
DTU

NNR2023 seminar: mandag 11. september 2023

Næringsstofanbefalinger – hvad er nyt?

2023 | Nordic Nutrition

Recommendations

INTEGRATING ENVIRONMENTAL ASPECTS

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DTU

Hvad er nyt i NNR2023?

- Nye aldersinddelinger
- Nye energireferenceværdier
- Tre nye typer referenceværdier (AI, pAR, CDRR) er indført i NNR2023
- Makronæringsstoffer, enkelte detaljer ændret
- Nogle mikronæringsstoffer har fået referenceværdier (hvilket de ikke havde før)
- Nogle mikronæringsstoffer har fået en anden type referenceværdi
  (AI, pAR erstatter RI, AR)
- Andre metoder til fastsættelse af DRVs
- **Referenceværdier er ændret for flere mikronæringsstoffer for nogle aldersgrupper**

Nye aldersinddelinger

— NNR, EFSA og NASEM/IOM har brugt forskellige aldersgrupper

Nye aldersgrupper i NNR2023 pga. harmonisering

EFSA
Females/males
7-11 mo
1-3 y
4-6 y
7-10 y
11-14 y
15-17 y
≥18 y
Pregnant
Lactating

IOM
1-3 y
4-8 y
Females/males
9-13 y
14-18 y
19-30 y
31-50 y
51-70 y
>70 y
Pregnant/lactating
14-18 y
19-30 y
31-50 y

NASEM
0-6 mo
7-12 mo
1-3 y
4-8 y
Females/males
9-13 y
14-18 y
19-30 y
31-50 y
51-70 y
>70 y
Pregnant/lactating
14-18 y
19-30 y
31-50 y

Allen et al.
infants
7-11 mo
1-3 y
4-6 y
7-10 y
Females/males
11-14 y
15-17 y
18-24 y
25-50 y
51-70 y
>70 y
Pregnant/lactating
≤18 y
19-30 y
31-50 y

NNR2012
<6 mo
6-11 mo
2-5 y
6-9 y
Females/males
10-13 y
14-17 y
18-30 y
31-60 y
61-74 y
≥75 y
Pregnant
Lactating

NNR2023
≤6 mo
7-11 mo
1-3 y
4-6 y
7-10 y
Females/males
11-14 y
15-17 y
18-24 y
25-50 y
51-70 y
>70 y
Pregnant
Lactating

Nye aldersinddelinger

- NNR, EFSA og NASEM/IOM har brugt forskellige aldersgrupper
- NNR2023 har harmoniseret aldersgrupperne med EFSA
- For at kunne sammenligne NNR2023 anbefalingerne med NNR2012 så kan aldersgrupperne matches som vist her

NNR2023	NNR2012
≤ 6 mo	< 6 mo
7-11 mo	6-11 mo
1-3 y	-
4-6 y	2-5 y
7-10 y	6-9 y
11-14 y	10-13 y
15-17 y	14-17 y
18-24 y	18-30 y
25-50 y	31-60 y
51-70 y	61-74 y
> 70 y	≥ 75 y

Nye energireferenceværdier

NNR2023: Appendix 4 og tabel 8-10

Table 8 Reference values for energy intakes in groups of adults with sedentary and active lifestyles.

Age, years	Reference weight, kg[1]	REE, MJ/d[2]	Average PAL 1.4, MJ/d	Average PAL 1.6, MJ/d	Active PAL 1.8, MJ/d
FEMALES					
18-24	64.2	5.9	8.3	9.4	10.6
25-50	64.1	5.7	8	9.0	10.2
51-70	62.5	5.2	7.2	8.3	9.3
>70	60.6	5.1	7.1	8.2	9.2
MALES					
18-24	75.2	7.4	10.4	11.8	13.2
25-50	74.8	7.1	9.9	11.3	12.7
51-70	73.0	6.4	9	10.3	11.6
>70	70.6	6.3	8.8	10.1	11.3
Pregnancy[3]					
≤50	76.4	6.4	8.9	10.2	11.5
Lactation[4]					
≤50	62.4	7.8	10.9	12.5	14.1

[1] See Appendix 4 and Cloetens & Ellegård (2023) for sources and methodology as well as reference values per year of age.
[2] For corresponding values expressed as kilocalories (kcal)/day, see Appendix 4.
[3] Weight gain of 14 kg during pregnancy, assuming a pre-pregnancy BMI of 18.5-24.9
[4] Exclusive breastfeeding 0-6 months postpartum

Voksne:

- Vægt beregnet fra højde af nordiske og baltiske populationsgrupper skaleret til en BMI 23 kg/m²

Spædbørn og børn op til 6 år:

- Vægt og højde fra publicerede vækstkurver fra Danmark, Estland, Finland, Norge og Sverige

Børn og unge 6-17 år:

- Vægt beregnet fra højde fra publicerede vækstkurver fra Danmark, Estland, Finland, Norge og Sverige og BMI jf. WHOs reference percentiler

Makronæringsstoffer

Overordnet ingen ændringer i makronæringsstofanbefalinger

Box 2: Recommended intake ranges of macronutrients for adults

Fats		**25-40 E%**
Cis-monounsaturated	10-20 E%	
Cis-polyunsaturated	5-10 E%	
Saturated fatty acids	<10 E%	
Carbohydrates		**45-60 E%**
Dietary fibre	≥25-35 g/d At least 3 g/MJ	
Added and free sugars	<10 E%	
Proteins		**10-20 E%**

Fri sukker: tilsat sukker + sukker naturligt forekommende i honning, sirup, frugt juice og frugt juice koncentrater

Sukker:

- NNR2023: Tilsat og fri sukker < 10 E%
- NNR2012: Tilsat sukker < 10 E% (alle)

- NNR2023:
  - ≥ 2 år: tilsat og fri sukker < 10 E% og helst lavere
  - < 2 år: undgå fødevarer og drikkevarer med tilsat og fri sukker

Kostfiber:

- NNR2023: mindst 3 g/MJ
  - Børn ≥ 2 år: 2-3 g/MJ eller mere
- NNR2012: approximately 3 g/MJ
  - Børn ≥ 2 år: 2-3 g/MJ

"Nye" typer af referenceværdier i NNR2023

AI: Adequate Intake

pAR: Provisorisk Average Requirement

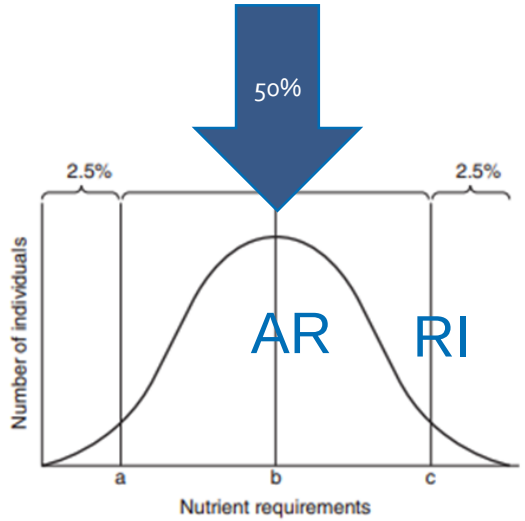
CDRR: Chronic Disease Risk Reduction

Tre nye typer af referenceværdier

- **AI er nyt i NNR 2023** – blev ikke brugt i NNR2012:
  - AI fastsættes ud fra observeret tilstrækkelighed i en befolkningsgruppe
  - AI har en større usikkerhed end RI
  - Opfylder eller overstiger behov for alle

- Man beregner **provisorisk AR** ud fra AI:
  - Provisorisk AR = 0,8 * AI
  - Provisorisk AR har større usikkerhed end AR
  - Provisorisk AR er en tilnærmet AR
  - Opfylder behov for 50%

- **CDRR** (Chronic Disease Risk Reduction):
  - Bruges til natrium som salt



Man beregner RI ud fra AR:

$RI = AR + 2(SD_{AR})$

Provisional Average Requirement (provisional AR)

Age group	Calcium mg	Copper µg	Iron mg	Zinc mg[2]
≤6 mo[1]	96	160		
7-11 mo	250[3]	180[3]	8	2.5
18-24 y	870	700	9	8.1
25-50 y	750	700	9	8.1
51-70 y	750	700	6	7.9
>70 y	750	700	6	7.7
Pregnant	800	800	20	
Lactating	800	1000	9	

Adequate Intake (AI)

Age group	Vitamin E α-TE[4]	Vitamin K µg	Pantothenic acid mg	Biotin µg	Vitamin B12 µg	Choline mg
≤6 mo[2]	4		2	4	0.4	120
7-11 mo	5[3]	10	3[3]	5[3]	1.5	170[3]
CHILDREN						
1-3 y	7	15	4	20		150
4-6 y	8	20	4	25	1.8	180
7-10 y	9	30	4	25	2.5	250
18-24 y	10	65	5	40	4	400
25-50 y	10	65	5	40	4	400
51-70 y	9	60	5	40	4	400
>70 y	9	60	5	40	4	400
Pregnant	11	80	5	40	4.5	480
Lactating	12	65	7	45	5	520

Dietary reference values NNR2023

Average Requirement (AR)

Age group	Vitamin A RE[2]	Vitamin D µg	Thiamin mg/MJ	Riboflavin mg	Niacin NE/MJ[3]	Vitamin B6 mg	Folate µg	Vitamin C mg
≤6 mo[1]				0.2		0.1	50	16
7-11 mo	200	7.5	0.07	0.3[4]	1.3	0.3[4]	70[4]	16[4]
CHILDREN								
1-3 y	240	7.5	0.07	0.5	1.3	0.5	90	20
4-6 y	280	7.5	0.07	0.6	1.3	0.6	110	30
7-10 y	340	7.5	0.07	0.8	1.3	0.9	160	45
18-24 y	540	7.5	0.07	1.3	1.3	1.3	250	75
25-50 y	540	7.5	0.07	1.3	1.3	1.3	250	75
51-70 y	530	7.5	0.07	1.3	1.3	1.3	250	75
>70 y	510	7.5	0.07	1.3	1.3	1.3	250	75
Pregnant	590	7.5	0.07	1.6	1.3	1.5	480[5]	75
Lactating	1070	7.5	0.07	1.6	1.3	1.4	380	75

Recommended Intake (RI)

AR, RI, provisorisk AR, AI – hvad er forskellen?

Table 5 Definition of different reference values (adapted from IOM (2006), EFSA (2010), NNR2012 and NASEM (2019)

Average Requirement (AR)	The average daily nutrient intake level that is estimated to meet the requirements of half of the individuals in a particular life-stage group in the general population. AR is usually used to assess adequacy of nutrient intake of groups of people, and may be used in planning for groups.
Recommended Intake (RI)	The average daily dietary nutrient intake level that is sufficient to meet the nutrient requirements of nearly all (usually 97.5%) individuals in a particular life-stage group in the general population. It can be used as a guide for daily intake by individuals. Usually used to plan diets for groups and individuals.
Adequate Intake (AI)	The recommended average daily intake level based on observed or experimentally determined approximations or estimates of nutrient intake by a group people that are assumed to be adequate. The AI has larger uncertainty than RI. Can be used when an RI cannot be determined. The AI is expected to meat or exceed the needs of most individuals in a life-stage group.
Provisional AR	The average daily nutrient intake level that is suggested to meet the requirements of half of the individuals in a particular life-stage group. The provisional AR, which is an approximation of AR, has larger uncertainty than AR. It is calculated by multiplying AI by a factor of 0.8. Can be used when an AR cannot be determined.

Nye referenceværdier i NNR2023

AI og provisorisk AR i NNR2023 (ingen anbefaling i NNR2012)	Provisorisk AR i NNR2023 (ingen AR i NNR2012)	AI og provisorisk AR i NNR2023 (RI og AR i NNR2012)
K-vitamin	Magnesium	E-vitamin
Pantothensyre	Kalium	B12-vitamin
Biotin		Fosfor
Kolin		Jod
Fluorid		Selen
Mangan		Magnesium
Molybdæn		Kalium
Natrium (AI,CDRR som salt)		

Anbefalinger for 35 næringstoffer

- Makronæringsstoffer
- Mikronæringsstoffer (14 vitaminer og 13 mineraler)

7 næringsstoffer med nye anbefalinger i NNR2023

- K-vitamin
- Biotin
- Pantothensyre
- Kolin
- Mangan
- Molybdæn
- Fluorid

- *Natrium som salt*

7 næringsstoffer har ændret anbefaling >20% blandt voksne 25-50 år

- E-vitamin
- Riboflavin
- B6-vitamin
- B12-vitamin
- C-vitamin
- Zinc
- Selen

9 andre næringsstoffer har ændret >20% i andre aldersgrupper

Mikronæringsstoffer

- I NNR2023 (tabel 6 og tabel 7) kan man se baggrunden for fastsættelse af DRVs for vitaminer og mineraler

- I NNR2023 (tabel 22 og tabel 23) kan man se forskelle fra NNR2012, men kun for aldersgruppen 25-50 år.

NNR2023: Tabel 6 og 7

Table 6 Basis for setting DRVs for vitamins in NNR2023[1]

Nutrient	Type of reference value	Source	Criteria for setting reference values
Vitamin A	AR RI	EFSA (2015)	Factorial approach, target liver concentration of 20 µg retinol/g.
Vitamin D	AR RI	NNR 2023 (Brustad and Meyer 2023)	Dose-response approach, biomarker (25(OH)D).
Vitamin E	AI Provisional AR	NNR 2023 (Hantikainen and Lagerros 2023), Raederstorff et al. (2015) For infants: EFSA (2015)	Relationship to PUFA intake (prevention of PUFA oxidation) For infants: estimated intake from human milk.
Vitamin K	AI Provisional AR	EFSA (2017)	Observed intakes in European countries. Biomarkers. For new-borns: prevention of vitamin K deficiency bleeding
Thiamin	AR RI	EFSA (2016)	Erythrocyte transketolase activity coefficient, urinary excretion.
Riboflavin	AR RI	EFSA (2017)	Urinary riboflavin excretion.
Niacin	AR RI	EFSA (2014)	Urinary excretion of niacin metabolites.
Pantothenic acid	AI Provisional AR	EFSA (2014)	Observed intakes in European countries. For infants: estimated intake from human milk.

Table 7 Basis for setting DRVs for minerals in NNR2023[1]

Nutrient	Type of reference value	Source	Criteria for setting reference values
Calcium	AR RI	EFSA (2015)	Factorial approach, calcium balance and calcium accretion in bone. For infants: estimated intake from human milk.
Phosphorus	AI Provisional AR	EFSA (2015)	Scaled to RI for calcium (molar calcium to phosphorus ratio of 1.4:1).
Potassium	AI Provisional AR	EFSA (2016)	Prevention of high blood pressure and risk of stroke.
Sodium	Chronic Disease Risk Reduction Intake	NASEM (2019)	Sodium reduction trials and one balance study. Extrapolations to children and adolescents using NNR 2023 reference energy intakes.
Magnesium	AI Provisional AR	EFSA (2015)	Observed intakes in European countries. For infants 7-11 months: midpoint between extrapolated values from infants 0-6 m and the highest range of observed intakes.
Iron	AR RI	NNR2023 (Domellöf & Sjöberg, 2023)	Factorial approach, replacement of daily iron loss, and need for growth.
Zinc	AR RI	EFSA (2014)	Factorial approach, zinc balance, accounting for phytate intake (assuming a phytate intake of 600 mg/day in adults).
Copper	AR ARI	IOM (2001)	A combination of copper biomarkers (including plasma copper, serum ceruloplasmin, platelet copper concentration).

Metoder til fastsættelse af DRVs

NNR2023: Appendix 5

- Dosis-respons metode
  - fx D-vitamin, thiamin, riboflavin, niacin, B6-vitamin, folate, C-vitamin
- Faktoriel metode (formel)
  - fx A-vitamin, E-vitamin, jern, zink, calcium
- Observeret indtag
  - fx K-vitamin, pantothensyre, biotin, kolin, magnesium, mangan, molybdæn

NNR2023: Tabel 22

Table 22 Comparison between RI and AI set by NNR2023 (25-50 years) and NNR2012 (31-60 years). *AI is shown in italics*

	NNR2023		NNR2012		Comments
	RI		RI		
	FEMALES	MALES	FEMALES	MALES	
Vitamin A, RE	700	800	700	900	
Vitamin D, µg	10	10	10	10	
Vitamin E, α-TE	*10*	*11*	8	10	AI in NNR2023
Vitamin K, µg	*65*	*75*	ND	ND	AI in NNR2023
Thiamin, mg	0.9	1.1	1.1	1.3	
Riboflavin, mg	1.6	1.6	1.3	1.6	
Niacin, NE	14	18	14	18	
Vitamin B_6, mg	1.6	1.8	1.2	1.5	
Folate, µg	330	330	300	300	
Vitamin B_{12}, µg	*4*	*4*	2	2	AI in NNR2023
Biotin, µg	*40*	*40*	ND	ND	AI in NNR2023
Pantothenic acid, mg	*5*	*5*	ND	ND	AI in NNR2023
Choline, mg	*400*	*400*	ND	ND	AI in NNR2023
Vitamin C, mg	95	110	75	75	
Calcium, mg	950	950	800	800	
Phosphorus, mg	*520*	*520*	600	600	AI in NNR2023
Magnesium, mg	*300*	*350*	280	350	AI in NNR2023
Sodium, g	*1.5*	*1.5*	ND	ND	AI in NNR2023
Potassium, g	*3.5*	*3.5*	3.1	3.4	AI in NNR2023
Iron, mg	15	9	15	9	
Zinc, mg	9.7	12.7	7	9	
Iodine, µg	*150*	*150*	150	150	AI in NNR2023
Selenium, µg	*75*	*90*	50	60	AI in NNR2023
Copper, µg	900	900	900	900	
Manganese, mg	*3*	*3*	ND	ND	AI in NNR2023
Molybdenum, µg	*65*	*65*	ND	ND	AI in NNR2023
Fluoride, µg	*3.2*	*3.7*	ND	ND	AI in NNR2023

NNR2023: Tabel 23

Table 23 Comparison between AR and provisional AR set by NNR2023 (25-50 yrs) and NNR2012 (31-60 yrs), and national intake data.

	Range of mean intakes in		Range of mean intakes in		NNR2023		NNR2012		Comments
	Nordic countries		Baltic countries		AR		AR		
	F	M	F	M	F	M	F	M	
Vitamin A, RE	747-1,110	812-1,556	666-942	666-1155	540	630	500	600	
Vitamin D, µg	4.3-10.0	5.3-11.0	4.3-9.1	5.5-7.2	7.5	7.5	7.5	7.5	
Vitamin E, α-TE	8.8-11.7	9.5-13.2	7.8-12.9	9.4-14.9	*8*	*9*	5	6	Provisional AR in NNR2023
Vitamin K, µg	NA	NA	NA	NA	*50*	*60*	ND	ND	Provisional AR in NNR2023
Thiamin, mg	1.1-1.4	1.4-1.9	0.8-1.3	1.1-1.4	0.7	0.8	0.9	1.2	
Riboflavin, mg	1.4-1.6	1.7-2.1	1.0-1.2	1.2-1.4	1.3	1.3	1.1	1.4	
Niacin, NE	29-32	39-41	12.7-23.7	13.1-32.9	12	15	12	15	
Vitamin B_6, mg	1.4-1.8	1.8-2.3	1.2-1.715	1.5-1.9	1.3	1.5	1.1	1.3	
Folate, µg	222-329	247-370	164-216	198-383	250	250	200	200	
Vitamin B_{12}, µg	4.9-6.0	6.0-8.9	2.9-5.8	3.3-8.0	*3.2*	*3.2*	1.4	1.4	Provisional AR in NNR2023
Biotin, µg	NA	NA	NA	NA	*32*	*32*	ND	ND	Provisional AR in NNR2023
Pantothenic acid, mg	NA	NA	NA	NA	*4*	*4*	ND	ND	Provisional AR in NNR2023
Choline, mg	NA	NA	NA	NA	*320*	*320*	ND	ND	Provisional AR in NNR2023
Vitamin C, mg	96-115	93-113	69-132	72-116	75	90	50	60	
Calcium, mg	811-1,038	945-1,188	546-659	660-768	750	750	500	500	
Phosphorus, mg	1,242-1,384	1,541-1,788	867-1,061	1,186-1,392	*420*	*420*	450	450	Provisional AR in NNR2023
Magnesium, mg	263-346	335-439	277-295	331-349	*240*	*280*	ND	ND	Provisional AR in NNR2023
Potassium, g	2.6-3.4	3.4-4.2	2.4-3.0	2.9-3.8	*2.8*	*2.8*	ND	ND	Provisional AR in NNR2023
Iron, mg	9.4-10.0	11-13	9.6-13.0	12.3-14.5	9	7	10	7	
Zinc, mg	8.8-10.5	12.4-14.1	7.2-8.3	10.1-11.4	8.1	10.6	5	6	
Iodine, µg	142-227	195-268	25-105	30-134	*120*	*120*	100	100	Provisional AR in NNR2023
Selenium, µg	42-68	50-88	20-47	31-65	*60*	*70*	30	35	Provisional AR in NNR2023
Copper, mg	1.1	1.3-1.3	1.1-1.7	1.5-2.1	0.7	0.7	0.7	0.7	
Manganese, mg	NA	NA	NA	NA	*2.4*	*2.4*	ND	ND	Provisional AR in NNR2023
Molybdenum, µg	NA	NA	NA	NA	*52*	*52*	ND	ND	Provisional AR in NNR2023
Fluoride, µg	NA	NA	NA	NA	*2.6*	*3.0*	ND	ND	Provisional AR in NNR2023

*Values are labeled in YELLOW if one or more countries have a national representative intake data lower than the corresponding AR/provisional AR
Provisional AR is shown in italics
NA: Not available
ND: Not determined
The intake data of Lemming & Pitsi (2022) is used in this table.

Mikronæringsstoffer

Årsager til ændringer, fx:

- Opdateret videnskabelig evidens
- Nye aldersgrupper
- Nye energireferenceværdier
- AI i stedet for RI, provisorisk AR i stedet for AR for visse mikronæringsstoffer
- Opdaterede metoder til fastsættelse af DRVs

Forskel (RI, AI) på NNR2023 og NNR2012

Forskel ≤ 20%	Forskel > 20% voksne	Forskel > 20% andre aldersgrupper	Nye
A-vitamin	E-vitamin	Folat	K-vitamin
D-vitamin	Riboflavin (kvinder)	Thiamin	Pantothensyre
Niacin	B6-vitamin	Calcium	Biotin
	B12-vitamin	Fosfor	Kolin
	C-vitamin	Kalium	Fluorid
	Zink	Magnesium	Mangan
	Selen	Kobber	Molybdæn
		Jod	*Natrium (som salt)*
		Jern	

Ændringer mikronæringsstoffer, eks.

Table 22 Comparison between RI and AI set by NNR2023 (25-50 years) and NNR2012 (31-60 years). *AI is shown in italics*

	NNR2023		NNR2012		Comments
	RI /AI		RI		
	FEMALES	MALES	FEMALES	MALES	
Vitamin B_{12}, µg	4	4	2	2	AI in NNR2023
Vitamin B_6, mg	1.6	1.8	1.2	1.5	
Calcium, mg	950	950	800	800	

11-14 år: 1150 900

Nye anbefalinger for næringsstoffer

Forskellige årsager til ændringer

- Opdateret videnskabelig evidens
- Nye aldersgrupper
- Nye energireferenceværdier
- AI i stedet for RI, provisorisk AR i stedet for AR for visse mikronæringsstoffer
- Opdaterede metoder til fastsættelse af DRVs

7 næringsstoffer har ændret anbefaling >20% blandt voksne 25-50 år

- E-vitamin
- Riboflavin
- B6-vitamin
- B12-vitamin
- C-vitamin
- Zinc
- Selen

9 andre næringsstoffer har ændret >20% i andre aldersgrupper

Tak for opmærksomheden

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