

Colonic transit time (CTT) in children and adolescents: Reference values

Colonic transit time values are not normally distributed. Therefore, percentile 95 is often used for upper reference values.

Two studies on totally 76 healthy subjects, 3-18 yrs., have been performed with the Abrahamsson Method (Transit-Pellets method) presenting percentile 95-values (Wagener et al 2004; Vande Velde et al 2013). In both studies the highest CTT value observed was 3.6 days (36 markers, 86.4 hours). In the Wagener study on 22 patient's percentile 95 was 3.5 days while in the Vande Velde study on 54 patients the percentile 95 was 3.3 days.

Rintala et al (1997) studied 25 healthy children with the same method. The highest CTT value observed was 3.4 days while percentile 95 was not reported.

For calculation of segmental transit times with the Transit-Pellets method four colonic sub-segments are usually considered as done by Wagener et al.

Based on these reports a provisional upper reference value for CTT (percentile 95) of about 3.3 days (approx. 80 hrs.) in children and adolescents seems reasonable until larger groups have been studied.



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Segmental Colonic Motility in Patients With Anorectal Malformations

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● **Background:** Constipation is one of the most important functional sequelae in patients with anorectal malformations. The cause of this motility disorder is unknown. **Aim:** The purpose of this study was to assess total colonic transit time (TCT) and segmental colonic transit time (SCT) in patients with anorectal malformations. **Method:** Ninety patients with anorectal malformations (40 low and 50 high; median age, 7 years; range, 3 to 13) and twenty-five healthy children (median age, 8 years; range, 3 to 14 years) underwent measurement of TCT and SCT by the saturation technique. Ten radiopaque markers were ingested daily for 6 days followed by administration of a single abdominal x-ray on day 7. TCT in days was calculated by dividing the number of retained markers in the whole colon by the daily intake. SCT in four colonic segments (right, transverse, left, rectosigmoid) was described as a percentage of TCT (markers in one segment versus total number of retained markers). In high anomalies the degree of rectosigmoid dilatation was assessed by contrast enemas taken before closure of the stoma and later during follow-up. **Results:** TCT was significantly ($P < .03$) prolonged in patients with anorectal anomalies (median high, 2.1 days; low, 1.9 days versus 1.3 in healthy subjects). In patients with high anomalies right SCT was prolonged when compared with low anomalies and healthy subjects (median high, 24% versus low, 10% and normal subjects, 10%; $P < .01$). The impairment was more severe in patients with very high anomalies ($P < .005$). Patients with a low anomaly had prolonged rectosigmoid SCT (median low, 65% versus high, 43% and normal subjects, 49%; $P < .05$). Prolonged right colonic SCT and TCT correlated with symptomatic constipation in patients with high anomalies ($P < .05$) but not with those who had low anomalies. Impaired overall functional outcome correlated with prolonged right colonic SCT in patients with high anomalies and with prolonged rectosigmoid SCT in patients with low anomalies. There was no correlation between the degree of rectosigmoid dilatation and SCT or TCT. **Conclusion:** Patients with anorectal malformations have abnormal colonic motility. The type of motility disorder in low anomalies is rectosigmoid hypomotility. In patients with high anomalies the motility disturbance is more generalized. The overall functional outcome was strongly related to the degree of these motility disorders.

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INDEX WORDS: Anorectal malformations, colonic motility.

Colon transit time in healthy children and adolescents

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Abstract

Purpose The aims of this study are to describe normal colon transit time (CTT) in healthy children, correlate results with age, the Bristol stool scale, and stool frequency, and to evaluate intra- and interobserver variability.

Methods Inclusion criteria were as follows: healthy children between 3 and 18 years old with a normal defecation pattern, no history of abdominal surgery, and no medication use. Total and segmental CTT is measured by taking ten polythene radiopaque markers during six consecutive days followed by a single abdominal X-ray on day 7. Total and segmental CTT are calculated by multiplying the number of markers by 2.4 (Abrahamsson et al. *Scand J Gastroenterol* 32:72–80, 1988).

Results Fifty-four children and adolescents have participated: 30 boys and 24 girls (median age 10 years (3–18 years)). Median total CTT is 36 h (<2.4–86.4 h). There is no significant difference for age category (toddlers 31.2 h (<2.4–74.4 h), elementary school 36 h (2.4–79.2 h), and adolescents 43.2 h (14.4–86.4 h)). Segmental CTT reveals a median right colon CTT of 4.8 h (0–28.8 h); a median left colon CTT of 2.4 h (0–31.2 h); and a median rectosigmoidal CTT of 24 h (0–64.8 h). The Bristol stool scale correlates with total CTT ($p=0.031$). The intra- and interobserver variability displays an ICC of 0.999 for the total CTT.

Conclusion The CTT of normal healthy children is not sex- or age-related (above the age of 3 years). The Abrahamson method for CTT measurement by using bony landmarks for the determination of colon segments is easy to perform and

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Colonic Transit Time—What Is Normal?

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Background: Constipation is a common problem in childhood, and various radiologic methods have been advocated for investigation. Colonic transit time (CTT) has been used in adults to investigate colonic motility, but few studies evaluate this method in children. Data on CTT in the normal paediatric population are scarce.

Methods: The colonic transit time was measured in 22 healthy children (median age, 10 years; range, 4 to 15 years) by Abrahamsson's method. Children took bolus ingestions of radiopaque markers on 6 consecutive days, and on day 7 a single abdominal x-ray was performed. This was evaluated for total and segmental colonic transit time.

Results: The mean total CTT was 40 hours, and the upper limit of normal (95th percentile) was 84 hours. The upper

limit of normal for segmental transit time was as follows: 14 hours for the ascending, 33 hours for the transverse, 21 hours for the descending, and 41 hours for the rectosigmoid colon.

Conclusions: CTT provides an objective measure to assess childhood constipation. To date, 6 studies using 5 different methods have been published reporting values for healthy children. Comparing these, Abrahamsson's method has low radiation exposure and is well tolerated. This study contributes additional normal values in children.

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INDEX WORDS: Colonic transit time, childhood constipation.
