



OREGON
HEALTH
AUTHORITY

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Nitrate Health Effects

D.F. - Public Health Toxicologist

What we'll cover

What are health effects of nitrates?

Who is at greatest risk and why?

Why do fact sheets from different agencies list different health effects?

When are nitrates a concern?

While nitrate can be natural, it **isn't safe** to consume too much. Nitrate at levels of

10 milligrams per liter (mg/L) or higher

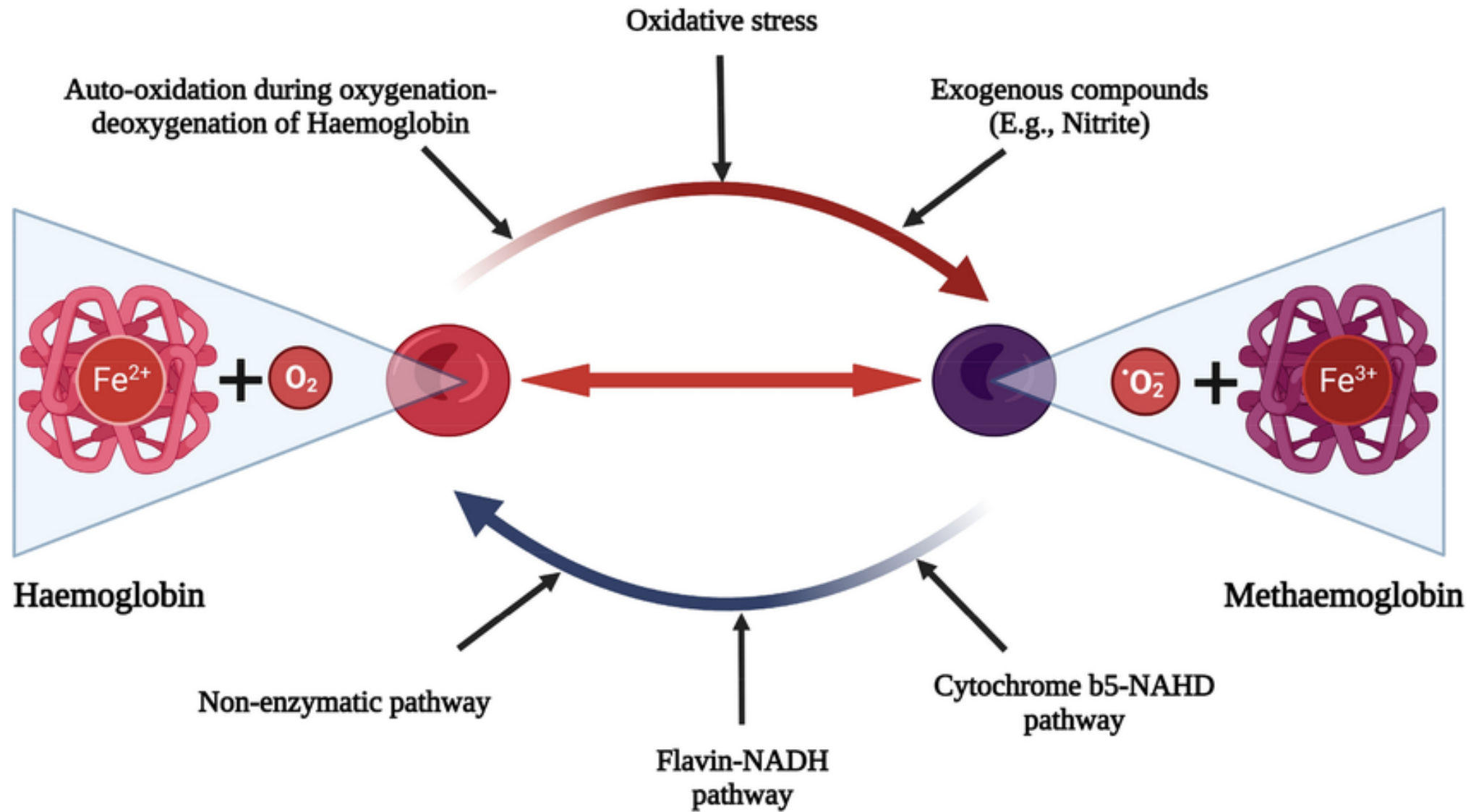
can cause serious health issues, especially for pregnant people and formula-fed babies.

Methemoglobinemia

Methemoglobinemia – Red blood cells unable to carry oxygen

- Blue Baby syndrome (cyanosis or blue skin coloring)
- Low blood pressure
- Increased heart rate
- Headache
- Dizziness or lightheadedness
- Shortness of breath

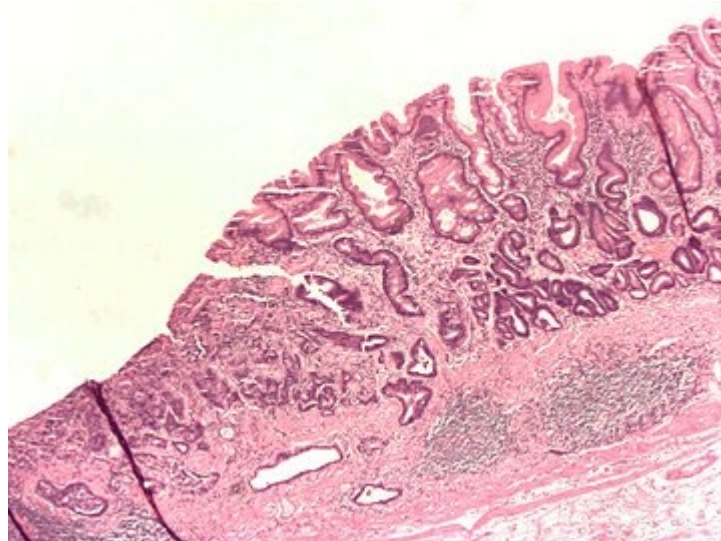
May pose risks to later stages of pregnancy



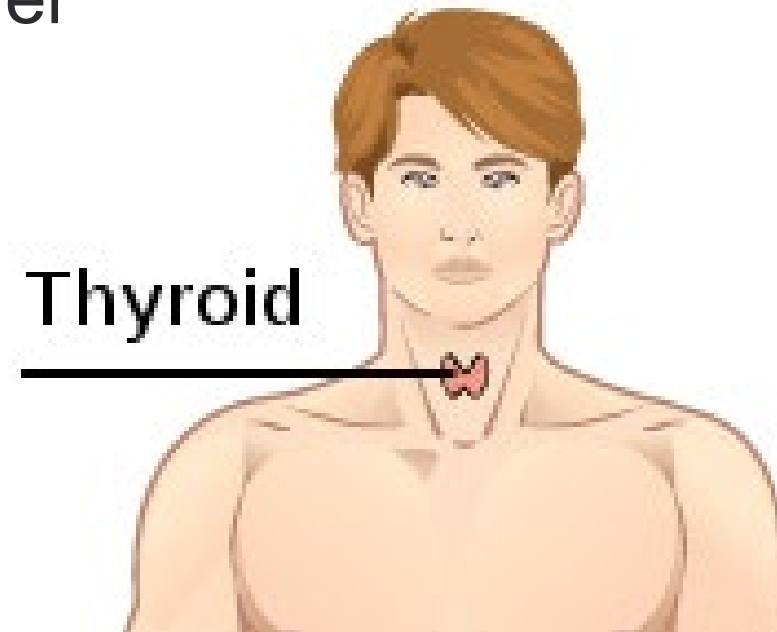
https://www.researchgate.net/figure/Conversion-between-haemoglobin-and-methaemoglobin-Methaemoglobin-is-oxidised-haemoglobin_fig1_375283897 - Researchgate

Potential other nitrate-related health effects

- Much weaker evidence
 - Thyroid effects
 - Cancers of stomach and bladder



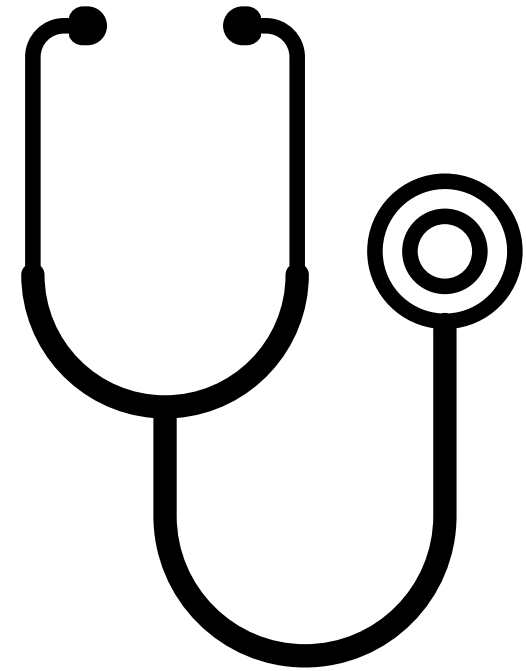
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Who should I talk to about my health?

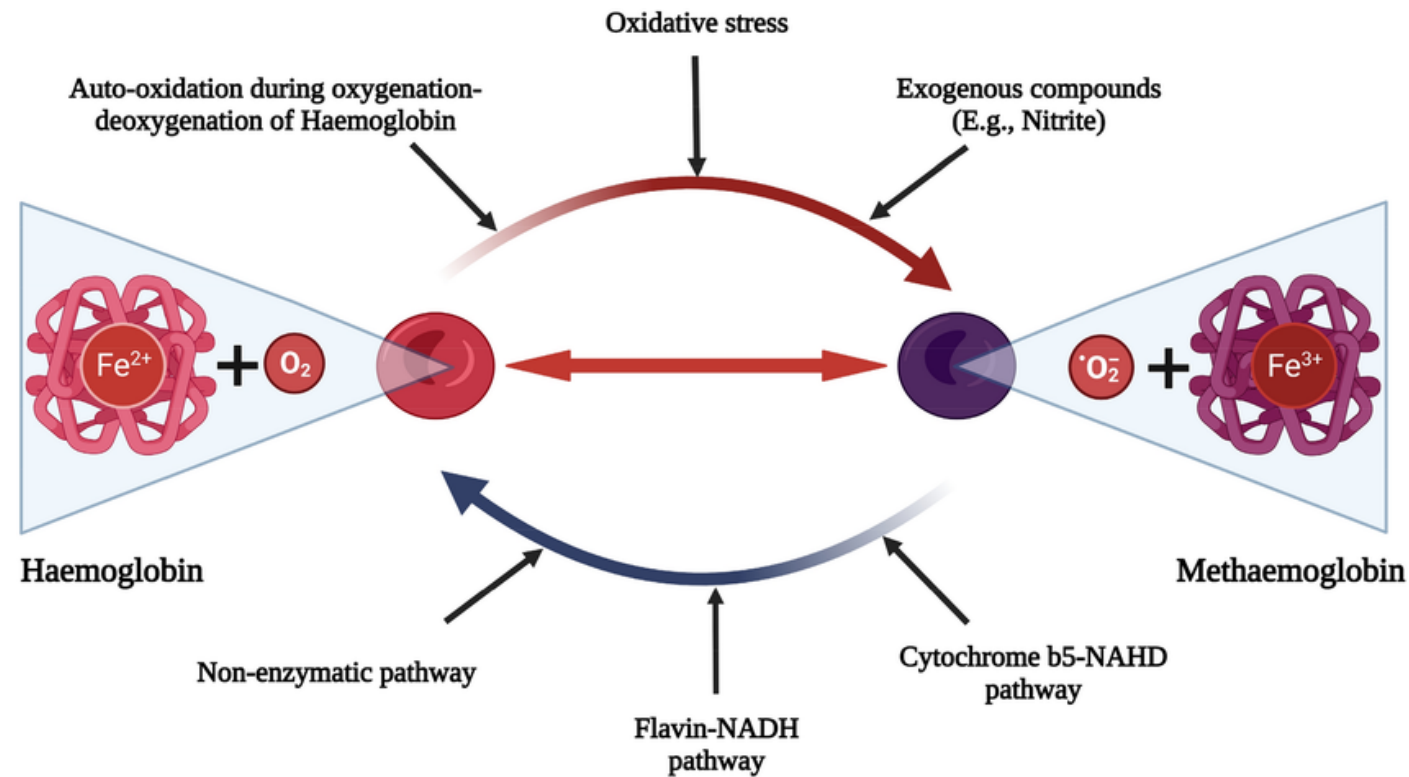
If you're concerned about any symptoms you're experiencing, **connect with your healthcare provider.**



Why are formula-fed infants at greatest risk?

Why are formula-fed infants at greatest risk?

- They drink more water per body weight
- Their stomachs convert more nitrates to the more toxic nitrite
- Their hemoglobin is easier to convert to methemoglobin
- They are not as good at converting methemoglobin back into hemoglobin



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Why are late-stage pregnancies at higher risk?

Why are late-stage pregnancies at higher risk?

- As the developing baby grows bigger, there is a higher demand for oxygen for the parent and baby.
- Decreases in oxygen carrying capacity can risk not getting enough oxygen to both parent and baby.



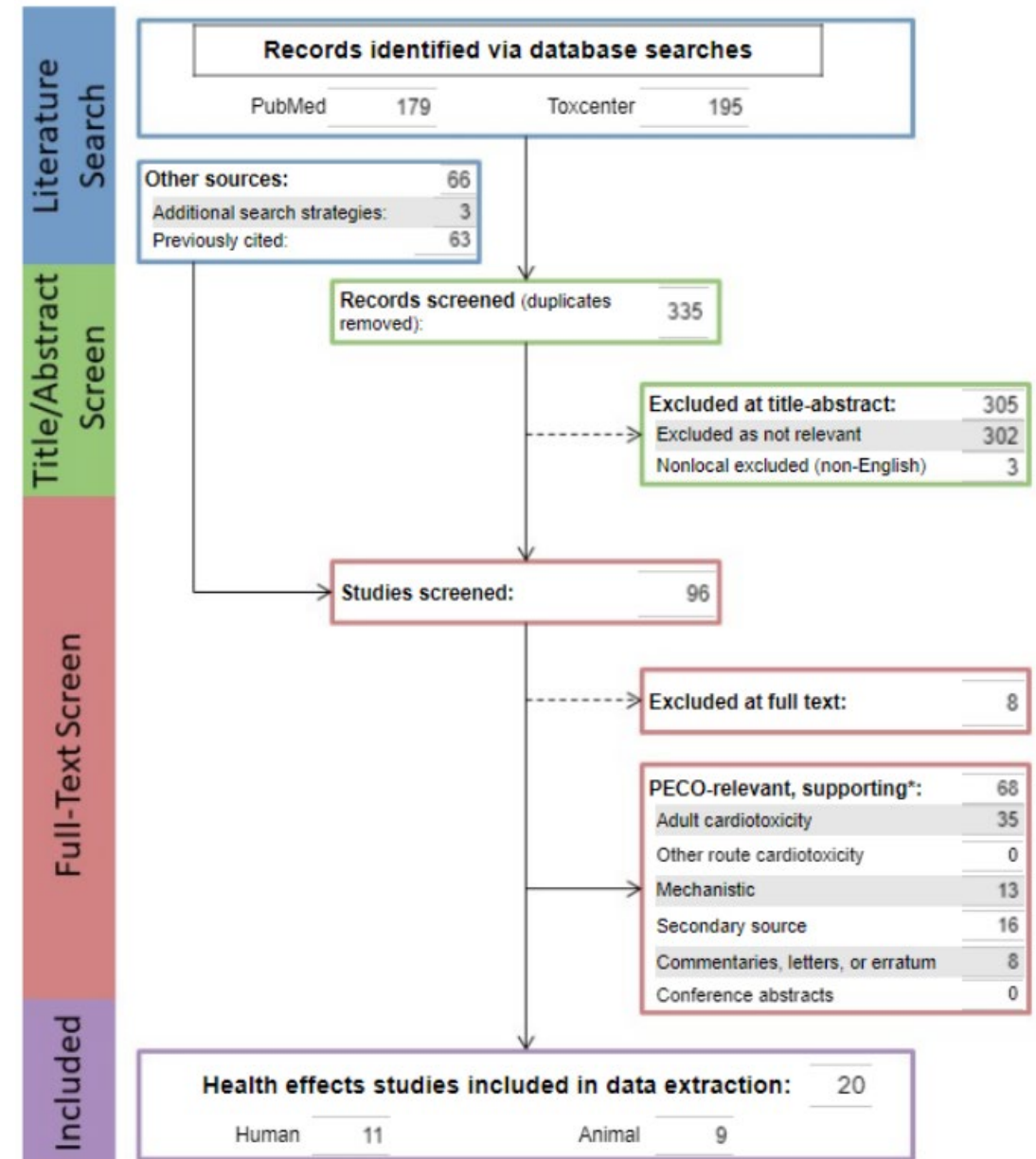
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Why do fact sheets from different agencies list different health effects for nitrates?

Different agencies have different thresholds for the strength of scientific evidence to mention a health effect

Scientific method

- Individual researchers test hypotheses with experiments and studies.
- Other researchers try to reproduce their results.
- Government agencies evaluate study quality and look for **weight of evidence and consistency** across studies.



Weight of evidence and consistency/consensus

- Government agencies look at all the individual studies together.
- Consistency in findings across studies strengthens evidence.
- Findings from higher quality studies get more weight.

Reference	Risk of bias criteria and ratings						Risk of bias tier
	Selection bias	Confounding bias	Attrition / exclusion bias	Detection bias		Selective reporting bias	
	Were the comparison groups appropriate?	Did the study design or analysis account for important confounding and modifying variables?*	Were outcome data complete without attrition or exclusion from analysis?	Is there confidence in the exposure characterization?*	Is there confidence in the outcome assessment?*	Were all measured outcomes reported?	
Outcome: Developmental cardiotoxicity							
<i>Cohort studies</i>							
Bove et al. 1995	+	-	+	+	++	++	Second
Lagakos et al. 1986	+	-	-	-	-	++	Second
MDPH 1996	+	+	+	-	+	++	Second
MDPH 1988	+	+	+	-	+	++	Second
Tola et al. 1980	+	-	+	-	-	+	Second
<i>Case-control</i>							
Brender et al. 2014	+	-	++	-	++	++	Second
Gilboa et al. 2012	+	-	++	-	++	++	Second
Liu et al. 2021	+	+	++	-	++	++	Second
Yauck et al. 2004	+	-	++	-	++	++	Second

Reliable sources of information



**Less reliable:
Social media or
blog posts**

Often opinion-based.



**Sometimes reliable:
Magazines or
newspapers**

Reviewed by an editor, but not
always accurate.



**More reliable: Scientific
articles**

Reviewed by other researchers.

Tip: Even scientific studies have
limits. For example, the results of a
single study may not be true for all
communities.

Quick Review

- Nitrate is all around us and can be safely consumed at low levels. However, consuming too much (10 mg/L or more) can cause serious health issues
- All agencies agree that **methemoglobinemia (blue baby syndrome)** is the most important and dangerous health effect of nitrates
- Formula-fed infants are most at risk
- Late stage pregnancies can also be threatened by nitrates
- Different agencies may list different additional effects depending on how they gauge the strength of scientific evidence

Thank you and questions

What questions do you have?

¿Que preguntas tienes?

OHA Domestic Well Safety Program:

- Phone / teléfono - 541-952-9254
- Email / correo electrónico - Domestic.Wells@odhsoha.oregon.gov



More resources and information available at **testmywell.oregon.gov**

Más recursos e información disponibles en **pruebadepozo.oregon.gov**