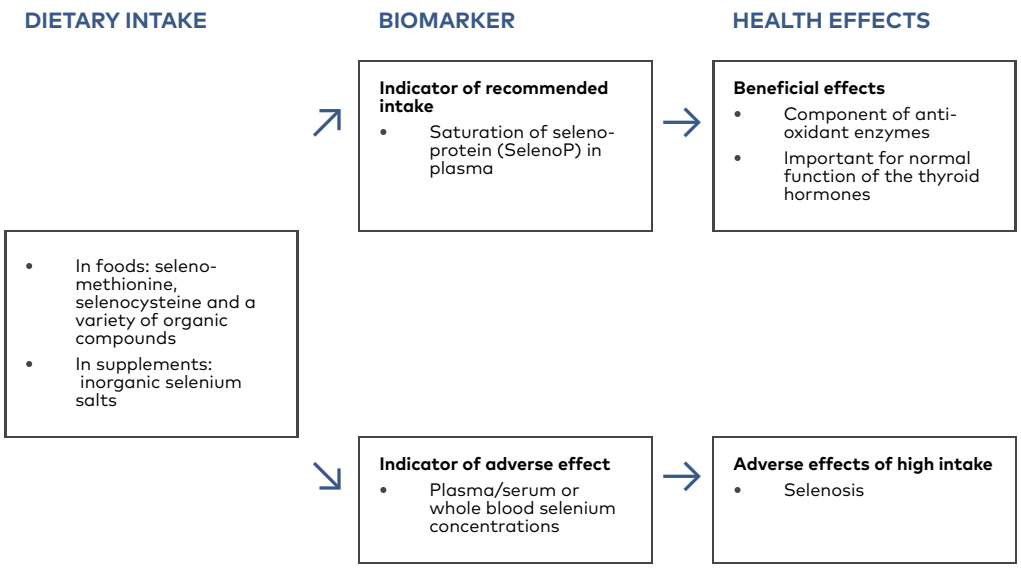
Selenium



	Females	Males
Provisional AR (µg/d)	60	70
AI (µg/d)	75	90

For more information about the health effects, please refer to the background paper by Jan Alexander and Ann-Karin Olsen (Alexander & Olsen, 2023).

Dietary sources and intake. Selenium concentrations in foods are highly dependent on soil content and availability. The Nordic and Baltic countries have low soil selenium content followed by low concentrations in locally grown foods. Finland has amended this by adding selenium to fertilizers while the other Nordic countries add selenium to animal feed. The main food sources are cereals (if imported from countries with higher soil selenium), fish, meat, dairy and eggs. The average selenium intake ranged from 20 to 88 µg/d (Lemming & Pitsi, 2022).

Main functions. The physiological functions of selenium are mediated by its presence in selenoproteins (Alexander & Olsen, 2023). Five of these are the antioxidant enzyme group of glutathione peroxidases, of which one is also a structural protein in sperm. The three iodothyronine deiodinases converting T4 to T3, the active thyroid hormone, are also selenium dependent. Three

selenium containing thioredoxin reductases play key roles in cellular redox regulation. The function of several selenoproteins have not yet been fully characterized. Selenoprotein P (SelenoP) in plasma has a dual role; it transports selenium to peripheral tissue, has antioxidative properties and appears to play a role in protecting circulating lipoproteins against oxidation to more toxic species.

Indicator for recommended intake. Saturation of SelenoP in plasma. This is obtained at plasma selenium concentrations of approximately 110 µg/L (Hurst et al., 2013). The selenium intake needed to achieve a plasma concentration of about 110 µg/L is dependent on the selenium compound given, e.g., Se-methionine has higher bioavailability than most other forms of selenium. Based on a Chinese study (Xia et al., 2010), an average daily intake of dietary selenium of about 1.2 µg/kg body weight would be sufficient to achieve an optimal selenium concentration and maximized expression of SelenoP in plasma (Alexander & Olsen, 2023).

Main data gaps. More studies are needed on the relationship between selenium status and health outcomes, in populations low in selenium. Health outcomes include developmental effects in humans, e.g., neurodevelopment, immune function, cardiovascular diseases, cancer, immune function, ageing etc.

Deficiency and risk groups. Persons with a high intake of locally grown plant foods in soils low in selenium, like vegans and vegetarians, might have very low selenium intakes, especially if the foods are grown organically (Kristensen et al., 2015). People with restriction of animal products in their diets, such as vegans, are at risk of becoming selenium inadequacy unless consuming supplements or fortified foods.

Dietary reference values. SelenoP in plasma represents a saturable pool of selenium and is maximised at a selenium concentration in plasma of about 110 µg/L or an intake of about 1.2 µg/kg bw. At intakes above 330 to 450 µg/day selenium may cause toxic effects affecting liver, peripheral nerves, skin, nails and hair. AI is set to 75 µg/day (females) and 90 µg/day (males). Provisional AR is set to 60 µg/day (females) and 70 µg/day (males). NNR2023 adopt EFSA's new UL of 255 µg/day (EFSA, 2023b).