



Fluor, skismurning og helseeffekter

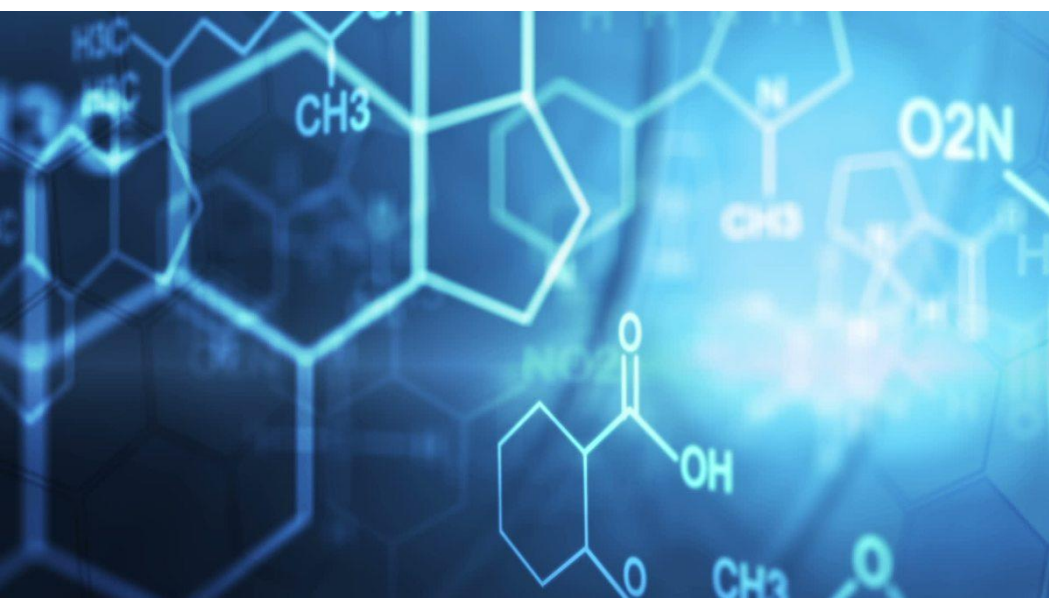
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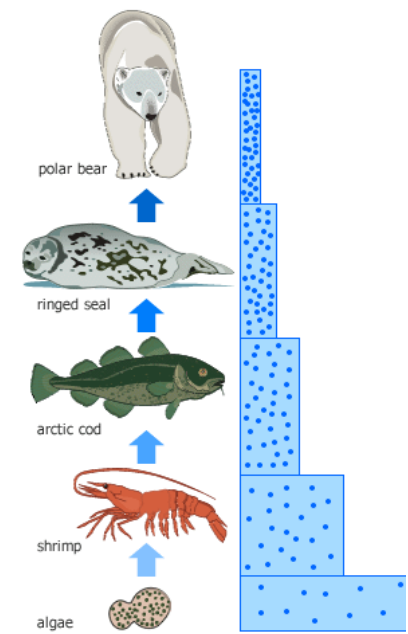
Hva er miljøgifter?



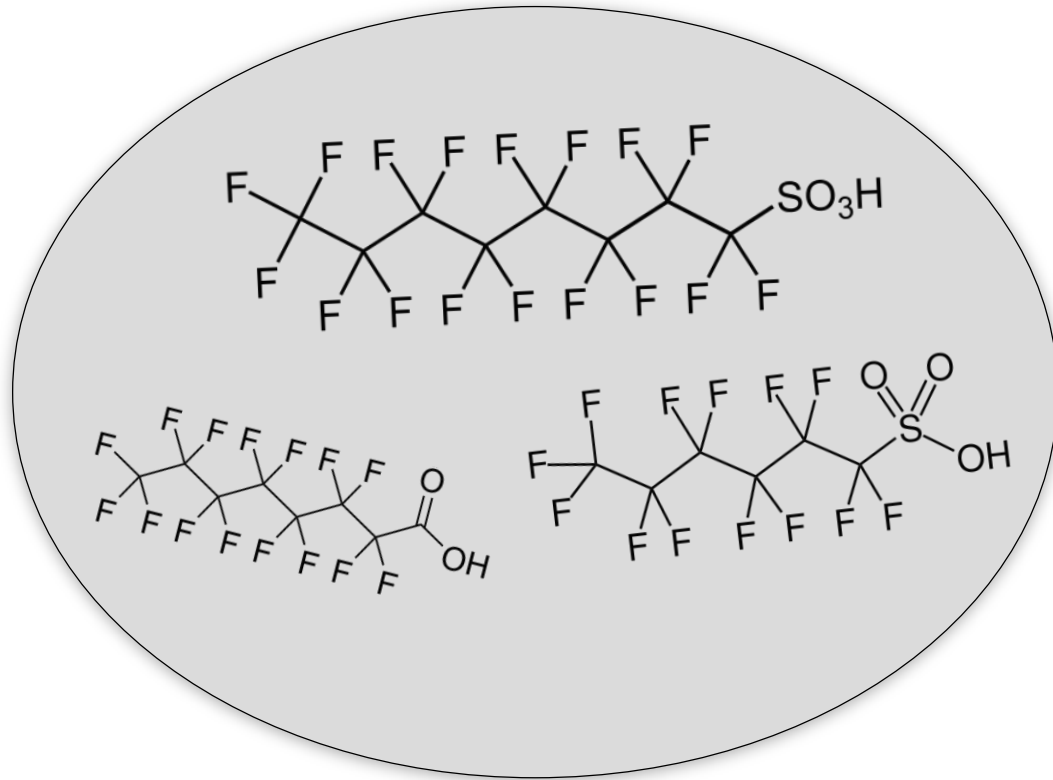


Hva er miljøgifter?

- Stoffer som er menneskeskapt eller som slippes ut i naturen pga. menneskelig aktivitet
- **PBT**-egenskaper:
 - **P**ersistente → brytes sakte ned i naturen
 - **B**ioakkumulerer → høyere nivåer oppover i næringskjeden
 - **T**oksiske → negative helseeffekter



Hva er fluorerte stoffer (PFAS-er)?

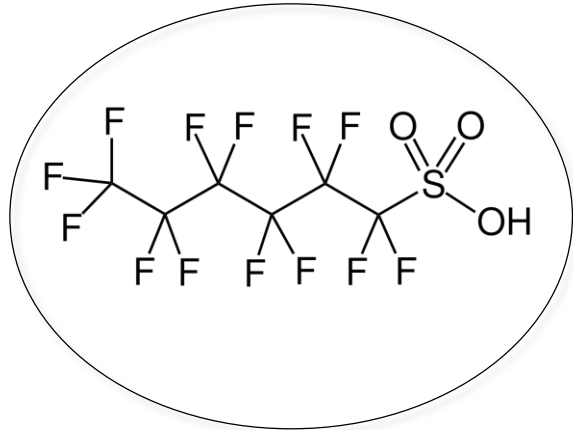


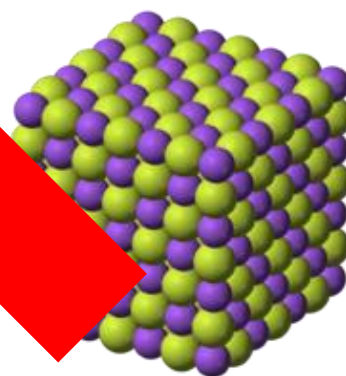
PFOS

C8

PFOA

Bruk av fluoreerte stoffer





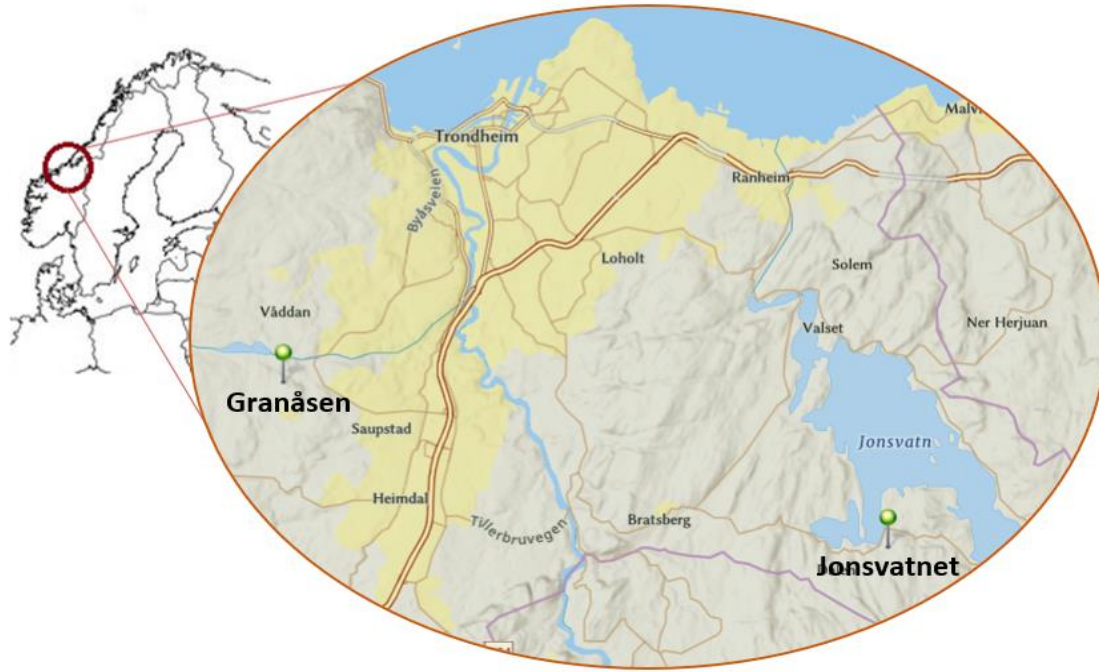
Natriumfluorid (NaF)

Menneskeskapte stoffer

Utslipp i natur og miljø

Eksponering av mennesker og dyr





Feltarbeid



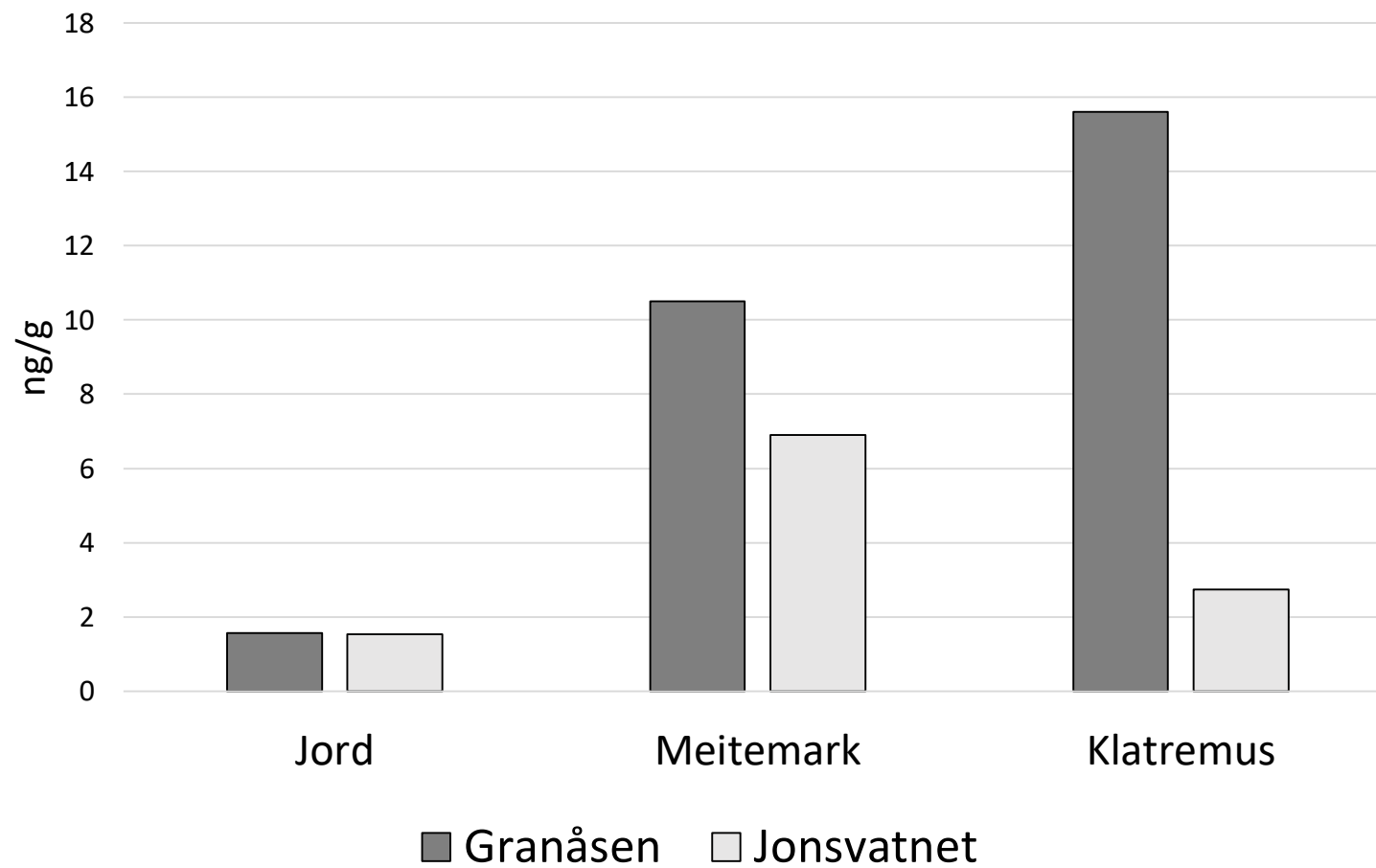


Spørsmål?



Hva fant vi?

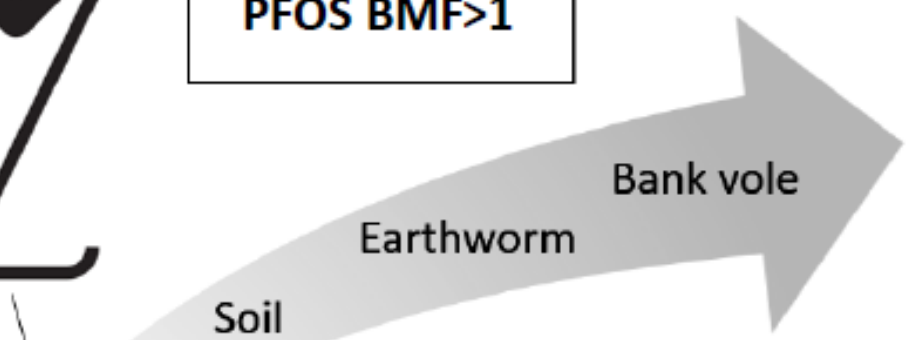
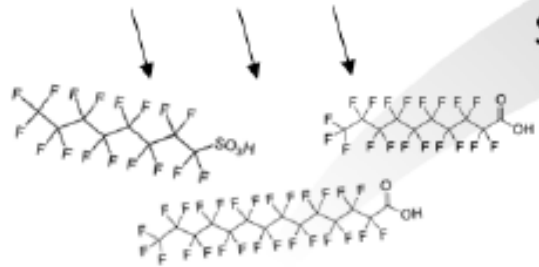
Total mengde PFAS



Stoffene
bioakkumuleres
opover i
næringskjeden



PFOS BMF>1

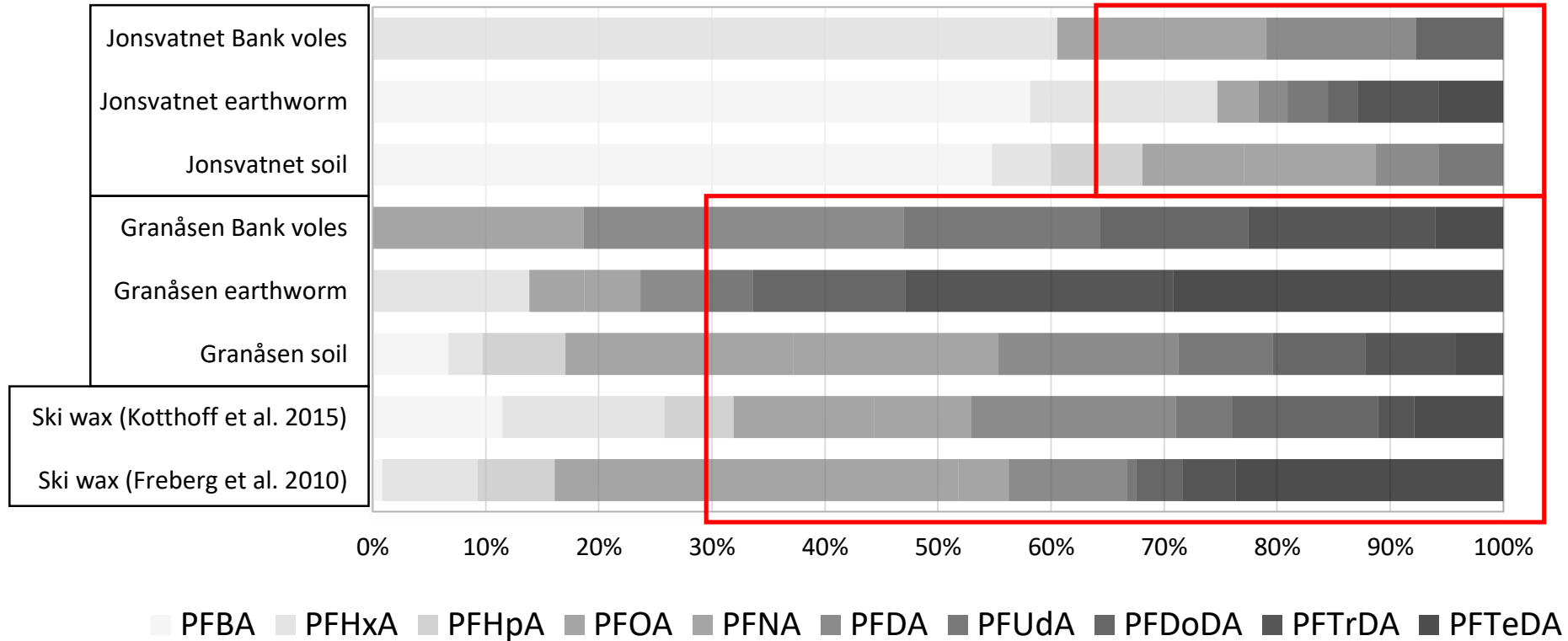


Bank vole

Earthworm

Soil

Mer langkjedet PFAS i skismurning



C8 →

Spørsmål?



Levels, Patterns, and Biomagnification Potential of Perfluoroalkyl Substances in a Terrestrial Food Chain in a Nordic Skiing Area

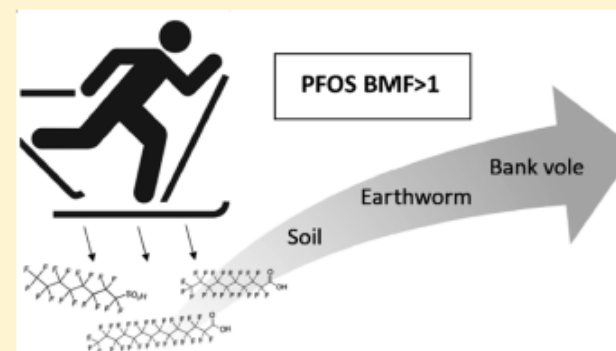
Randi Grønnestad,^{*,†} Berta Pérez Vázquez,[†] Augustine Arukwe,[†] Veerle L. B. Jaspers,[†] Bjørn Munro Jenssen,[†] Mahin Karimi,[‡] Jan L. Lyche,[‡] and Åse Krøkje[†]

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Supporting Information

ABSTRACT: Perfluoroalkyl substances (PFASs) are used in a wide range of consumer products, including ski products, such as ski waxes. However, there is limited knowledge on the release of PFASs from such products into the environment and the resultant uptake in biota and transport in food webs. We investigated levels, patterns, and biomagnification of PFASs in soil, earthworms (*Eisenia fetida*), and Bank voles (*Myodes glareolus*) from a skiing area in Trondheim, Norway. In general, there was higher PFAS levels in the skiing area compared to the reference area with no skiing activities. The skiing area was dominated by long-chained perfluorocarboxylic acids (PFCAs, $\geq 70\%$), while the reference area was dominated by short-chained PFCAs (>60%). The soil PFAS pattern in the skiing area was comparable to analyzed ski waxes, indicating that ski products are important sources of PFASs in the skiing area. A biomagnification factor (BMF) > 1 was detected for Bank vole_{whole}/earthworm_{whole} for perfluorooctansulfonate in the skiing area. All other PFASs showed a BMF < 1. However, it should be noted that these organisms represent the base of the terrestrial food web, and PFASs originating from ski wax may result to higher exposure in organisms at the top of the food chain.



Miljøgifter funnet i dyr i skiløypene:

Skremt av fluorfunn i Granåsen

En norsk forsker har funnet farlige miljøgifter fra skismøring igjen i levende organismer i skiområdet i Granåsen i Trondheim.



News > Science

Wax on skis could be harming the environment



Tutkijat löysivät hälyttävän määrän myrkyjä Norjan hiihtopyhätoista: "Aiheuttavat syöpää ja monia haittoja ihmiskehölle"



Holmenkollenin ympäristöstä löytyy hälyttäviä määriä myrkyllisiä fluorijäämiä.
Kuva: Vesa Oja

Jaa

Julkaisu: 18.12.2019 19:32

Ympäristölle haitallisten fluorivoiteiden jäämien määrä perinteisten hiihtonäyttämöiden ympäristössä on Dagbladetin mukaan hälyttävä.

MAINOS KRAI 117

– Niillä voi olla monenlaisia seurauksia. Nämä aineiden on näytetty vaikuttavan hormonisysteemiin, aiheuttavan syöpää, ja aiheuttavan epätasapainoa monissa ihmiskehon systeemeissä, yliopistotutkija **Randi Grønnestad** kuvallee Dagbladetille.



Långdspåren i Holmenkollen och Lillehammer är förgiftade. Foto: Bildbyrån

Skidspåren förgiftade av fluorvalla

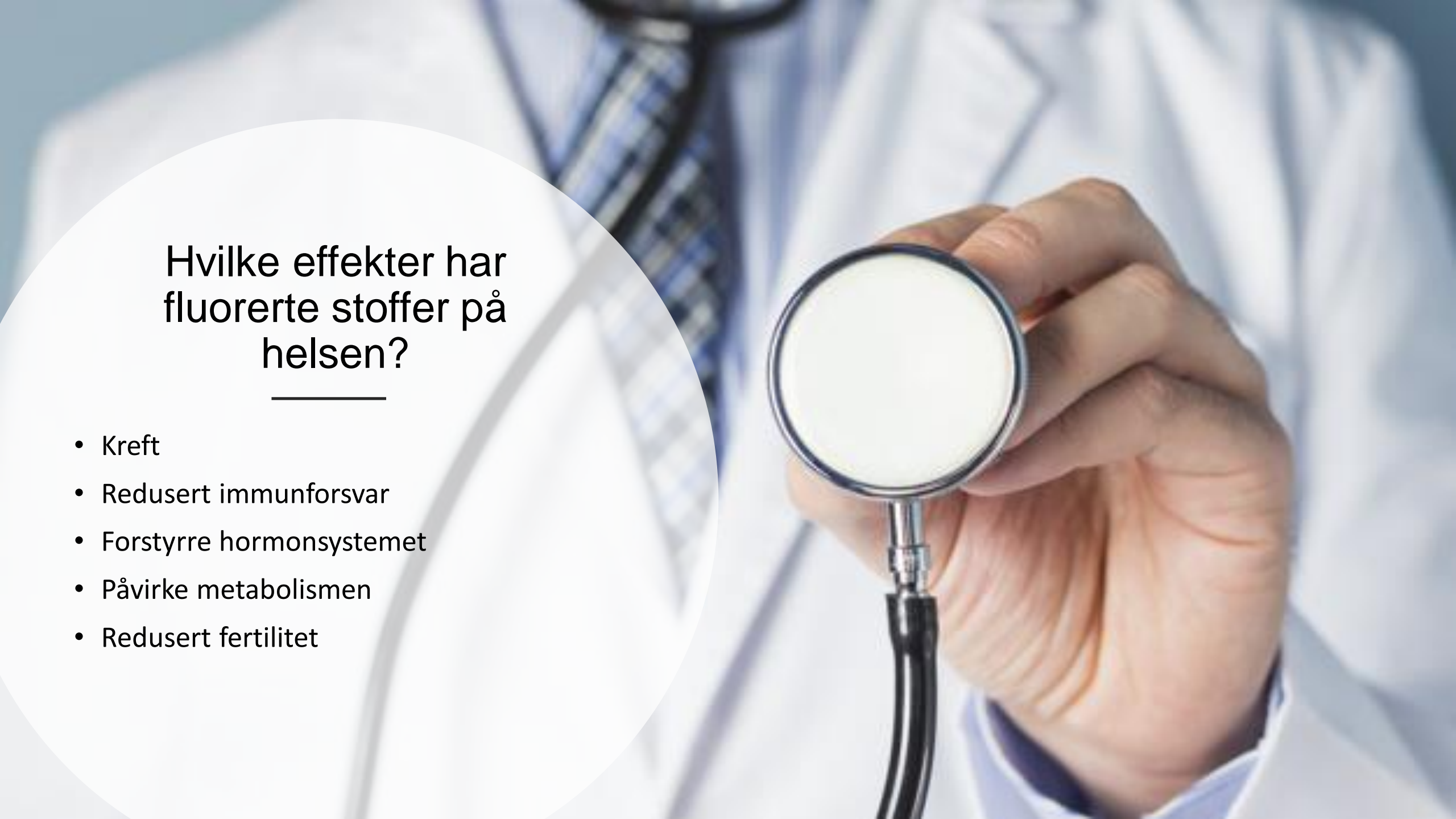
UPPDATERAD 18 DECEMBER 2019 PUBLICERAD 18 DECEMBER 2019

Skidvalla som innehåller fluor är hälsofarlig.

En norsk granskning visar nu att markerna runt skidanläggningarna i Holmenkollen och Lillehammer har förgiftats av fluorvalla.

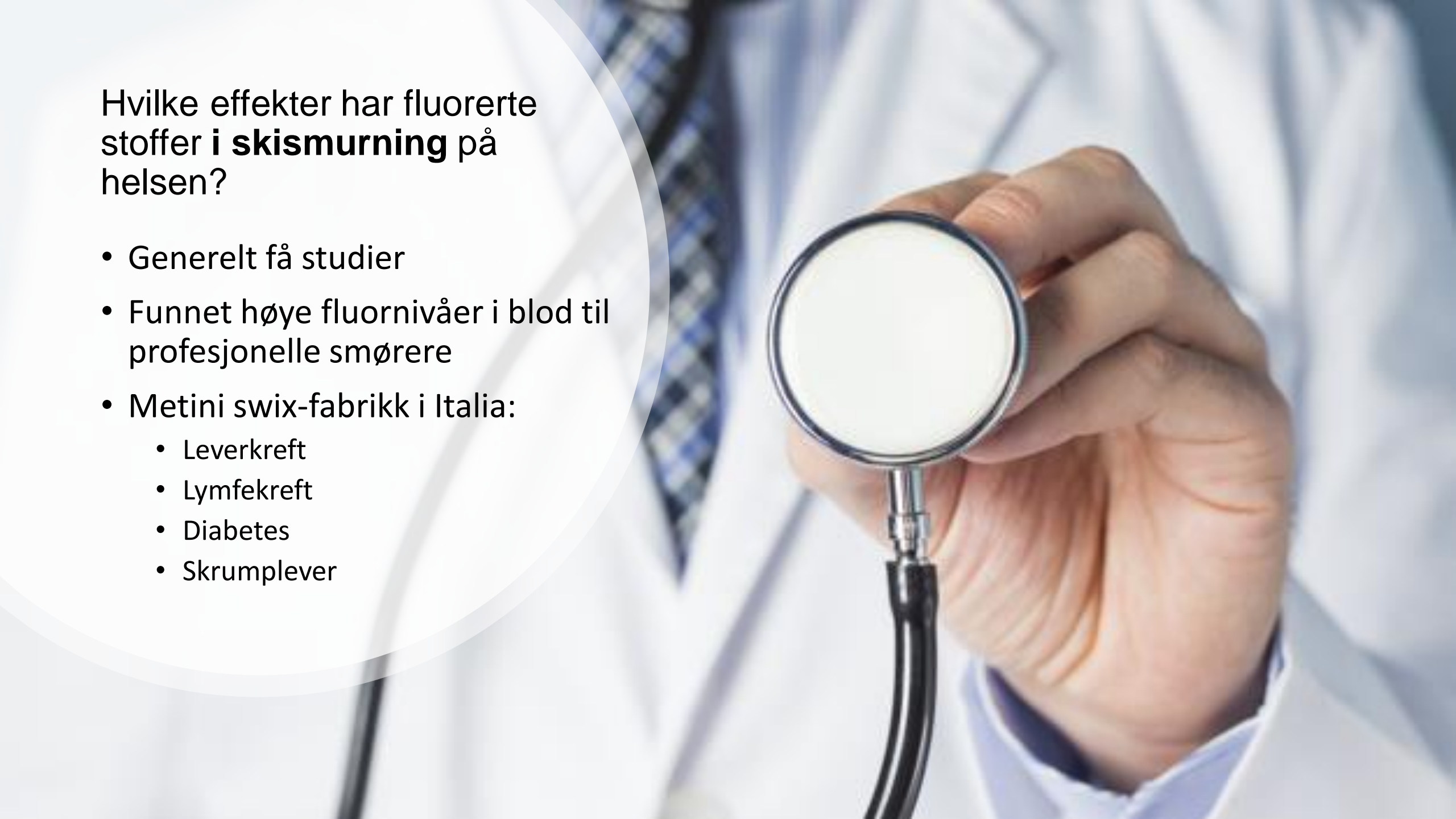
Enligt tidningen Dagbladet är det vid dessa anläggningar och skidspår mycket höga nivåer av fluorkemikalier i marken. Kemikalierna kan tas upp av djur och transporteras vidare uppåt i näringskedjan till människor, bland annat genom att äta fisk, vilt och dricka vatten.

– De här ämnena har visat sig ha effekter på hormonsystemet vilket kan leda till cancer och obalans i många av kroppens system, säger den norska forskaren **Randi Grønnestad** till Dagbladet.



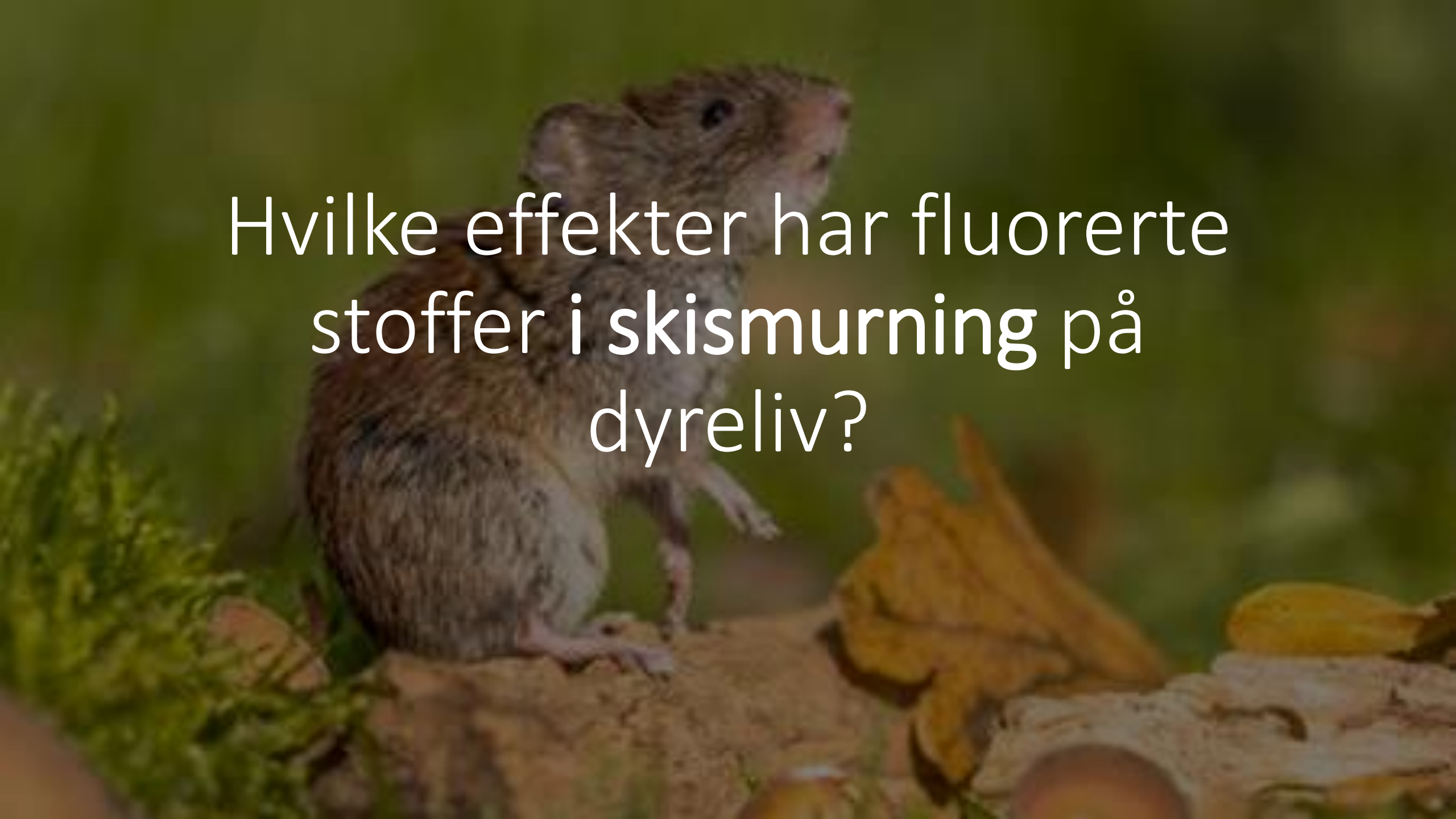
Hvilke effekter har fluorerte stoffer på helsen?

- Kreft
- Redusert immunforsvar
- Forstyrre hormonsystemet
- Påvirke metabolismen
- Redusert fertilitet



Hvilke effekter har fluorerte stoffer i **skismurning** på helsen?

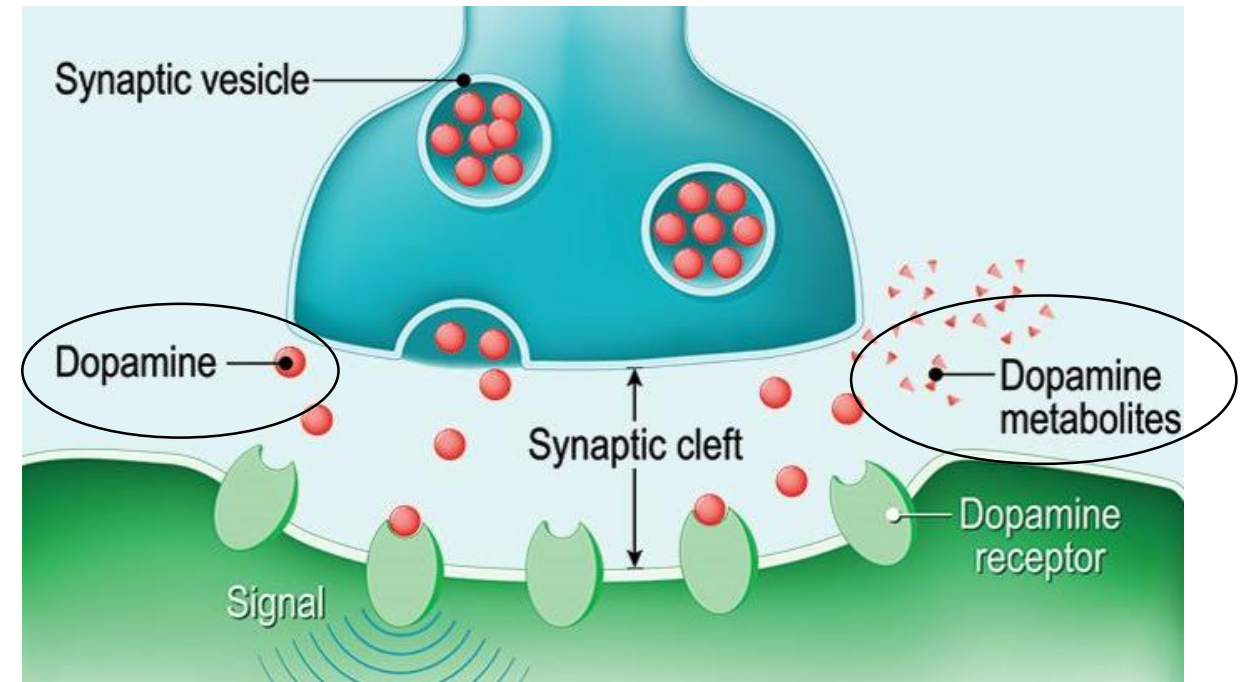
- Generelt få studier
- Funnet høye fluornivåer i blod til profesjonelle smørere
- Metini swix-fabrikk i Italia:
 - Leverkreft
 - Lymfekreft
 - Diabetes
 - Skrumplever

A small brown mouse is standing on a log in a forest setting. The mouse is facing right and appears to be looking at something off-camera. The background is a soft-focus green, suggesting a forest floor with grass and other vegetation. The text is overlaid on the image in a white, sans-serif font.

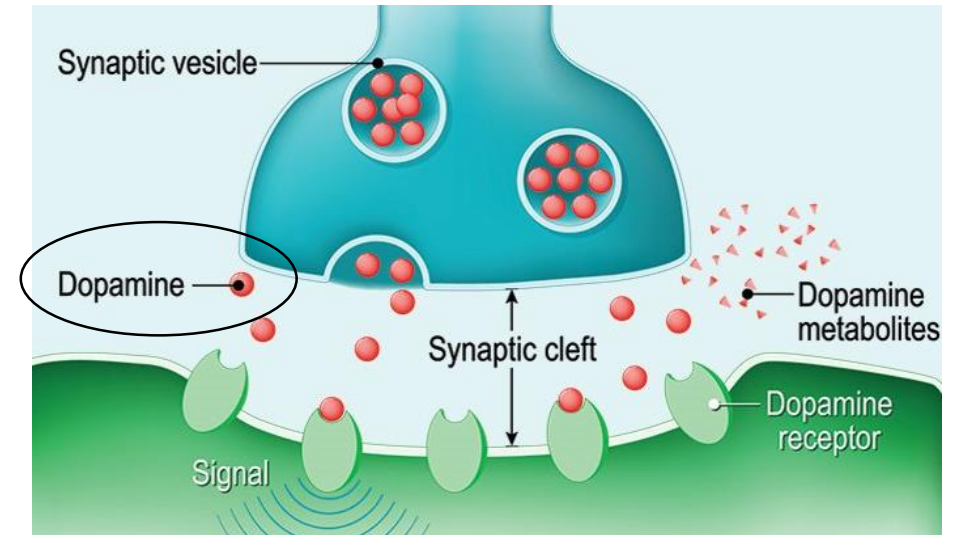
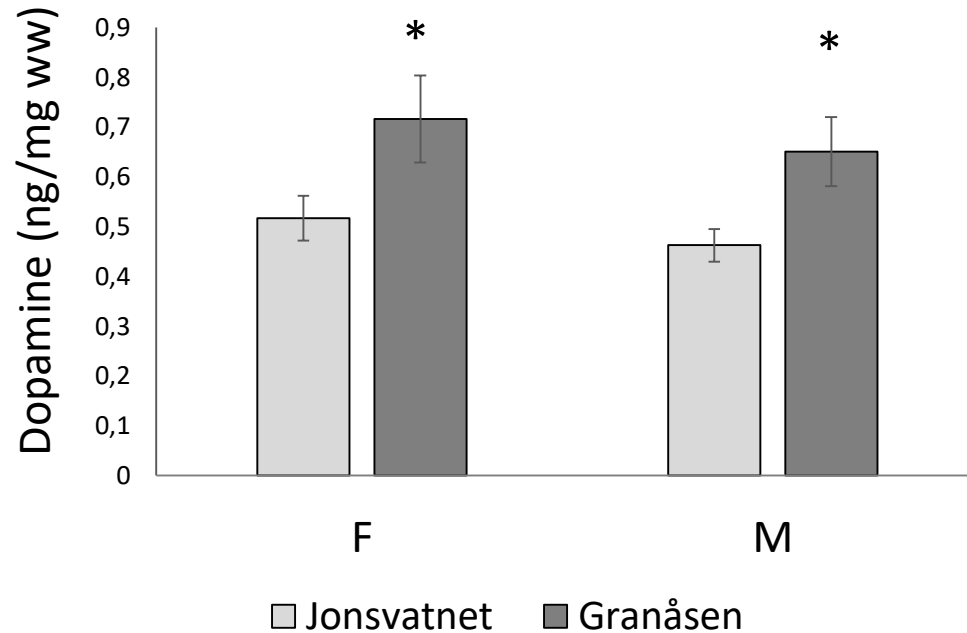
Hvilke effekter har fluoreerte
stoffer i skismurning på
dyreliv?

Dopamin

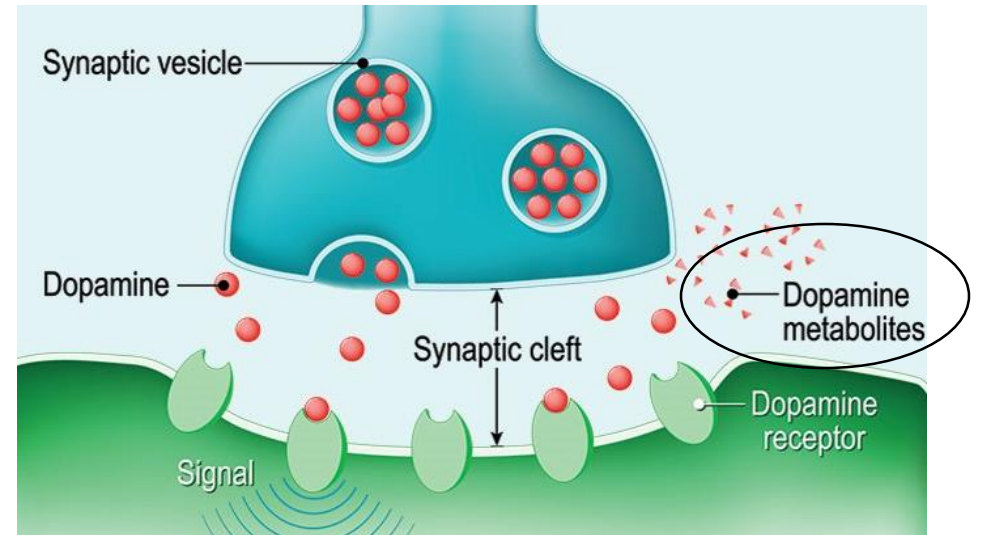
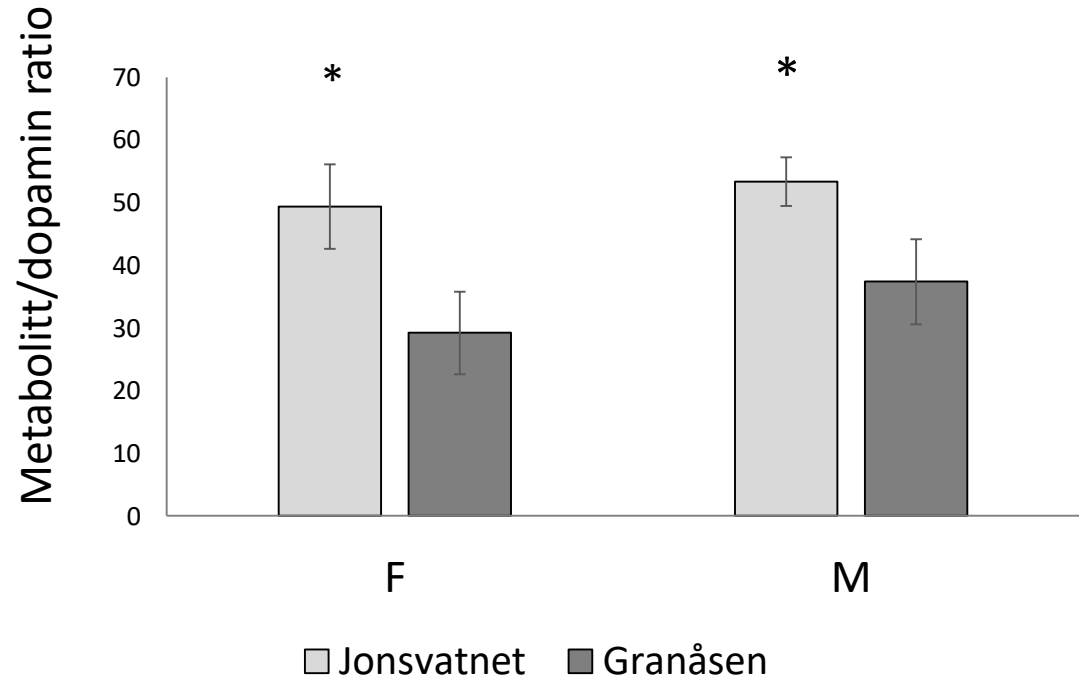
- Neurotransmitter
- Dopamin er viktig for
 - Motivasjon og belønning
 - Bevegelse
 - Atferd
 - Appetitt



Effekter på dopamin i hjernen til mus



Effekter på dopamin-metabolismen i hjernen til mus

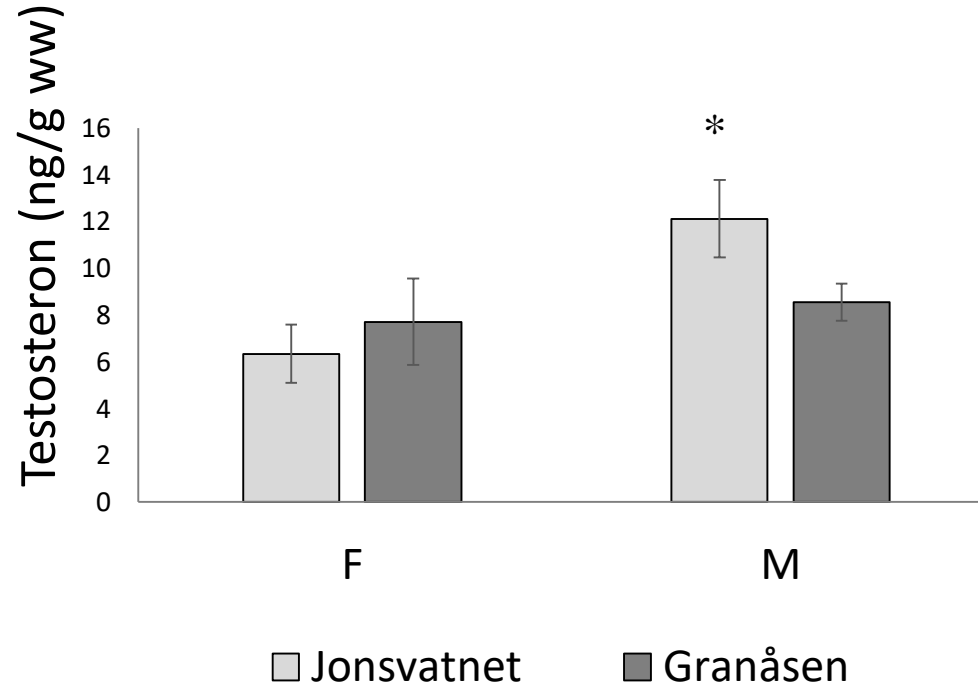
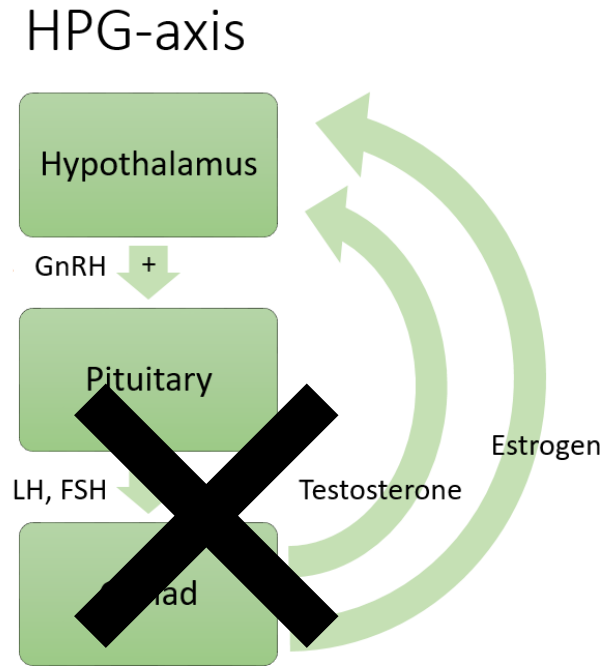


Hva vil dette si for musene?

- Endret atferd?
- Mer aggressive?
- Endret appetitt?
- Kan påvirke andre systemer i kroppen!



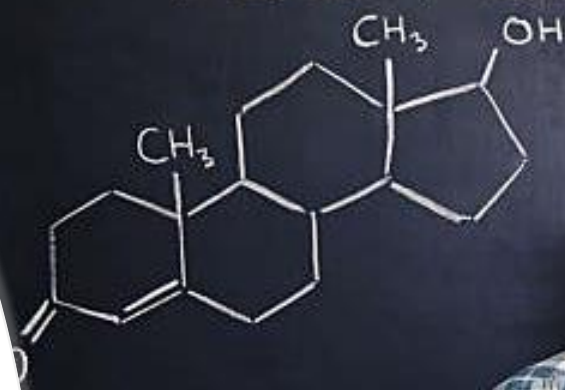
Effekter på testosteron i mus



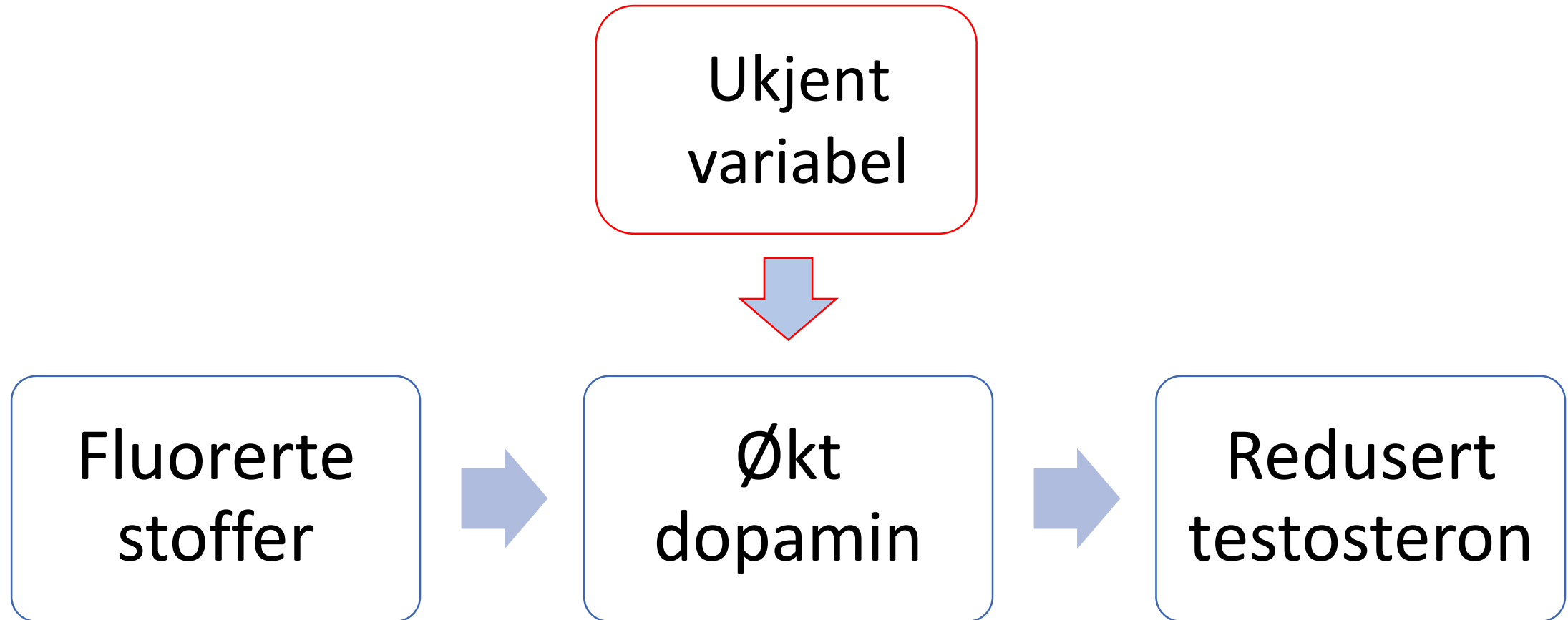
Hva vil dette si for musene?

- Effekt på muskelvekst?
- Effekt på atferd?
- Effekt på fettforbrenning?
- Effekt på reproduksjon?

TESTOSTERONE



Korrelasjon vs. kausalitet

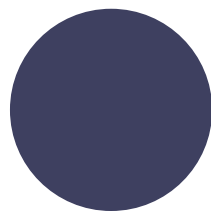
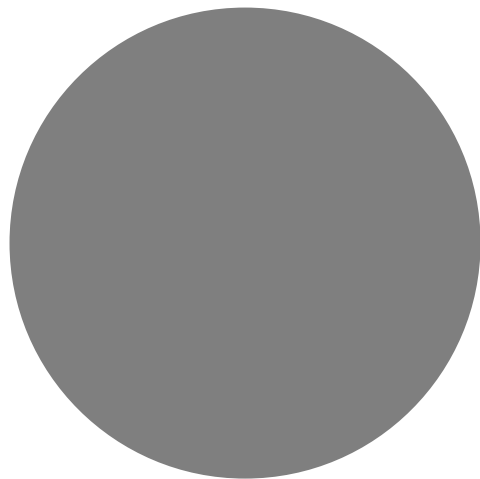


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Veien videre:
Validere resultatene
under kontrollerte
forhold

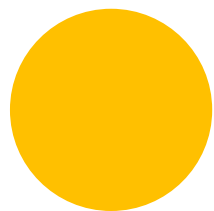
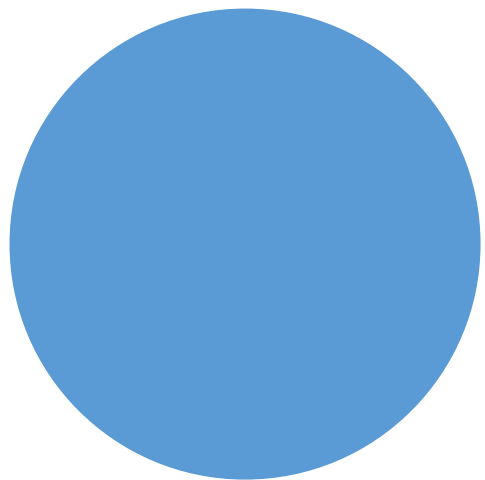






Takk for meg!
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Spørsmål?

