Paediatrics

Feet examination in children and young people with diabetes: The challenges

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Diabetic peripheral neuropathy can lead to severe consequences, including disability, ulcer formation and amputations, thereby significantly reducing the quality of life of affected individuals. These complications take years to develop and are therefore usually seen in adults. The average paediatric diabetes specialist will have no experience of seeing children with overt diabetic foot problems due to peripheral neuropathy. However, prevention of peripheral neuropathy and its sequelae is of paramount importance and includes maintaining good glycaemic control, early detection of peripheral neuropathy by regular feet examination and appropriate education of the individual on foot care. The prevalence of subclinical peripheral neuropathy, detected by nerve conduction studies, in children with diabetes ranges from 25% to 50% (Maser et al, 1991; Nelson et al, 2006).

In order to alert paediatricians to the importance of good foot care and to aid young people in developing good habits looking after their feet, the new NICE (2015) guideline advises that:

> *"For young people with diabetes who are 12–17 years, the paediatric care team or the transitional care team should assess the young person's feet as part of their annual assessment, and provide information about foot care. If a diabetic foot problem is found or suspected, the paediatric care team or the transitional care team should refer the young person to an appropriate specialist."*

There are currently no good screening tests for detection of peripheral neuropathy in children. In adults, a calibrated tuning fork and the 10 g monofilament tests are used to detect vibration perception and tactile perception, respectively.

In the paper summarised alongside, Hirschfeld and colleagues compared the specificity and sensitivity of a novel abbreviated monofilament test and the 128 Hz Rydel–Seiffer tuning fork with the gold standard, the nerve conduction test, in 88 children with diabetes. The abbreviated monofilament test consisted of three von Frey monofilaments (1 mN, 2 mN and 4 mN). Sadly, the test had only 18% sensitivity but 80% specificity, with a positive predictive value of 33%. The tuning fork test had 0% sensitivity and 98% specificity, with a positive predictive value of 0%.

This is very disappointing. The chances of paediatricians detecting any children with peripheral neuropathy using currently available tests are minimal. The value of the current NICE guideline, then, is really in raising awareness of the importance of good foot care. ■

Maser RE, Nielsen VK, Dorman JS et al (1991) Measuring subclinical neuropathy: does it relate to clinical neuropathy? Pittsburgh epidemiology of diabetes complications study-V. *J Diabet Complications* **5**: 6–12

Nelson D, Mah JK, Adams C et al (2006) Comparison of conventional and non-invasive techniques for the early identification of diabetic neuropathy in children and adolescents with type 1 diabetes. *Pediatr Diabetes* **7**: 305–10

NICE (2015) *Diabetic Foot Problems: Prevention and Management* (NG19). NICE, London. Available at: www.nice.org.uk/guidance/ng19 (accessed 15.10.15)

Diabet Med

Peripheral neuropathy screening in children with diabetes

Readability	✓✓✓✓
Applicability to practice	✓✓✓
WOW! Factor	✓✓✓✓

1 In this study, the authors sought to evaluate a new abbreviated monofilament test to screen for peripheral neuropathy in children with diabetes.

2 The abbreviated test was based on previous results and involved the use of only three monofilaments, with thresholds of 1 mN, 2 mN and 4 mN, allowing the test to be performed in less than 90 seconds.

3 The new screening test was performed by two independent examiners, blinded to the results of the other, and was compared with the gold-standard nerve conduction test, conducted by a third blinded examiner.

4 A 128 Hz Rydel–Seiffer tuning fork was also used to test vibration perception.

5 Of 88 children with diabetes enrolled, 43 (49%) had at least one abnormal result on the nerve conduction test.

6 The diagnostic utility of the two non-invasive tests, however, was very low. The monofilament test had a sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of 18%, 80%, 33% and 63%, respectively.

7 The tuning fork test had a sensitivity, specificity, PPV and NPV of 0%, 98%, 0% and 61%, respectively.

8 In addition, inter-rater agreement was low in the monofilament test (60% in the right foot, 67% in the left foot. Agreement was higher with the tuning fork test, although this is not surprising given the sensitivity of 0%.

Hirschfeld G, von Glischinski M, Knop C et al (2015) Difficulties in screening for peripheral neuropathies in children with diabetes. *Diabet Med* **32**: 786–9

Diabetes Care

Coeliac antibodies often normalise spontaneously in T1D

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓✓

1 As the prevalence of coeliac disease (CD) is significantly higher in people with T1D than in the general population, guidelines recommend that children should be screened for CD upon diagnosis of diabetes, even if they have no symptoms of the disease.

2 Following observations that high levels of the antibody used to screen for CD, anti-tissue transglutaminase (anti-tTG), can spontaneously normalise even with continued gluten consumption, these authors sought to investigate this phenomenon.

3 Between 2002 and 2012, over a minimum follow-up of 2 years, 446 children with T1D (median age at onset, 8.5 years) were evaluated, of whom 38 developed active CD along with elevated anti-tTG.

4 In addition, 27 children tested positive for low levels of anti-tTG without symptoms of CD; of these, nine remained antibody-positive but 18 spontaneously became antibody-negative, with three of these redeveloping antibodies over the follow-up.

5 The authors conclude that, in children with type 1 diabetes who develop anti-tTG antibodies, levels decrease spontaneously in 40% and become persistently negative in 20%, even with a gluten-containing diet.

6 Therefore, they conclude that, in the absence of clinical signs of CD, histological confirmation of the disease and introduction of a gluten-free diet should be delayed in order to avoid unnecessary procedures and an even greater disease burden.

Castellaneta S, Piccinno E, Oliva M et al (2015) High rate of spontaneous normalization of celiac serology in a cohort of 446 children with type 1 diabetes: a prospective study. *Diabetes Care* **38**: 760–6

Diabetologia

Sugar intake in children at high risk of T1D

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓✓

1 These authors evaluated the diet records of 1893 children at high risk of T1D (either a first-degree relative with the condition or a high-risk human leukocyte antigen [*HLA*] genotype).

2 In total, 142 children developed insulin autoantibodies (IA), of whom 42 progressed to T1D.

3 After adjustment for T1D family history, *HLA* genotype and ethnicity, total sugar intake (including fructose, sucrose, sugar-sweetened drinks, fruit juice and artificially sweetened drinks) was associated with progression from IA to T1D (hazard ratio [HR], 1.75).

4 Sugar intake was not associated with development of IA.

5 Sugar-sweetened drinks increased the risk of progression to T1D in people with the high-risk *HLA* genotype (HR, 1.84) but not those without it (P=0.02 for interaction).

Lamb MM, Frederiksen B, Seifert JA et al (2015) Sugar intake is associated with progression from islet autoimmunity to type 1 diabetes: the Diabetes Autoimmunity Study in the Young. *Diabetologia* **58**: 2027–34

Diabetes Technol Ther

Factors associated with nocturnal hypoglycaemia

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓

1 These authors studied continuous glucose monitoring data from a total of 855 nights obtained from 45 people with T1D aged 15–45 years.

2 Hypoglycaemia occurred in 221 of the 855 nights (25%).

3 Nocturnal hypoglycaemia was associated with younger age (P<0.001), lower HbA_{1c} levels (P=0.006), exercise in the preceding day (P=0.003) and hypoglycaemia in the preceding day (P=0.001). There was also a borderline association with lower bedtime blood glucose levels (P=0.10).

4 While no single factor could strongly predict hypoglycaemia, the authors identify exercise, bedtime glucose levels and daytime hypoglycaemia as modifiable factors that can be targeted to prevent this complication.

Wilson DM, Calhoun PM, Maahs DM et al (2015) Factors associated with nocturnal hypoglycemia in at-risk adolescents and young adults with type 1 diabetes. *Diabetes Technol Ther* **17**: 385–91

Diabetes Care

DKA rates compared internationally

Readability	✓✓✓
Applicability to practice	✓✓✓✓
WOW! Factor	✓✓✓

1 The rates of diabetic ketoacidosis (DKA) in children and adolescents from three large national T1D registries in England and Wales (n=16 314), Germany and Austria (n=22 397) and the US (n=11 148) were evaluated.

2 The rate of DKA was 5.0% in Austria/Germany, 6.4% in England/Wales and 7.1% in the US, (P<0.001 after adjustment for demographics).

3 Multivariate analysis showed that DKA was more likely in females (odds ratio [OR], 1.23) and ethnic minorities (OR, 1.27).

4 DKA risk also increased with HbA_{1c} (OR, 2.54 in those with HbA_{1c} 58–74 mmol/mol [7.5–8.9%] and OR, 8.74 in those with HbA_{1c} ≥75 mmol/mol [≥9.0%]).

5 The authors conclude that cost-effective DKA prevention programmes need to be developed.

Maahs DM, Hermann JM, Holman N et al (2015) Rates of diabetic ketoacidosis: international comparison with 49,859 pediatric patients with type 1 diabetes from England, Wales, the U.S., Austria, and Germany. *Diabetes Care* **38**: 1876–82

> ***"In the absence of clinical signs of coeliac disease, histological confirmation of the disease and introduction of a gluten-free diet should be delayed in order to avoid unnecessary procedures and an even greater disease burden."***