Otyłość u dzieci - profilaktyka i leczenie

2 - 3 lutego 2024, Warszawa

INSTYTUT „POMNIK-CENTRUM ZDROWIA DZIECKA"

Wskaźniki antropometryczne

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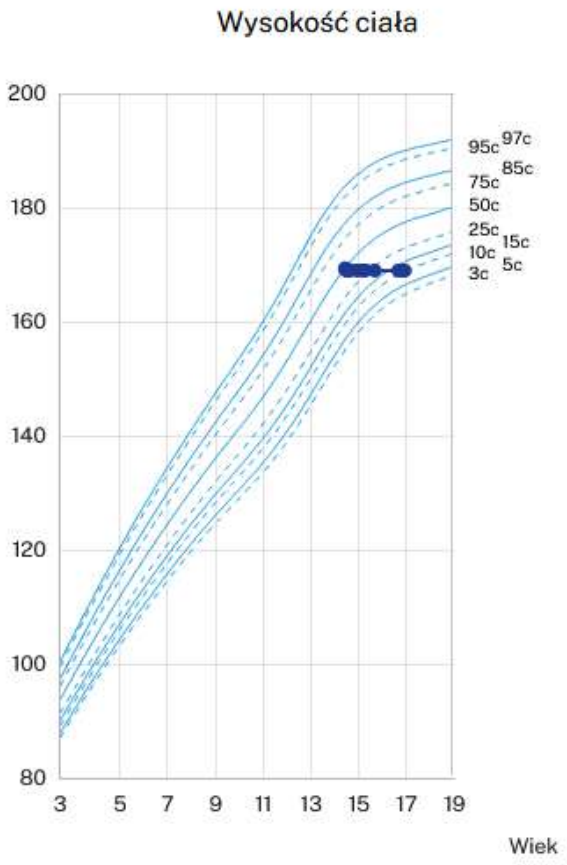
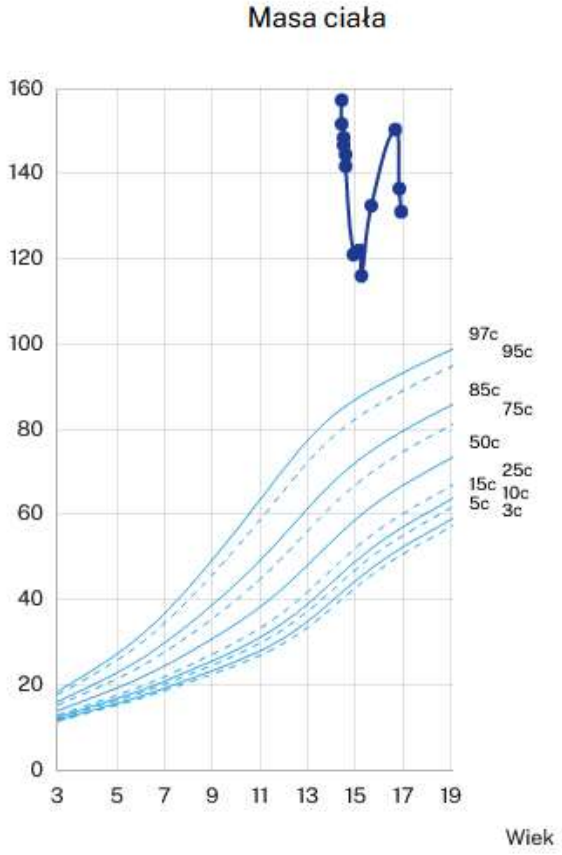
INSTYTUT „POMNIK-CENTRUM ZDROWIA DZIECKA"

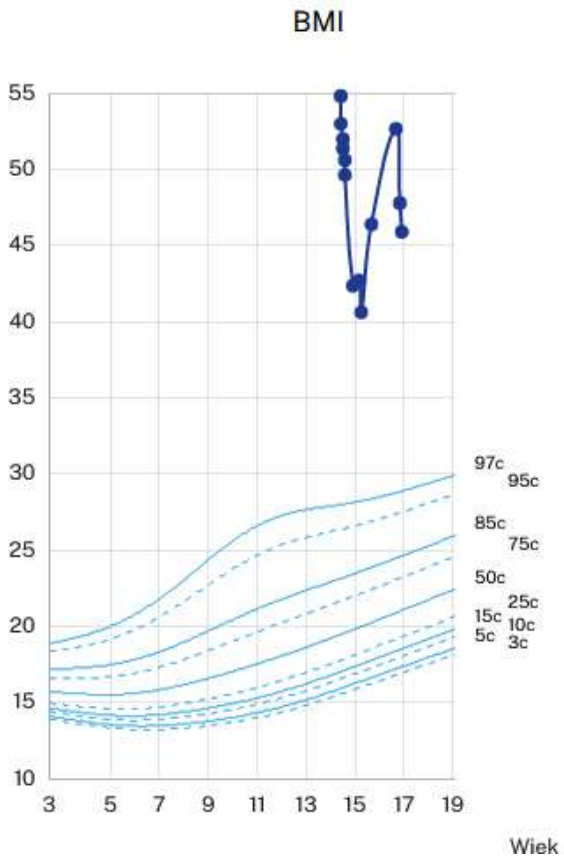
Podstawowe pomiary antropometryczne:

- ✓ masa ciała
- ✓ wysokość ciała

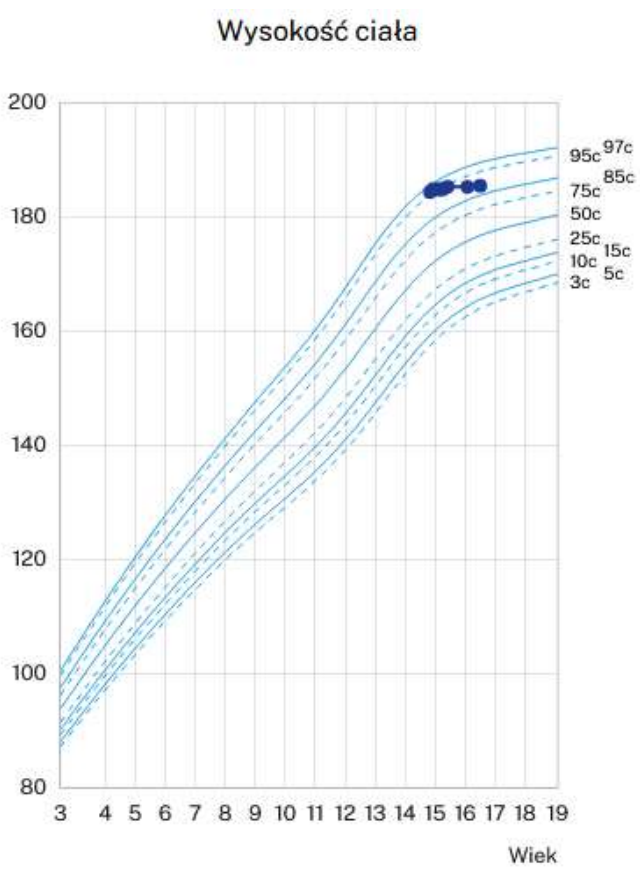
Pacjent 1







Pacjent 2


Wysokość ciała
200
180
160
140
120
100
80
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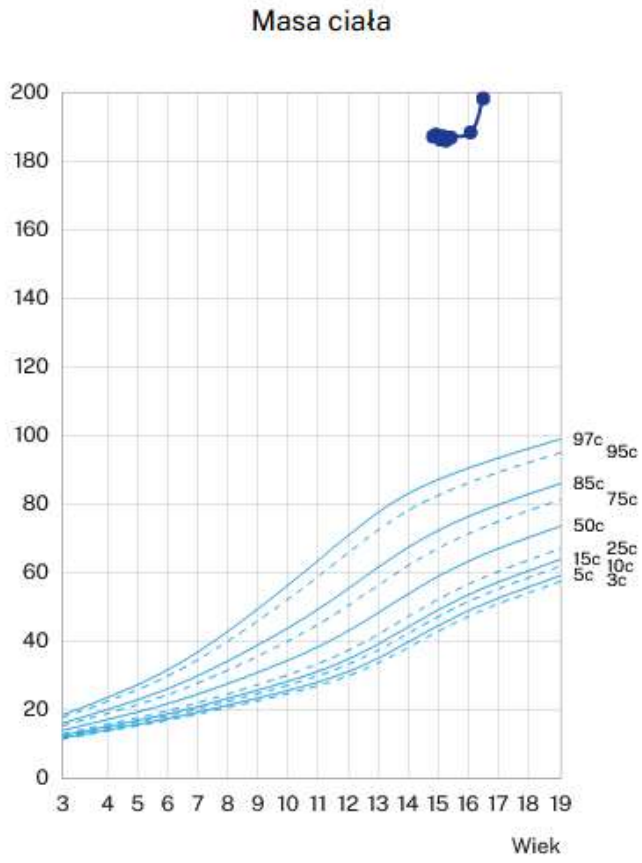
Wiek
97c
95c
85c
75c
50c
25c
15c
10c
5c
3c


Masa ciała
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Wiek
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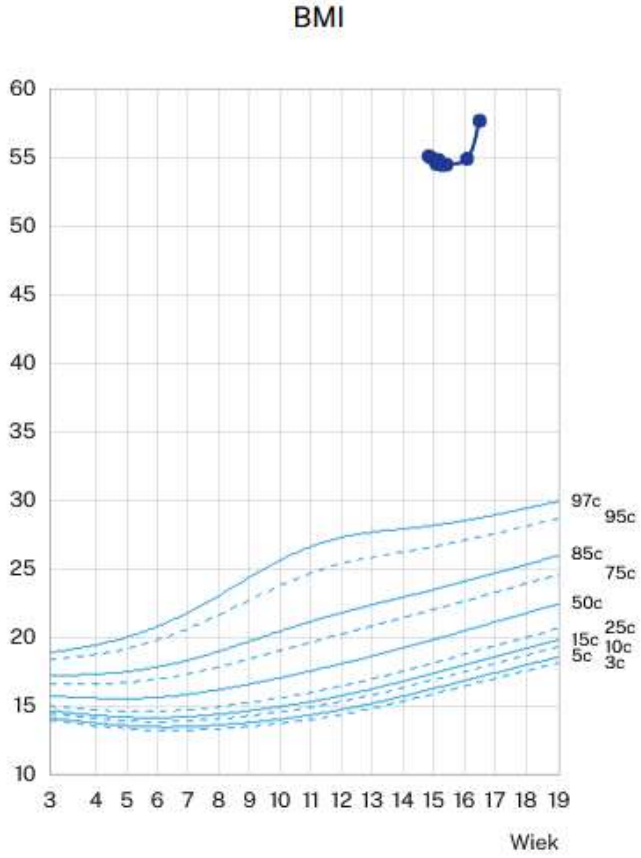
BMI
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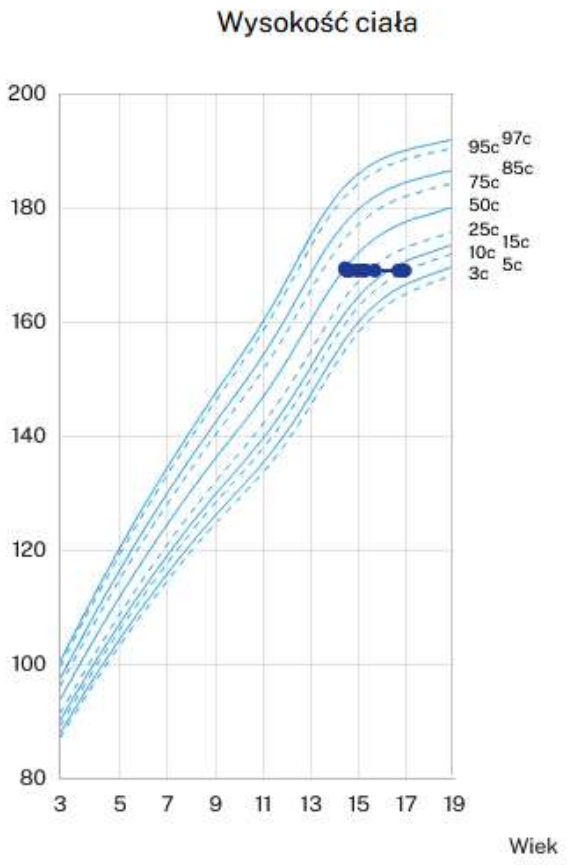
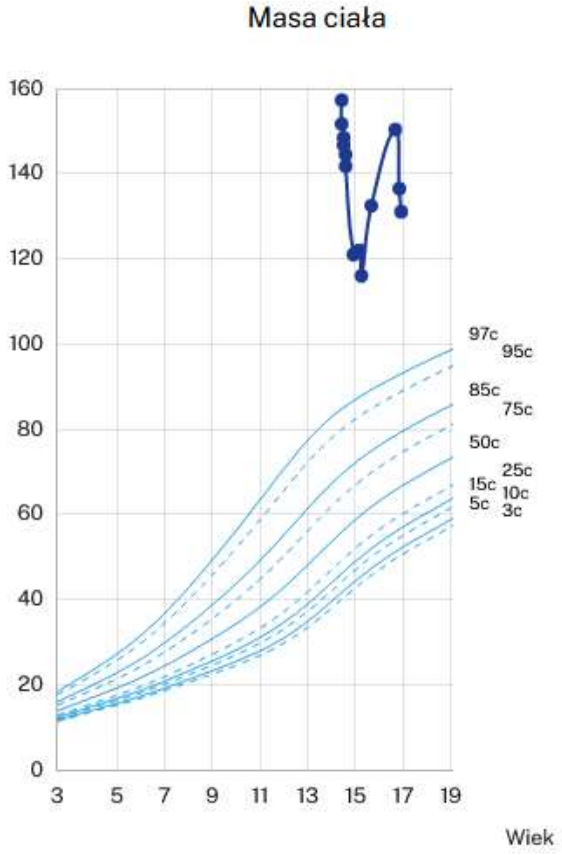
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Wiek
97c
95c
85c
75c
50c
25c
15c
10c
5c
3c

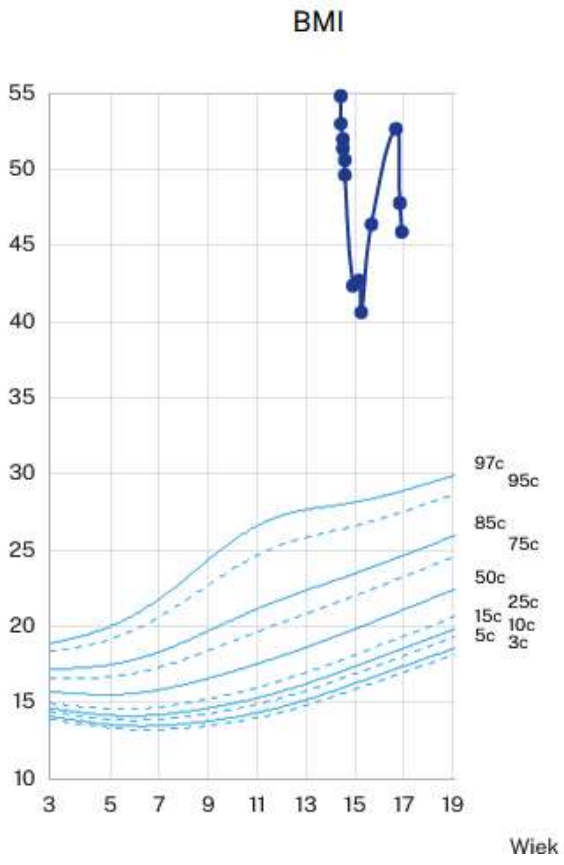
Podstawowe pomiary antropometryczne:

- ✓ masa ciała
- ✓ wysokość ciała

Pacjent 1







Pacjent 1

Wysokość ciała (centyle) - Wiek kalendarzowy

Data pomiaru	Wiek	Wartość	Centyl	Z-score
03.03.2015	14/5	169.4	50	0
10.03.2015	14/5	169.2	49	-0.03
20.03.2015	14/6	169	45.8	-0.11
30.03.2015	14/6	169	45.8	-0.11
13.04.2015	14/7	169	43.2	-0.17
30.04.2015	14/7	169	43.2	-0.17
31.08.2015	14/11	169	35.3	-0.38
24.11.2015	15/2	169	30.1	-0.52
11.12.2015	15/3	169	28.1	-0.58
20.05.2016	15/8	169	21.5	-0.79
10.05.2017	16/8	169	11.8	-1.18
17.07.2017	16/10	169	10.8	-1.24
23.08.2017	16/11	169	10.5	-1.26

Masa ciała (centyle) - Wiek kalendarzowy

Data pomiaru	Wiek	Wartość	Centyl	Z-score
03.03.2015	14/5	157.3	>99!	3.94
10.03.2015	14/5	151.7	>99!	3.84
20.03.2015	14/6	148.5	>99!	3.79
30.03.2015	14/6	146.7	>99!	3.75
13.04.2015	14/7	144.5	>99!	3.72
30.04.2015	14/7	141.8	>99!	3.66
31.08.2015	14/11	121	>99!	3.16
24.11.2015	15/2	122	>99!	3.18
11.12.2015	15/3	116	>99!	3.01
20.05.2016	15/8	132.5	>99!	3.49
10.05.2017	16/8	150.4	>99!	3.97
17.07.2017	16/10	136.5	>99!	3.6
23.08.2017	16/11	131.1	>99!	3.44

BMI (centyle) - Wiek kalendarzowy

Data pomiaru	Wiek	Wartość	Centyl	Z-score
03.03.2015	14/5	54.82	>99!	3.4
10.03.2015	14/5	52.99	>99!	3.36
20.03.2015	14/6	51.99	>99!	3.35
30.03.2015	14/6	51.36	>99!	3.34
13.04.2015	14/7	50.59	>99!	3.32
30.04.2015	14/7	49.65	>99!	3.3
31.08.2015	14/11	42.37	>99!	3.07
24.11.2015	15/2	42.72	>99!	3.12
11.12.2015	15/3	40.61	>99!	3.01
20.05.2016	15/8	46.39	>99!	3.35
10.05.2017	16/8	52.66	>99!	3.74
17.07.2017	16/10	47.79	>99!	3.56
23.08.2017	16/11	45.9	>99!	3.47

Eur J Pediatr (2011) 170:599–609
DOI 10.1007/s00431-010-1329-x

ORIGINAL PAPER

Polish 2010 growth references for school-aged children and adolescents

Zbigniew Kułaga · Mieczysław Litwin · Marcin Tkaczyk · Iwona Palczewska · Małgorzata Zajączkowska · Danuta Zwolińska · Tomasz Krynicki · Anna Wasilewska · Anna Moczulska · Aurelia Morawiec-Knysak · Katarzyna Barwicka · Aneta Grajda · Beata Gurzkowska · Ewelina Napieralska · Huiqi Pan

Eur J Pediatr (2013) 172:753–761
DOI 10.1007/s00431-013-1954-2

ORIGINAL ARTICLE

Polish 2012 growth references for preschool children

Zbigniew Kułaga · Aneta Grajda · Beata Gurzkowska · Magdalena Góźdź · Małgorzata Wojtyło · Anna Świąder · Agnieszka Różdżyńska-Świątkowska · Mieczysław Litwin

INSTYTUT „POMNIK-CENTRUM ZDROWIA DZIECKA"

European Journal of Pediatrics (2023) 182:3217–3229
https://doi.org/10.1007/s00431-023-05001-4

RESEARCH

Population-based references for waist and hip circumferences, waist-to-hip and waist-to-height ratios for children and adolescents, and evaluation of their predictive ability

Zbigniew Kułaga[1] · Anna Świąder-Leśniak[2] · Aneta Kotowska[1] · Mieczysław Litwin[3]

Eur J Pediatr (2012) 171:1215–1221
DOI 10.1007/s00431-012-1717-5

ORIGINAL ARTICLE

Population-based centile curves for triceps, subscapular, and abdominal skinfold thicknesses in Polish children and adolescents—the OLAF study

Maciej Jaworski · Zbigniew Kułaga · Paweł Płudowski · Aneta Grajda · Beata Gurzkowska · Ewelina Napieralska · Anna Świąder · Huiqi Pan · Mieczysław Litwin · the Olaf Study Group

Siatki centylowe dla oceny wzrastania i stanu odżywienia polskich dzieci i młodzieży od urodzenia do 18 roku życia

Percentile charts for growth and nutritional status assessment in Polish children and adolescents from birth to 18 year of age

Zbigniew Kułaga[1], Agnieszka Różdżyńska-Świątkowska[2], Aneta Grajda[1], Beata Gurzkowska[1], Małgorzata Wojtyło[1], Magdalena Góźdź[1], Anna Świąder-Leśniak[2], Mieczysław Litwin[3]

Antropometryczne wskaźniki wagowo-wzrostowe

Wskaźnik	Wzór
BMI	$\frac{masa\ ciała\ [kg]}{wysokość\ ciała\ [m^2]}$
Queteleta I	$\frac{masa\ ciała\ [g]}{wysokość\ ciała\ [cm]}$
Rohera	$\frac{masa\ ciała\ [g]}{wysokość\ ciała\ [cm^3]}$
Cole'a	$\frac{BMI\ aktualne}{BMI\ standardowe} \times 100\%$
WMC	$\frac{71{,}84\ \times masa\ ciała\ [kg]^{1{,}425}}{wysokość\ ciała\ [cm]^{1{,}275}}$

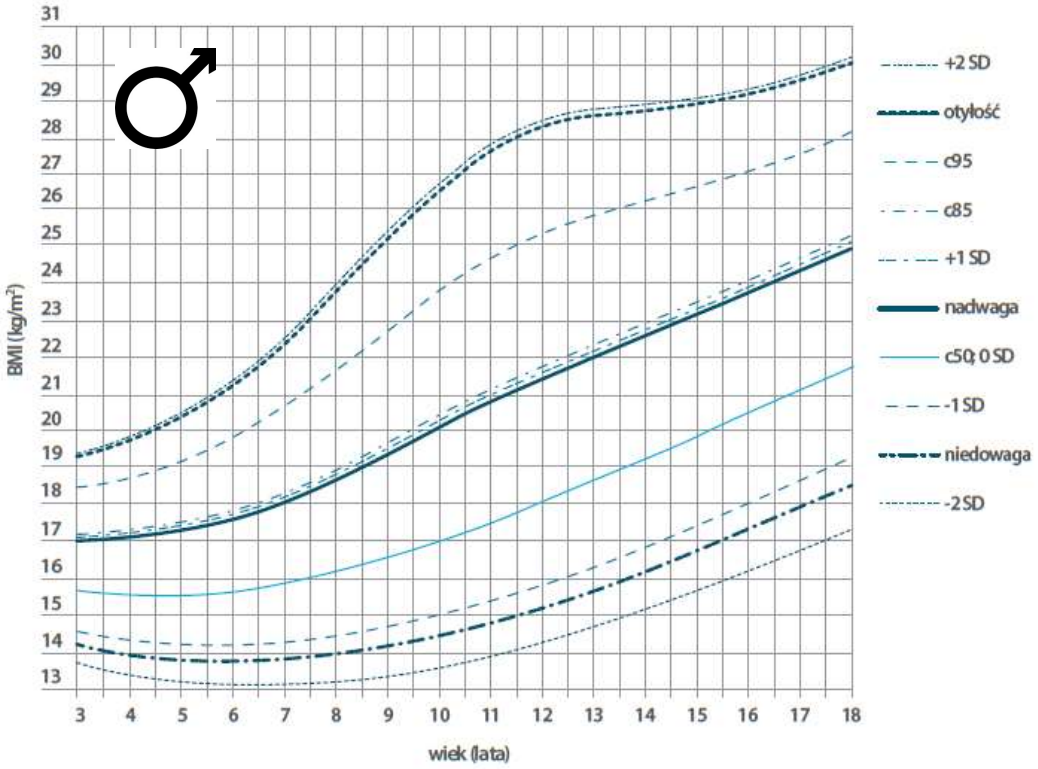
WHO CLASSIFICATION OF WEIGHT STATUS	
WEIGHT STATUS	**BODY MASS INDEX (BMI), kg/m^2**
Underweight	<18.5
Normal range	18.5 – 24.9
Overweight	25.0 – 29.9
Obese	≥ 30
Obese class I	30.0 – 34.9
Obese class II	35.0 – 39.9
Obese class III	≥ 40

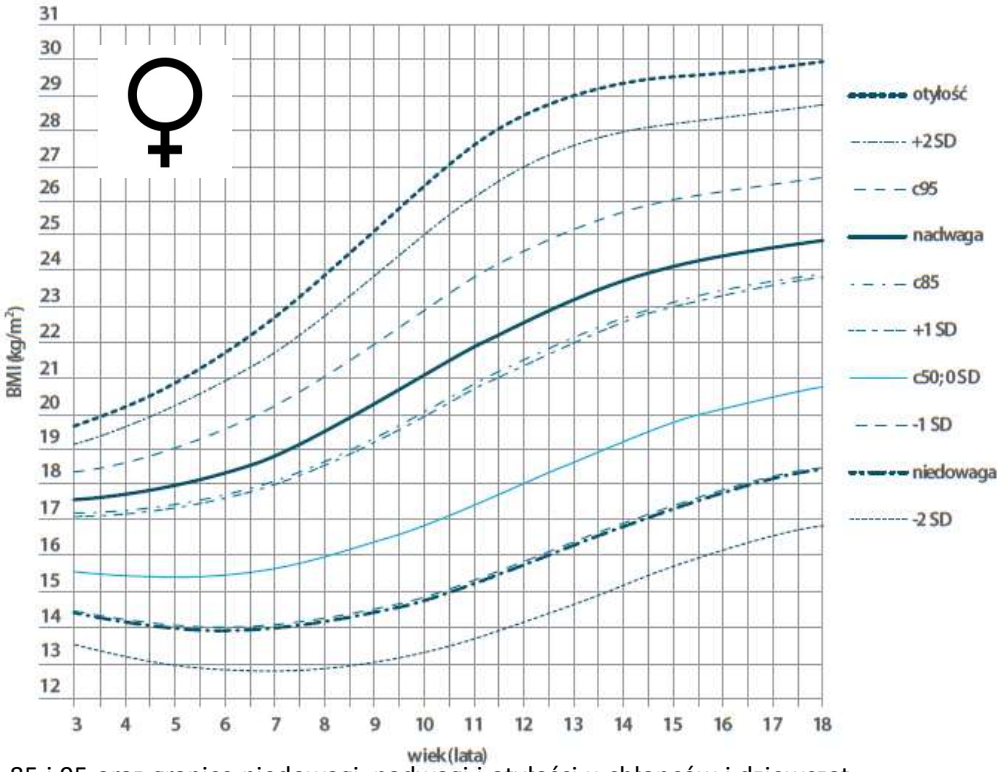
Ocena wskaźnika BMI dla dzieci i młodzieży – na podstawie siatek centylowych

Wskaźnik BMI

Granice niedowagi, nadwagi i otyłości opracowane w reprezentatywnej próbie populacyjnej polskich dzieci i młodzieży wg. metodologii analogicznej do Cole'a

	chłopcy	dziewczynki
nadwaga 25 kg/m^2	82.9 c.	90.5 c.
otyłość 30 kg/m^2	97.5 c.	98.6 c.

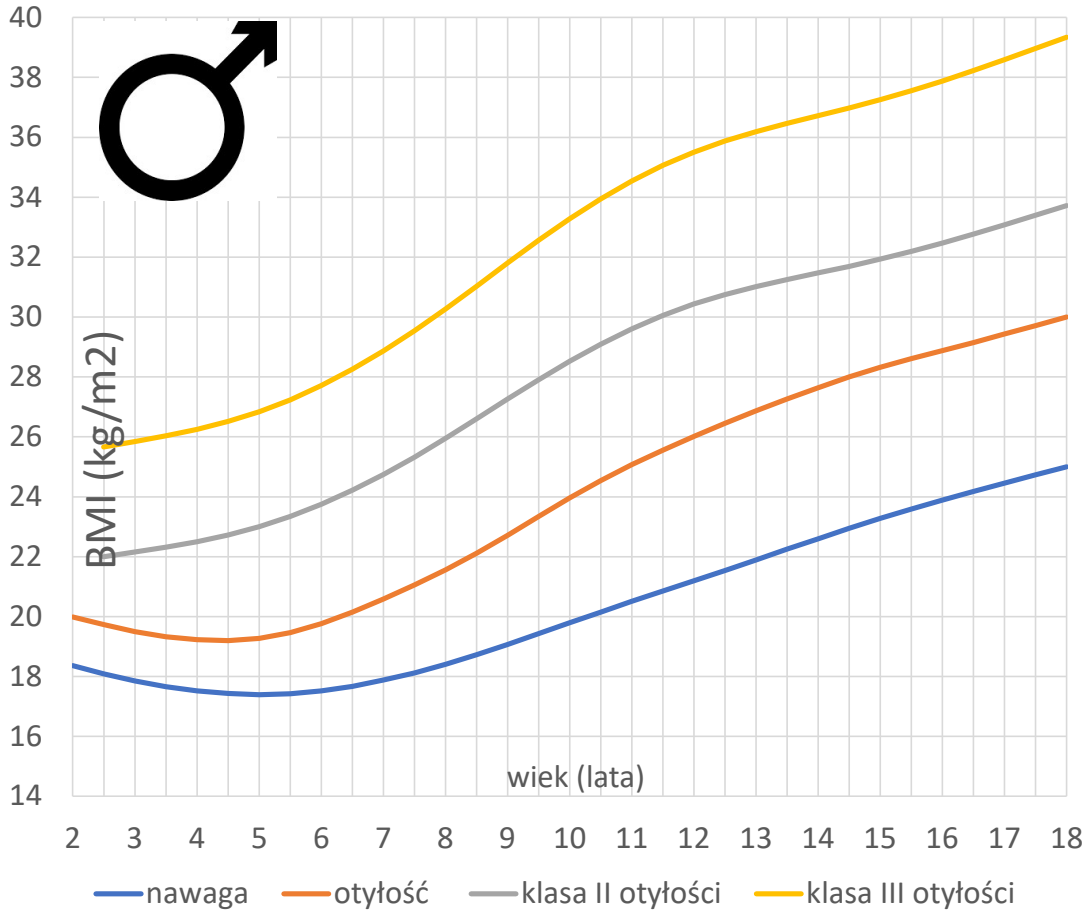


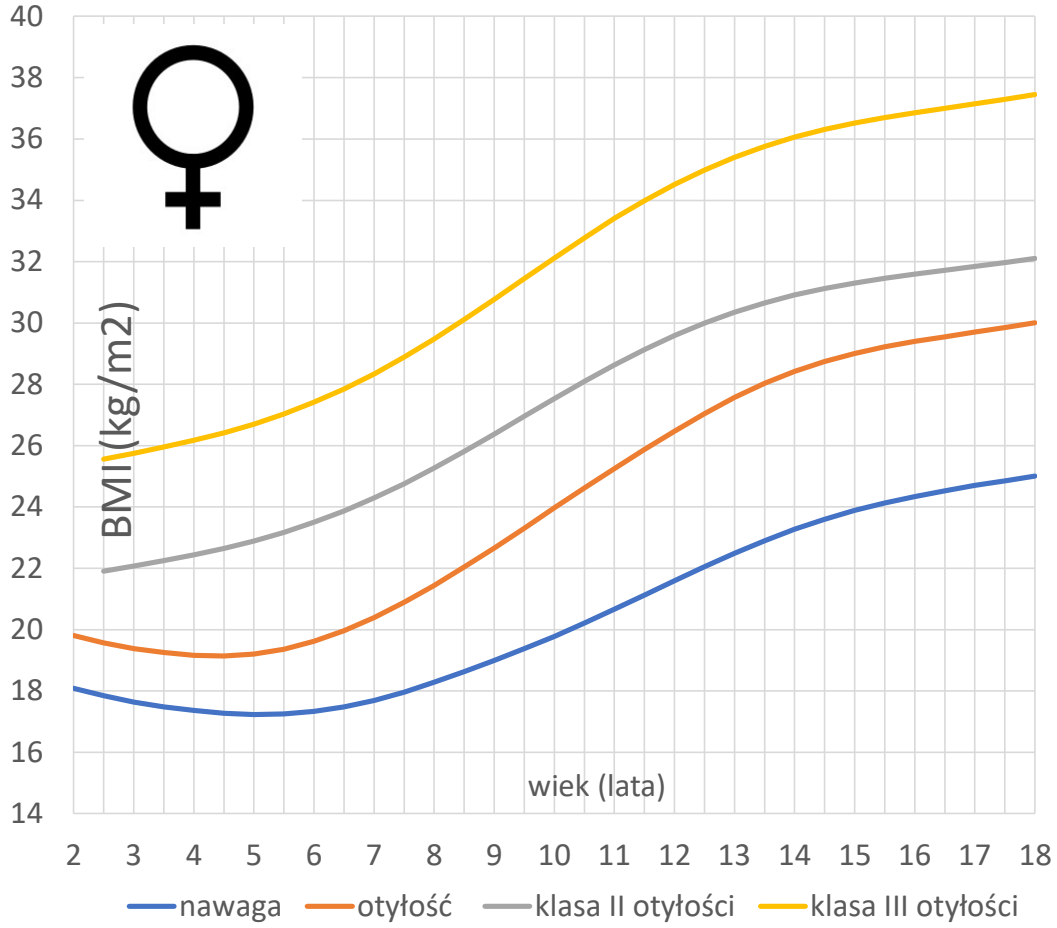


Rozkład odchyleń standardowych (SD) BMI centyle 85 i 95 oraz granice niedowagi, nadwagi i otyłości u chłopców i dziewcząt.
Kułaga Z i wsp. *Standardy Med. Pediatria*, 2015 suplement 1

Otyłość II stopnia: BMI ≥ 120% 95 centyla
Otyłość III stopnia BMI ≥ 140% 95 centyla

Skinner AC, Ravanbakht SN, Skelton JA, et al. Prevalence of Obesity and Severe Obesity in US Children, 1999–2016. Pediatrics. 2018;141(3):e20173459

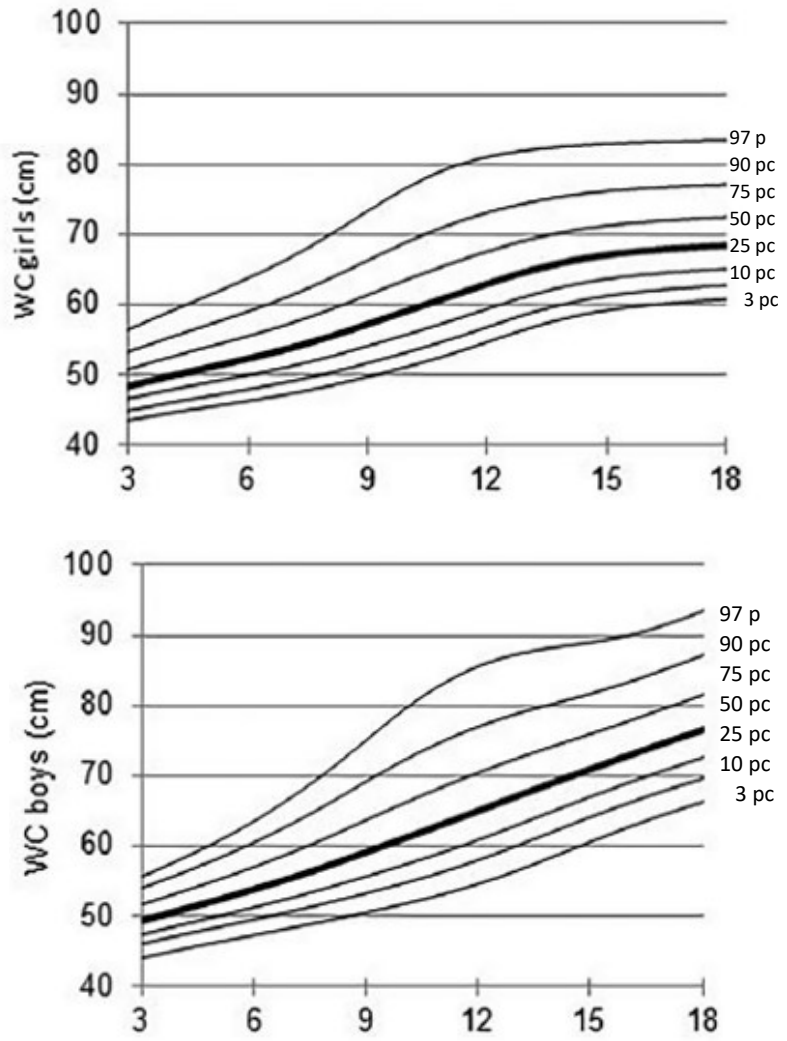




Obwód talii

Table 2: The IDF consensus definition of metabolic syndrome in children and adolescents

Age group (years)	Obesity* (WC)	Triglycerides	HDL-C	Blood pressure	Glucose (mmol/L) or known T2DM
6–<10	≥90th percentile	Metabolic syndrome cannot be diagnosed, but further measurements should be made if there is a family history of metabolic syndrome, T2DM, dyslipidemia, cardiovascular disease, hypertension and/or obesity.			
10–<16 Metabolic syndrome	≥90th percentile or adult cut-off if lower	≥1.7 mmol/L (≥150 mg/dL)	<1.03 mmol/L (<40 mg/dL)	Systolic ≥130/ diastolic ≥85 mm Hg	≥5.6 mmol/L (100 mg/dL) (If ≥5.6 mmol/L [or known T2DM] recommend an OGTT)
16+ Metabolic syndrome	Use existing IDF criteria for adults, ie: Central obesity (defined as waist circumference ≥ 94cm for Europid men and ≥ 80cm for Europid women, with ethnicity specific values for other groups*) plus any two of the following four factors: • raised triglycerides: ≥ 1.7mmol/L • reduced HDL-cholesterol: <1.03mmol/L (<40 mg/dL) in males and <1.29mmol/L (<50 mg/dL) in females, or specific treatment for these lipid abnormalities • raised blood pressure: systolic B∂ =130 or diastolic B∂ =85mm Hg, or treatment of previously diagnosed hypertension • impaired fasting glycemia (IFG): fasting plasma glucose (FPG)Ê=5.6 mmol/L (≥100 mg/dL), or previously diagnosed type 2 diabetes				



Kułaga i wsp. European Journal of Pediatrics (2023) 182:3217-3229

Obwód talii

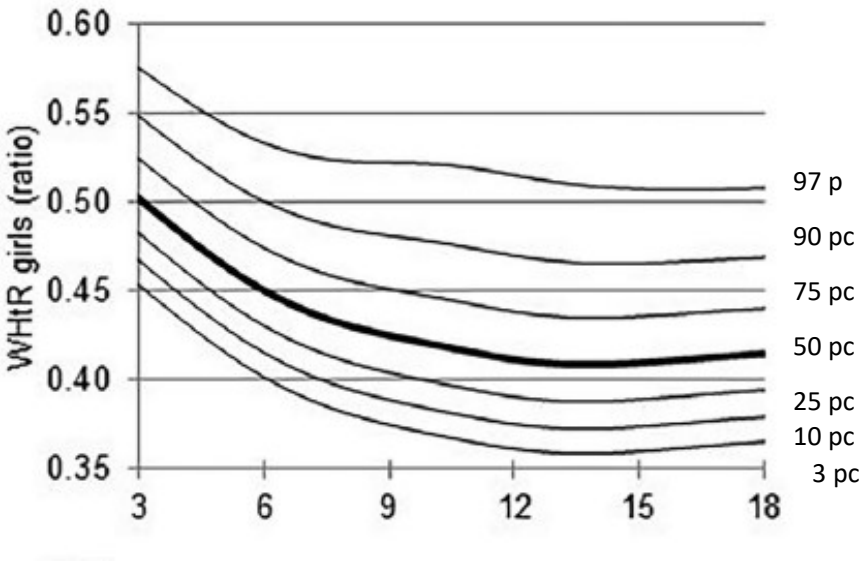
Table 1 Waist circumference LMS parameters, 90th and 95th percentile by sex and age and cut-offs linked to waist 80 and 94 cm in girls and boys, respectively, at age 18 years

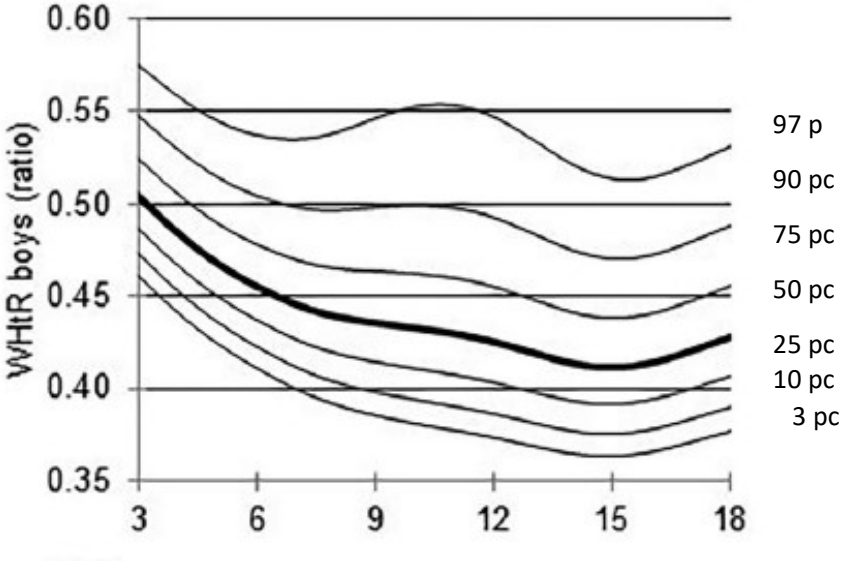
Age	Girls						Boys					
	L	M	S	Cut-offs (waist cm)			L	M	S	Cut-offs (waist cm)		
				Percentile		Cut-off adult 80 cm				Percentile		Cut-off adult 94 cm
				90th	95th					90th	95th	
3.0	−2.7714	48.4171	0.0657	53.3	55.1	54.7	−3.2654	49.2057	0.0617	53.9	55.7	56.8
4.0	−2.8222	49.8008	0.0704	55.3	57.3	56.9	−3.2911	50.7158	0.0657	56.0	58.0	59.3
5.0	−2.8631	51.0858	0.0750	57.2	59.5	59.0	−3.3097	52.1768	0.0704	58.1	60.4	61.9
6.0	−2.8939	52.3672	0.0795	59.1	61.7	61.2	−3.3151	53.7172	0.0759	60.4	63.1	64.9
7.0	−2.9133	53.768	0.0842	61.2	64.2	63.6	−3.2869	55.3446	0.0822	63.0	66.2	68.4
8.0	−2.9183	55.3973	0.0891	63.6	67.1	66.4	−3.2106	57.1629	0.0894	65.9	69.7	72.4
9.0	−2.9110	57.2563	0.0937	66.4	70.2	69.4	−3.0898	59.1160	0.097	69.2	73.6	76.8
10.0	−2.9043	59.1739	0.0969	69.0	73.3	72.4	−2.9544	61.0594	0.103	72.2	77.2	80.9
11.0	−2.9176	61.0813	0.0973	71.3	75.8	74.8	−2.8335	63.0168	0.1059	74.8	80.1	83.9
12.0	−2.9596	62.9769	0.0945	73.2	77.5	76.6	−2.7486	65.0261	0.1055	77.0	82.3	86.1
13.0	−3.0242	64.7288	0.0898	74.6	78.7	77.9	−2.7231	67.0767	0.1014	78.7	83.8	87.3
14.0	−3.0901	66.0883	0.0856	75.6	79.5	78.7	−2.7465	69.0525	0.0956	80.2	84.8	88.0
15.0	−3.1436	67.0355	0.0824	76.2	80.0	79.2	−2.7827	70.9893	0.0899	81.6	85.9	88.8
16.0	−3.1801	67.6398	0.0805	76.6	80.3	79.6	−2.8105	72.8855	0.0862	83.2	87.3	90.1
17.0	−3.2060	68.0580	0.0792	76.9	80.6	79.8	−2.8201	74.8000	0.0845	85.1	89.2	92.0
18.0	−3.2268	68.3872	0.0781	77.2	80.7	80.0	−2.8039	76.5658	0.0842	87.1	91.2	94.0

L skewness, *M* median, *S* coefficient of variation

Kułaga i wsp. European Journal of Pediatrics (2023) 182:3217-3229

Wskaźnik WHtR





Kułaga i wsp. European Journal of Pediatrics (2023) 182:3217-3229

Wskaźnik WHtR

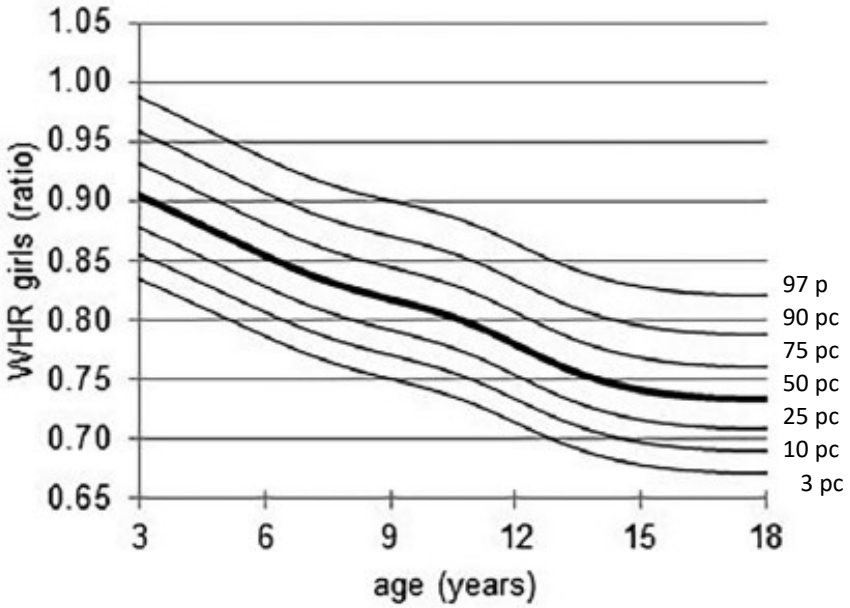
Table 3 WHtR LMS parameters, 90th and 95th percentile by sex and age and cut-offs linked to WHtR 0.5 at age 18 years

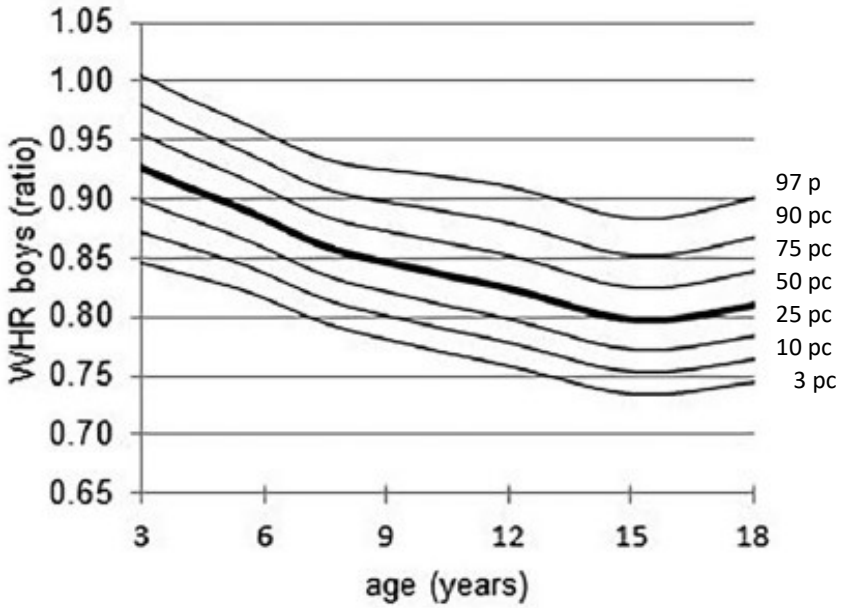
Age	Girls						Boys					
	L	M	S	Cut-offs (ratio)			L	M	S	Cut-offs (ratio)		
				Percentile		Cut-off adult 0.5				90th		Cut-off adult 0.5
				90th	95th					90th	95th	
3.0	−2.4564	0.5022	0.0620	0.549	0.565	0.570	−3.3777	0.5038	0.0558	0.547	0.562	0.555
4.0	−2.6240	0.4826	0.0647	0.530	0.547	0.553	−3.4072	0.4846	0.0596	0.529	0.546	0.538
5.0	−2.7660	0.4645	0.0676	0.513	0.530	0.537	−3.4370	0.4684	0.0634	0.515	0.533	0.525
6.0	−2.8890	0.4495	0.0708	0.499	0.518	0.525	−3.4659	0.4558	0.0676	0.505	0.524	0.516
7.0	−3.0004	0.4383	0.0744	0.490	0.510	0.518	−3.4905	0.4461	0.0724	0.499	0.520	0.510
8.0	−3.0909	0.4305	0.0780	0.485	0.507	0.515	−3.5077	0.4397	0.0776	0.497	0.521	0.510
9.0	−3.1639	0.4251	0.0813	0.482	0.506	0.515	−3.5135	0.4359	0.0823	0.497	0.524	0.511
10.0	−3.2243	0.4206	0.0839	0.480	0.505	0.514	−3.5061	0.4329	0.0860	0.498	0.526	0.513
11.0	−3.2697	0.4158	0.0852	0.476	0.502	0.511	−3.4859	0.4297	0.0880	0.496	0.526	0.511
12.0	−3.2853	0.4113	0.0852	0.471	0.496	0.506	−3.4533	0.4253	0.0885	0.491	0.521	0.507
13.0	−3.2681	0.4088	0.0846	0.467	0.492	0.502	−3.4087	0.4197	0.0876	0.483	0.512	0.498
14.0	−3.2220	0.4083	0.0837	0.466	0.490	0.499	−3.3508	0.4145	0.0860	0.476	0.502	0.490
15.0	−3.1608	0.4096	0.0826	0.466	0.489	0.498	−3.2786	0.4126	0.0847	0.472	0.497	0.485
16.0	−3.0995	0.4114	0.0816	0.467	0.489	0.498	−3.1951	0.4150	0.0838	0.473	0.498	0.486
17.0	−3.0708	0.4132	0.0810	0.468	0.490	0.499	−3.1045	0.4209	0.0836	0.479	0.504	0.492
18.0	−3.0735	0.4147	0.0806	0.470	0.492	0.500	−3.0090	0.4281	0.0836	0.487	0.511	0.500

L skewness, *M* median, *S* coefficient of variation, *WHtR* waist-to-height ratio

Kułaga i wsp. European Journal of Pediatrics (2023) 182:3217-3229

Wskaźnik WHR





Wskaźnik WHR

Table 4 WHR LMS parameters, 90th and 95th percentile by sex and age and cut – offs linked to WHR 0.85 and 0.9 in the case of girls and boys, respectively, at age 18 years

Age	Girls						Boys					
	L	M	S	Cut-offs (ratio)			L	M	S	Cut-offs (ratio)		
				Percentile		Cut-off adult 0.85				90th		Cut-off adult 0.9
				90th	95th					90th	95th	
3.0	−1.2336	0.9034	0.0447	0.959	0.976	1.013	1.2953	0.9268	0.0448	0.980	0.994	1.004
4.0	−1.2869	0.8869	0.0450	0.942	0.959	0.996	0.8351	0.9122	0.0436	0.963	0.978	0.987
5.0	−1.3211	0.8699	0.0455	0.924	0.941	0.978	0.3820	0.8987	0.0427	0.949	0.963	0.972
6.0	−1.3365	0.8532	0.0460	0.907	0.924	0.961	−0.0611	0.8838	0.0423	0.933	0.948	0.957
7.0	−1.3554	0.8380	0.0467	0.892	0.909	0.946	−0.4863	0.8672	0.0426	0.917	0.931	0.941
8.0	−1.3932	0.8260	0.0474	0.880	0.897	0.934	−0.8906	0.8547	0.0434	0.905	0.920	0.930
9.0	−1.4508	0.8165	0.0480	0.871	0.888	0.926	−1.2649	0.8466	0.0446	0.898	0.914	0.925
10.0	−1.5299	0.8070	0.0487	0.862	0.879	0.917	−1.5945	0.8392	0.0459	0.893	0.909	0.920
11.0	−1.6430	0.7945	0.0495	0.850	0.867	0.906	−1.8697	0.8318	0.0469	0.887	0.904	0.915
12.0	−1.8004	0.7779	0.0503	0.833	0.851	0.891	−2.0832	0.8243	0.0477	0.880	0.898	0.910
13.0	−1.9945	0.7612	0.0510	0.816	0.834	0.875	−2.2387	0.8147	0.0482	0.871	0.889	0.901
14.0	−2.1787	0.7483	0.0516	0.804	0.822	0.864	−2.3471	0.8045	0.0483	0.860	0.878	0.890
15.0	−2.3124	0.7401	0.0519	0.796	0.814	0.856	−2.4201	0.7981	0.0484	0.854	0.872	0.884
16.0	−2.3915	0.7353	0.0521	0.791	0.809	0.852	−2.4686	0.7983	0.0486	0.854	0.873	0.885
17.0	−2.4265	0.7333	0.0522	0.789	0.807	0.851	−2.4950	0.8036	0.0491	0.860	0.879	0.892
18.0	−2.4375	0.7326	0.0522	0.788	0.807	0.850	−2.5042	0.8100	0.0496	0.868	0.887	0.900

L skewness, *M* median, *S* coefficient of variation, *WHR* waist-to-hip ratio

Kułaga i wsp. European Journal of Pediatrics (2023) 182:3217-3229

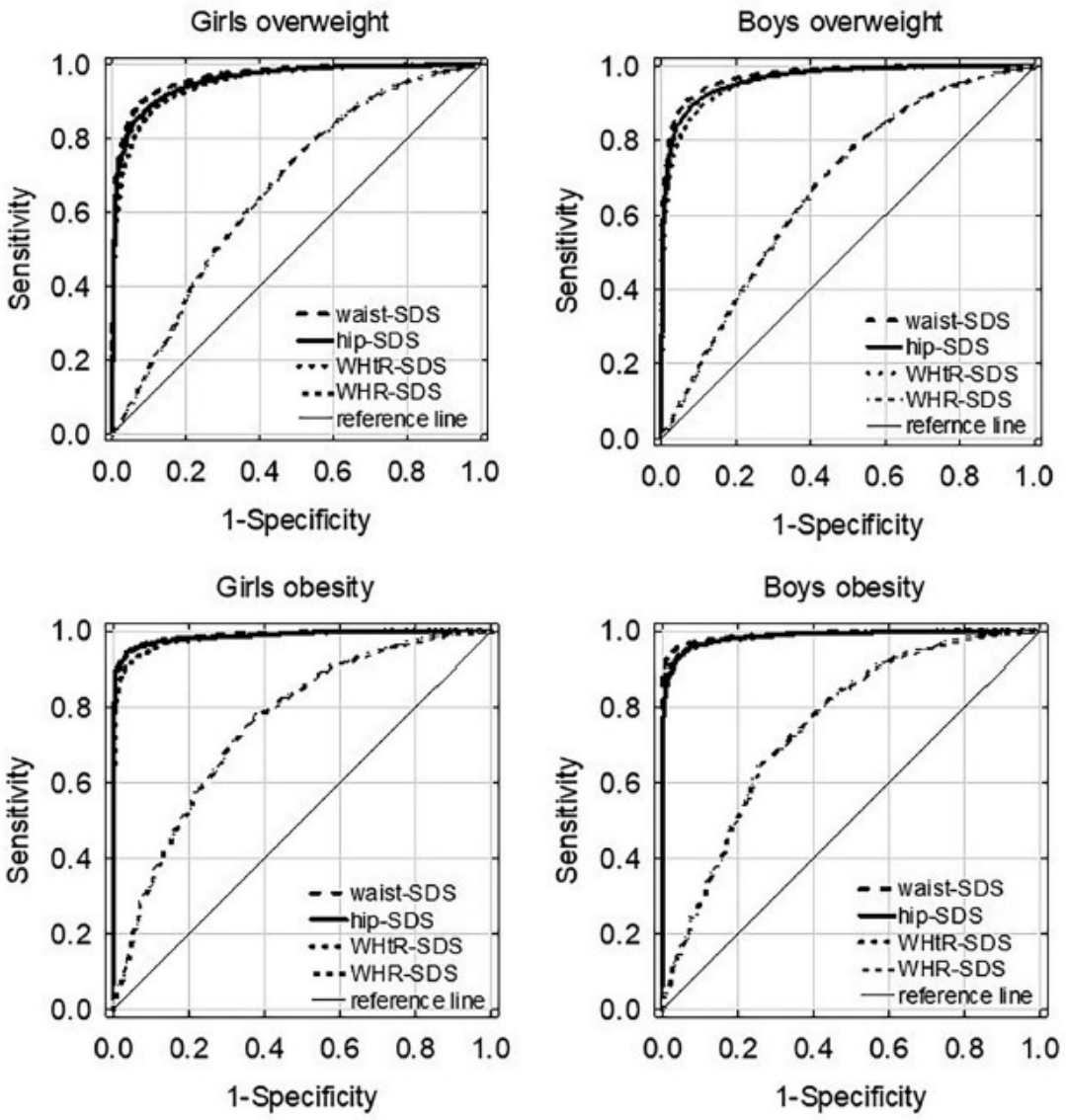


Fig. 2 ROC curves for prediction of IOTF overweight, obesity and elevated blood pressure from waist-SDS, hip-SDS, WHtR-SDS and WHR-SDS. BP, blood pressure; IOTF, International Obesity Task Force; ROC, receiver operating characteristics; WHtR, waist-to-height ratio; WHR, waist-to-hip ratio; SDS, standard deviation score

	AUC ROC (95% CI)	Cut-off	Sensitivity	Specificity	Youden index	*p* value[a]
Girls – overweight						
Waist-SDS	0.969 (0.964 0.972)	0.7414	92.4%	89.7%	0.821	<0.01[b]
Hip-SDS	0.960 (0.956 0.964)	0.7042	90.8%	87.9%	0.787	<0.05[c]
WHtR-SDS	0.954 (0.948 0.957)	0.6972	89.7%	87.3%	0.770	<0.01[d]
WHR-SDS	0.667 (0.652 0.682)	0.4839	52.8%	72.9%	0.257	–
Girls – obesity						
Waist-SDS	0.989 (0.986 0.991)	1.3913	97.4%	93.9%	0.913	<0.01[c]
Hip-SDS	0.987 (0.984 0.989)	1.4039	96.6%	94.4%	0.909	<0.01[d]
WHtR-SDS	0.982 (0.979 0.986)	1.3466	94.6%	93.2%	0.878	<0.01[d]
WHR-SDS	0.759 (0.732 0.786)	0.7353	62.2%	78.7%	0.409	–

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RESEARCH

Population-based references for waist and hip circumferences, waist-to-hip and waist-to-height ratios for children and adolescents, and evaluation of their predictive ability

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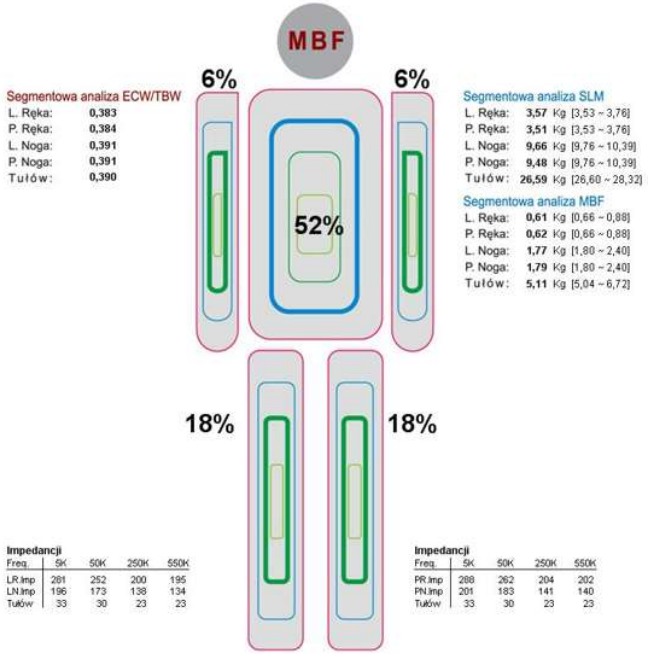
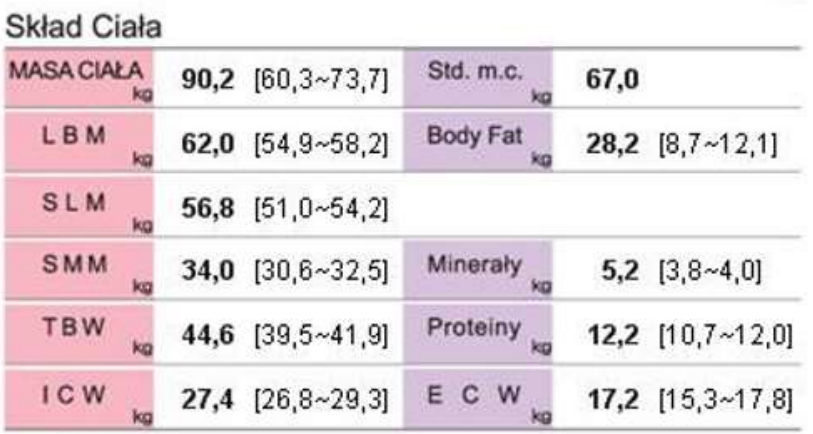
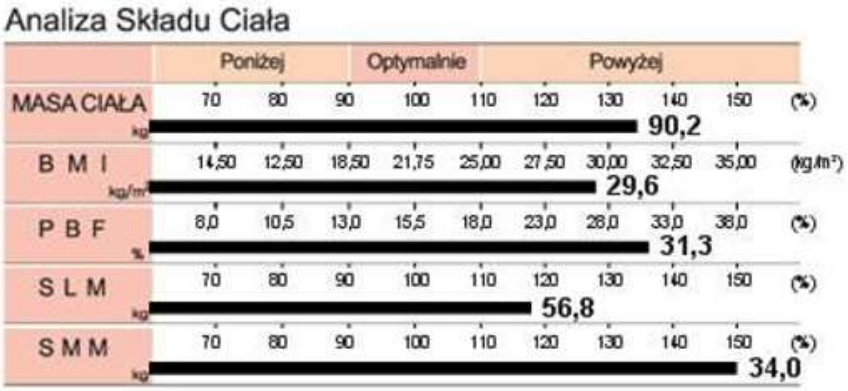
Tkanka tłuszczowa

Metody analizy składu ciała:

- ✓ Bioelektryczna impedancja (BIA)
- ✓ Densytometria (DEXA)
- ✓ Rezonans magnetyczny
- ✓ Tomografia komputerowa







Dziękuję

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