

**EXISTE-T-IL UNE ASSOCIATION ENTRE  
CARENCE EN VITAMINE D ET  
FAIBLESSE MUSCULAIRE DU QUADRICEPS ?**

**Résultats de la cohorte EPIDOS**



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For **A**geing, **B**alance and **C**ognition research group

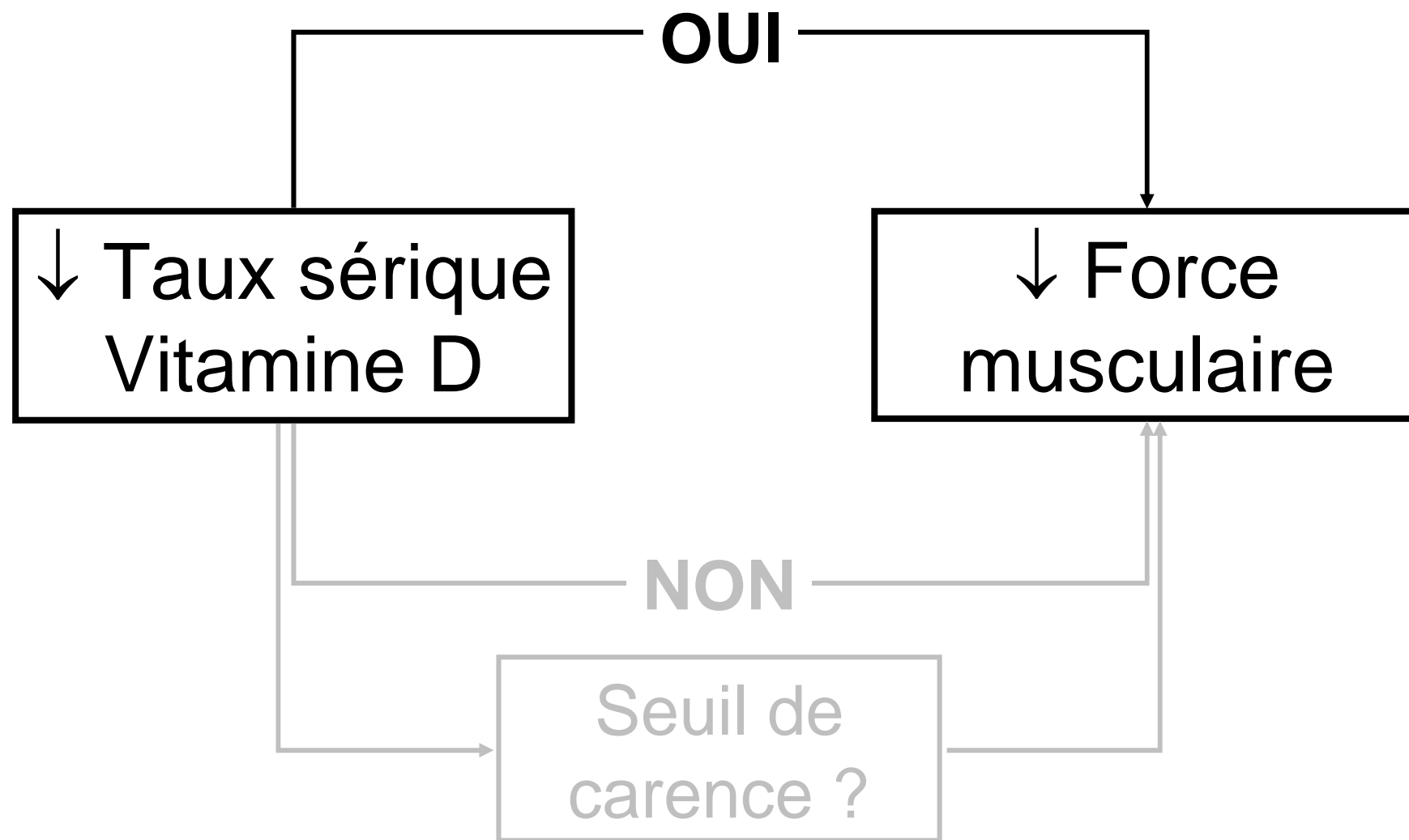
# VITAMINE D ET MUSCLE

- Vieillessement : **hypovitaminose D ++**
  - 80% après 70 ans
  - ↓ exposition solaire et ↓ apports alimentaires
  
- **Retentissement musculaire**
  - **Carence sévère**
    - **Myopathie**
  - **Substitution**
    - Amélioration **équilibre postural**
    - ↑ **force musculaire** (quadriceps +++)

**Mais...**

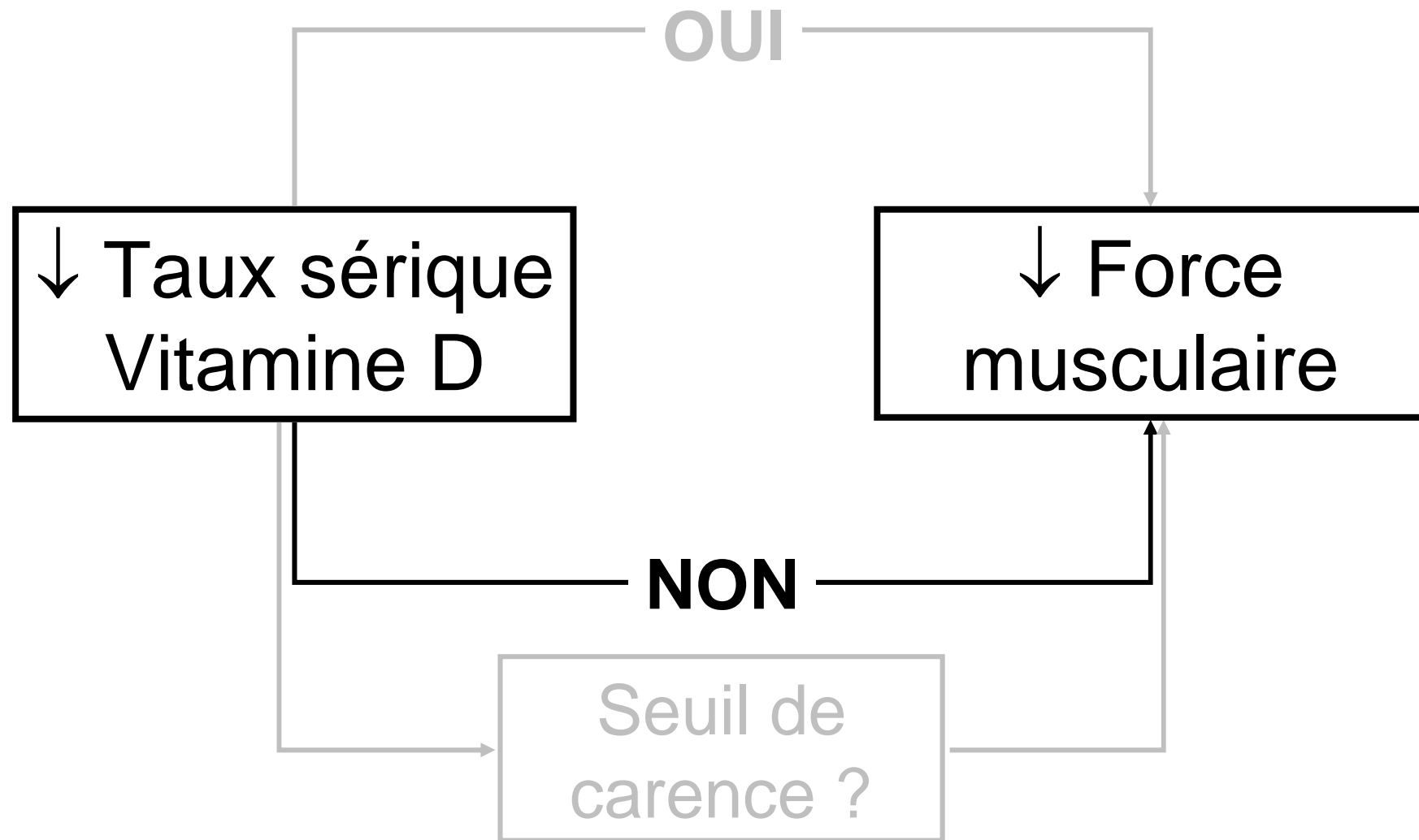
# ASSOCIATION VITAMINE D - FORCE MUSCULAIRE

## Controverses



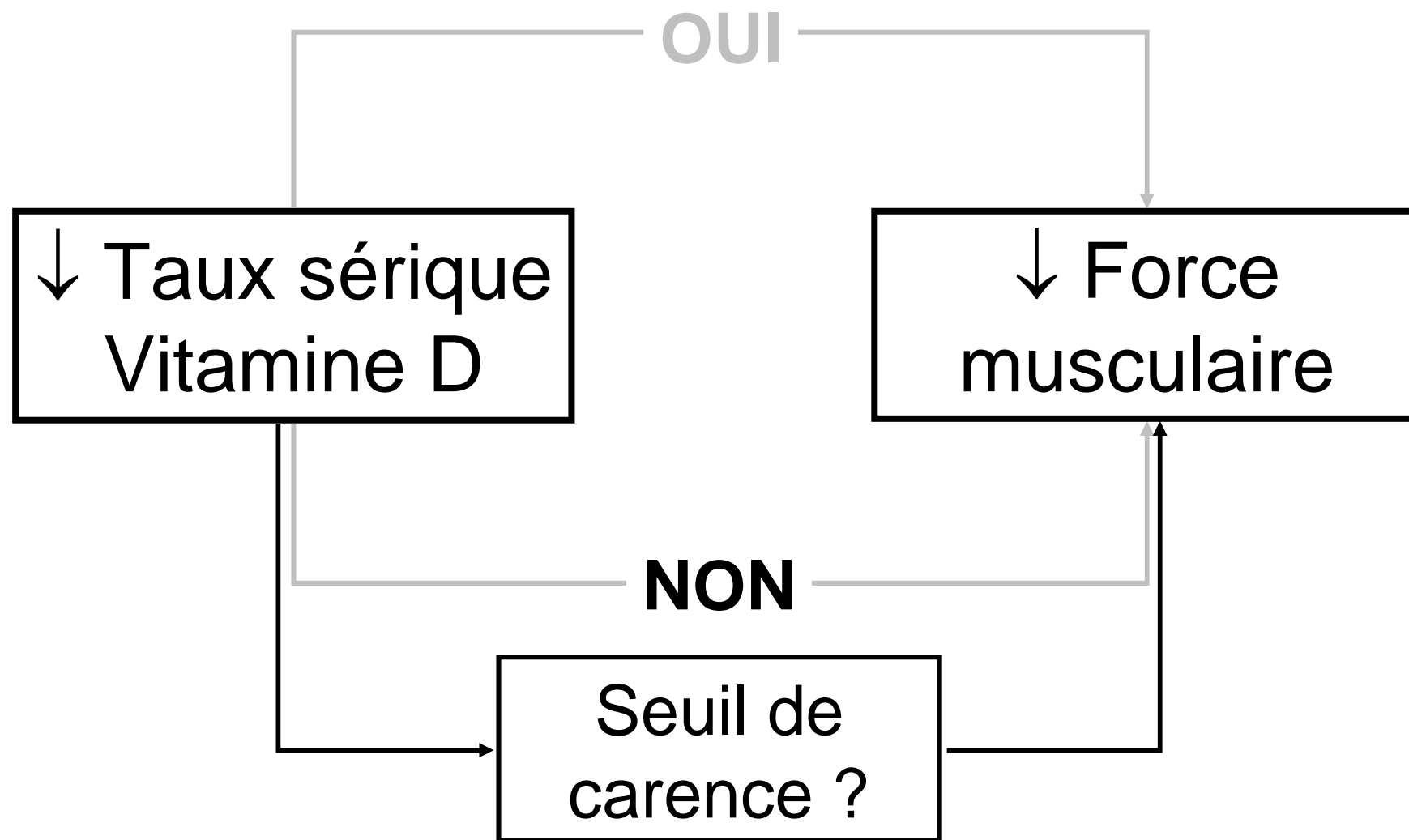
# ASSOCIATION VITAMINE D - FORCE MUSCULAIRE

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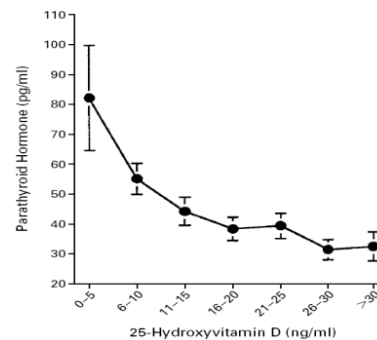
## Controverses : le choix du seuil de carence

### – Seuil de carence en vitamine D

- Théorique, consensuel
- Effectif, calculé au sein de la population étudiée

### – Hormone parathyroïde

- Hyperparathyroïdie II ↔ Carence en vitamine D
- Action musculaire indépendante ?



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## Objectif

- Etudier l'association entre carence en vitamine D et faiblesse musculaire du quadriceps
- Carence en vitamine D définie par PTH upregulation
- Après ajustement sur les potentiels facteurs de confusion
- Femmes âgées de 75 ans et plus, incluses dans l'étude **EPIDOS**

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## Matériel : Etude EPIDOS

- Etude de **cohorte prospective**
- Période : 1992 – 1996
- 7575 femmes âgées de 75 ans et plus, vivant à domicile
- Amiens, Lyon, Montpellier, Paris et Toulouse

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## Méthode

- **Etude transversale : phase d'inclusion EPIDOS**
  - Questionnaires, examen physique exhaustif
  - 752 dosages sériques randomisés
- **Critères d'exclusion : causes d'hyperparathyroïdie II**
  - Insuffisance rénale et/ou dysthyroïdie
  - Prise de biphosphonates et/ou de corticoïdes
- **Facteur étudié : [25 OHD] sérique**
  - Carence définie par une analyse de sensibilité < 16.5 ng/mL
- **Critère de jugement : force de contraction musculaire max**
  - Quadriceps membre dominant

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## Méthode

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### Facteurs de confusion

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#### Cliniques

#### Biologiques

Age

[parathormone]

Indice de Masse Corporelle

[calcium]

Nombre de maladies  
chroniques

Clairance de la  
créatinine

Activité physique régulière

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## Résultats

**Table 1** Characteristics and comparison of randomized sample subjects (n=554) separated into two groups based on serum 25OHD concentration

|  | Serum 25OHD concentration (ng/mL) |                | P-Value* |
|--|-----------------------------------|----------------|----------|
|  | < 16.5 (n=179)                    | ≥ 16.5 (n=366) |          |
| Clinical measures                                |                                   |                |          |
| Age, mean ± SD (years)                           | 80.0 ± 3.1                        | 79.8 ± 3.2     | 0.522    |
| Number of chronic diseases†, mean ± SD           | 3.0 ± 1.8                         | 2.8 ± 1.8      | 0.112    |
| Body mass index, mean ± SD (kg/cm <sup>2</sup> ) | 26.6 ± 4.6                        | 26.1 ± 4.0     | 0.180    |
| Regular physical activity ‡, n (%)               | 89 (49.7)                         | 196 (53.6)     | 0.400    |
| Quadriceps strength ¶                            |                                   |                |          |
| Mean value ± SD (N/m <sup>2</sup> )              | 184.4 ± 57.8                      | 185.8 ± 60.3   | 0.774    |
| Serum measures                                   |                                   |                |          |
| 25 ODH, mean ± SD (ng/mL)                        | 15.7 ± 8.5                        | 19.2 ± 12.3    | 0.0001   |
| PTH, mean ± SD (pg/mL)                           | 86.1 ± 21.7                       | 44.7 ± 11.8    | 0.0001   |
| Calcium, mean ± SD ¶ (mmol/L)                    | 2.2 ± 0.1                         | 2.2 ± 0.1      | 0.841    |
| Clearance §, mean ± SD (mL/mn)                   | 47.5 ± 12.4                       | 48.0 ± 11.9    | 0.493    |

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## Résultats

Table 1. Uni- and Multivariate Logistic Regression Showing the Cross-Sectional Association Between Serum Vitamin D (25OHD) Deficiency and Quadriceps Strength in the Worst Quintile of Performance

| Variable                             | Crude OR (95% CI) | P-Value | Adjusted OR (95% CI) | P-Value |
|--------------------------------------|-------------------|---------|----------------------|---------|
| 25OHD deficiency*                    | 1.72 (1.06–2.86)  | .03     | 1.61 (0.96–2.70)     | .07     |
| Hyperparathyroidism†                 | 1.12              | .66     | 1.12                 | .68     |
| Age                                  | 1.14 (1.06–1.22)  | <.001   | 1.15 (1.06–1.24)     | <.001   |
| Number of chronic diseases‡          | 1.21 (1.07–1.38)  | .003    | 1.19 (1.04–1.37)     | .01     |
| Body mass index                      | 0.94 (0.89–1.00)  | .06     | 0.89 (0.82–0.96)     | .004    |
| Regular physical activity§           | 0.52 (0.32–0.83)  | .007    | 0.57 (0.34–0.98)     | .03     |
| Serum calcium concentration, mmol/L¶ | 3.39 (0.39–29.40) | .27     | 2.57 (2.51–26.2)     | .43     |
| Creatinine clearance, mL/min#        | 0.99 (0.97–1.01)  | .42     | 1.02 (1.00–1.05)     | .07     |

\*Binary threshold determined according to sensitivity analysis with serum 25OHD threshold  $\geq 16.5$  ng/mL.

†High serum parathyroid hormone level with threshold  $> 65$  pg/mL related to vitamin D deficiency.

‡Range 0 to 6; obtained from physical examination and a health status questionnaire to target comorbid diseases (hypertension, diabetes mellitus, dyslipidemia, coronary artery disease, chronic obstructive pulmonary disease, peripheral vascular disease, cancer, stroke, Parkinson's disease, and depression).

§Considered if subjects had performed at least one recreational physical activity (walking, gymnastics, cycling, swimming, or gardening) for at least 1 hour a week or more for the previous month.

¶Corrected value based on the formula  $(Ca + 0.02 (46 - albumin))$ .

#Calculated using the Cockcroft formula  $((140 - \text{age in years}) / \text{creatinine mmol/L}) \times 1.04$ .

OR = odd ratio; CI = confidence interval.

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## Conclusion

- **Pas d'association** vitamine D - force musculaire
  - En utilisant un seuil de carence basé sur la population
  - En ajustant sur l'ensemble des potentiels facteurs de confusion
- Résultats :
  - **Cohérents** avec précédentes études **épidémiologiques**
  - **Non cohérents** avec études **fondamentales**
- Explication paradoxe :  
**La force musculaire est-elle le « bon » paramètre ?**

**Merci pour votre attention**



**Pour plus d'informations :**

Annweiler C, Schott AM, Kressig RW, Bridenbaugh S, Berrut G, Herrmann FR, Beauchet O.

Vitamin D insufficiency-related quadriceps weakness: Results of the EPIDOS cohort.

J Am Geriatr Soc 2009; 57(2): 368-9