskeletal examination performed. Children with suspected arthritis were invited to attend for Consultant review at the NCPR in OLCHC. At this appointment, diagnosis was confirmed, investigations carried out and management instigated as required.

To date, just over 550 children with Down syndrome (56% Male) have been screened for DA. A range of musculoskeletal disorders have been detected and documented through the screening process. After pes planus ("flat feet"), the most common musculoskeletal finding in our cohort of children with Down syndrome was inflammatory arthritis.

Twenty-two new cases of DA were detected through the screening initiative. Combining those attending the NCPR prior to the start date of the study, and direct referrals throughout the time period of the study, we had a cohort of 40 cases of DA, the largest reported in the literature to date. Using results from our research, the suspected **prevalence of DA is 18-21/1000**, greater than previously reported in the literature.

Comparable to the limited literature available pre-dating our study, we observed a significant **delay in diagnosis** in our DA cohort (1.7 years, range 0.2-4.9 years) compared with our JIA cohort (0.7 years, range 0.2-2.4 years).

DISEASE PATTERN

In terms of disease pattern, children with Down's Arthritis frequently present with a **polyarticular arthritis**, i.e. five or more joints affected. **Small joint involvement of the hands** occurs in almost all cases, a feature that appears unique to the arthritis associated with Down syndrome. Radiological changes were present in 67% of DA cases at diagnosis, 29% had erosions on plain film, representing irreversible joint damage. These changes were significantly higher than those detected in our JIA comparison group (Radiological changes at diagnosis 24%; Erosions 10%). Again this is likely due to the significant delay in diagnosis of DA, but could also support the theory that **DA is potentially a more aggressive, erosive disease than JIA**.

Another research finding is that treatment for DA is complicated by drug-associated side effects in a higher proportion of cases when compared to treatment for JIA cases. These findings have allowed us to make evidence-based choices when deciding on appropriate treatment for our patients with DA. This in turn enables improved disease control, minimising irreversible joint damage and leading to better clinical outcomes, whilst ensuring greater patient satisfaction in terms of side effect profile.

Down's Arthritis is an under-recognised condition that results in chronic disability and functional impairment in a population already at significant risk. Studies of arthritis in Down syndrome are very limited. Our research, the largest of its kind to date, has shown that there is an **increased risk of arthritis in children with T21**, with a **prevalence double that previously reported**. We have found there to be a **significant delay in diagnosis**, the reasons for this being multifactorial. The **disease pattern appears to be unique to DA**, with **predominance in the small joints of the hands**. Treatment is complicated by a high percentage of **drug-associated complications**.



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To date, our research has increased both knowledge and awareness in the public and professional fields about Down's Arthritis. We would like to say a **special thank you** to all the **children and families** that have taken part in our study. Without your involvement and support we would not be working towards improving the care of children with Down syndrome and arthritis. Already your participation has helped make a difference. Children with Down syndrome and arthritis are now presenting earlier due to the increased awareness about the condition. As a result, timely diagnosis and treatment leads to improved clinical outcomes, which translates to a better quality of life for children with Down's Arthritis.

Notes for Parents

Consider a diagnosis of arthritis if you notice;

- A change in your child's behaviour e.g. seeking comfort, irritability, dislikes holding your hand (may suggest arthritis of the fingers or wrist)
- Subtle adaptations to overcome difficulty e.g. bum shuffles down stairs
- A change or dis-improvement in handwriting
- Regression in motor milestones
- Your child becomes less active
- Your child walks with a limp
- Your child is slow to get going in the mornings, may suggest early morning stiffness, a sign of arthritis
- Joint swelling, maybe a sign of inflammatory arthritis
- Your child bites their fingers or rubs a particular joint, may suggest arthritis here

Notes for Health Care Professionals

- Down's Arthritis is 18 – 21 times more common than JIA in the general Paediatric population.
- Have a high index of suspicion of Arthritis when assessing a child with Down syndrome presenting with change and/or deterioration in function and mobility.
- Small joints, wrists and knees are the most commonly affected sites.
- Down's Arthritis may often be insidious and symptomatic.
- A child with Down's Arthritis may present with minimal clinical signs, i.e joint pain, joint swelling or early morning stiffness.
- Look for subtle signs from clinical examination that may suggest a possible diagnosis of Down's Arthritis, e.g loss of range or loss of hyperextension, especially if there is asymmetry between both sides. This may suggest restrictions from undiagnosed/untreated Down's Arthritis.
- MRI with gadolinium contrast should be the gold standard for definitive diagnosis of Down's Arthritis. Consider if any concerns, as clinically there can be little to aid with diagnosis.
- Children with Down syndrome should have a Musculoskeletal Assessment as part of their Annual Surveillance Programme.

Down's Arthritis (DA)

Research Team

Dr. Orla Killeen, Consultant Paediatric Rheumatologist (*Principal Investigator*)¹

Dr. Charlene Foley, Clinical Research Fellow¹

Dr. Emma Jane Mac Dermott, Consultant Paediatric Rheumatologist¹

Professor Gerry Wilson, Professor of Rheumatology (*Supervisor*)²

Professor Ursula Fearon, Professor of Rheumatology (*Supervisor*)³

Professor Douglas Veale, Consultant Rheumatologist (*Supervisor*)⁴

Derek Deely, Clinical Nurse Specialist¹

Joanna Connolly, Clinical Nurse Specialist¹

Deirdre Carroll, Clinical Nurse Specialist¹

Affiliations

¹National Centre for Paediatric Rheumatology (NCPR), Our Lady's Children's Hospital,
Crumlin

²University College Dublin

³Trinity College Dublin

⁴St Vincent's University Hospital, Dublin

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Down Syndrome Ireland formally launched the updated **Medical Management Guidelines for children and adolescents with Down syndrome in Ireland** in February 2017. The guidelines provide both you as parents and professionals that work with your child advice on monitoring your child's health. You can find the updated guidelines on our website [www.downsyndrome.ie](http://www.downsyndrome.ie).