



Les adjuvants à base d'aluminium *100 ans d'utilisation, 100 ans d'alertes ?*

AG REVAV
12 octobre 2026

Guillemette Crépeaux
EnvA, IMRB INSERM U955, MUSE



Les adjuvants à base d'aluminium *100 ans d'utilisation, 100 ans d'alertes ?*



Écoutons la science : comprendre, agir & protéger

LA TRILOGIE DES ABA (3/3) :
LE RÉQUISITOIRE D'E3M*

ADJUVANTS À BASE D'ALUMINIUM : 40 ANS D'ALERTE IGNORÉES CHRONOLOGIE D'UN SCANDALE SANITAIRE

PAR **DIDIER LAMBERT**
PRÉSIDENT DE L'ASSOCIATION E3M
MEMBRE DU COMITÉ SCIENTIFIQUE PERMANENT
PHARMACOVIGILANCE DE L'ANSM (2019-2021)

SEPTEMBRE 2026

* ABA : adjuvants à base d'aluminium

CONTACT : Didier Lambert, president@asso-e3m.fr
www.vaccinssansaluminium.org



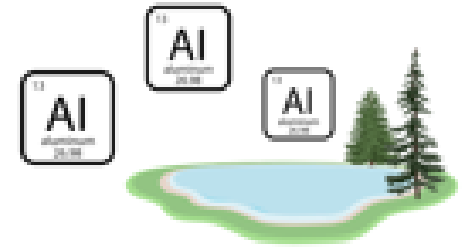
Non-exhaustif !



Aluminium : généralités



- 3^{ème} élément au sein de la croûte terrestre
- Oxydes ou silicates d'Al stables
- > Al très peu biodisponible



- Aucune utilisation connue d'Al par un système biologique
- Fin du XIX^e siècle :
 - industrialisation et extraction aluminium
 - usages industriels, alimentaires, médicaux
 - exposition humaine ↗↗



= « Age de l'aluminium »

- Alimentation
- Nutrition parentérale
- Produits pharmaceutiques
- Cosmétiques
- Inhalation



Voies d'exposition ≠
Composés ≠
Valeurs Tox de Réf ≠

Aluminium : toxicité ?



- Post-doctorante - 2013
- Médecine du travail

Inserm



La science pour la santé
From science to health

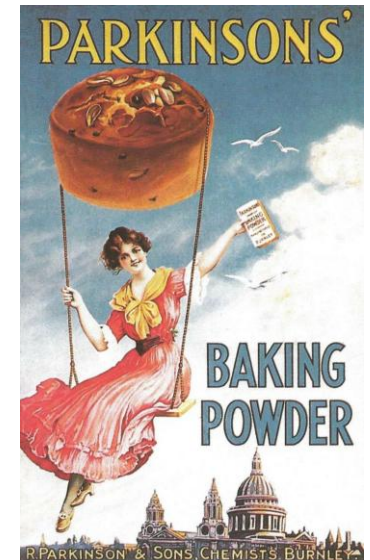
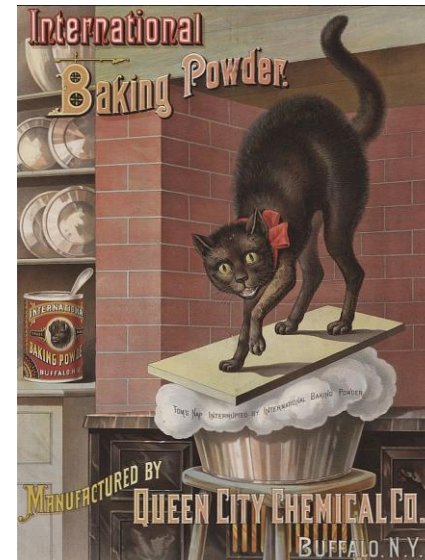


« Si l'aluminium était toxique on le saurait ! »

Aluminium : 1850-1910s



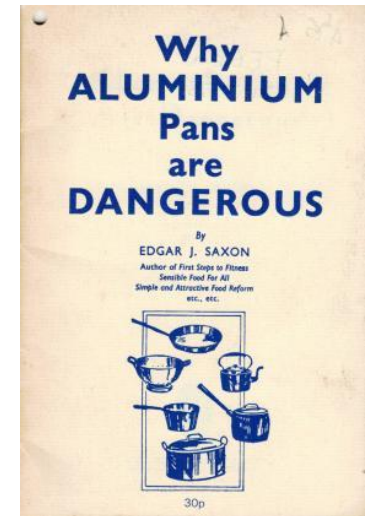
- Controverses fortes sur innocuité/toxicité Al alimentaire depuis 1850's
- 1890's
 - France, Allemagne : gourdes militaires
 - USA : additifs alimentaires et levures chimiques



Aluminium : 1850-1910s



- Controverses fortes sur innocuité/toxicité Al alimentaire depuis 1850's
- 1890's
 - France, Allemagne : gourdes militaires
 - USA : additifs alimentaires et levures chimiques
- 1906 : *Pure Food and Drug Act* (-> FDA)
- 1908 : comité Remsen (Roosevelt) (qualité aliments)



Poison squad - 1906



Dessin humoristique illustrant la position de Remsen au sein de divers comités - 1910

Aluminium : 1850-1910s

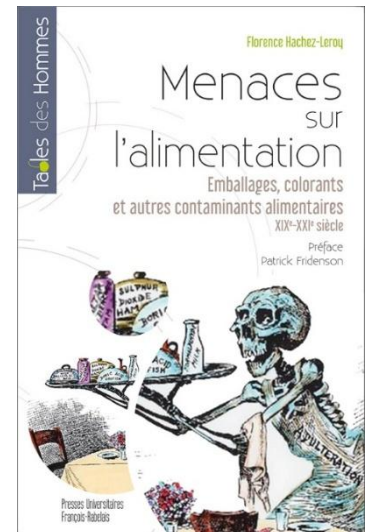


- Controverses fortes sur innocuité/toxicité Al alimentaire depuis 1850's
- 1890's
 - France, Allemagne : gourdes militaires
 - USA : additifs alimentaires et levures chimiques
- 1906 : *Pure Food and Drug Act* (-> FDA)
- 1908 : comité Remsen (Roosevelt) (qualité aliments)

William J. Gies (Columbia U) - 1911

“the use in food of aluminum or any other aluminum compound is a dangerous practice.”

-> Florence Hachez-Leroy



Aluminium : 1920s



- Adjuvants
 - > **Al-Based Adj. (ABA)**
- 1920's : alun de potassium
- 1932 : 1^{ère} utilisation

IMMUNOLOGICAL NOTES

XVII.-XXIV.

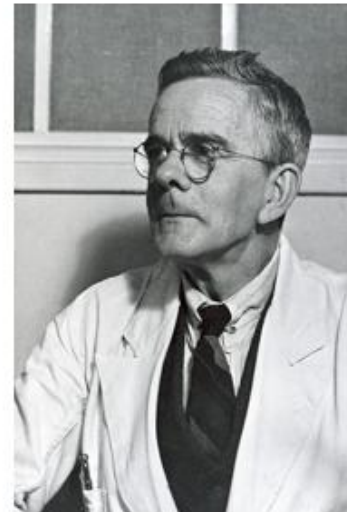
A. T. GLENNY, C. G. POPE, HILDA WADDINGTON and U. WALLACE.

From the Wellcome Physiological Research Laboratories, Beckenham.



Gaston Ramon (1886-1963)

Vétérinaire, Paris (élève à Alfort)
Vaccin antidiphtérique
Notion d'adjuvants (1925)



Alexander T Glenny (1882-1965)

Immunologiste, Londres
Vaccin antidiphtérique
Propriétés **adjuvantes** des **sels d'aluminium** (1926)

ABA : 1920s-1940s



- Adjuvants
 - > *Al-Based Adj. (ABA)*
- 1920's : alun de potassium
- 1932 : 1^{ère} utilisation

Al particulière

■ 1930s-1940s

Oxyhydroxyde d'Al
(AlOOH)
= **AH** (Alhydrogel®)



Hydroxyphosphate d'Al
(AlOHPO_4)
= **AP** (Adju-Phos®)



■ 1980s-1990s

Sulfate d'hydroxyphosphate d'Al
($\text{Al}_2(\text{PO}_4)(\text{OH})(\text{SO}_4)$)
= **AAHS**

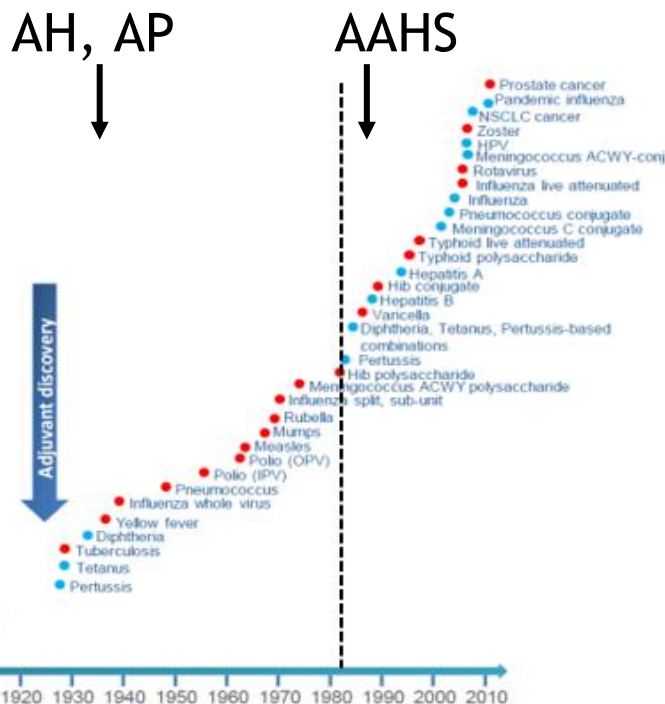
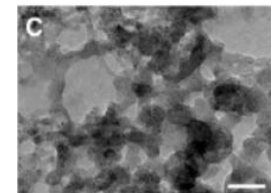


Figure 3. Licensed vaccines with or without adjuvant.

ABA : 1940-1970s

- Début 50s : Institut Pasteur ne choisit pas les ABA
- Définition dose Alun (efficacité) - NIH

AH, AP

AAHS

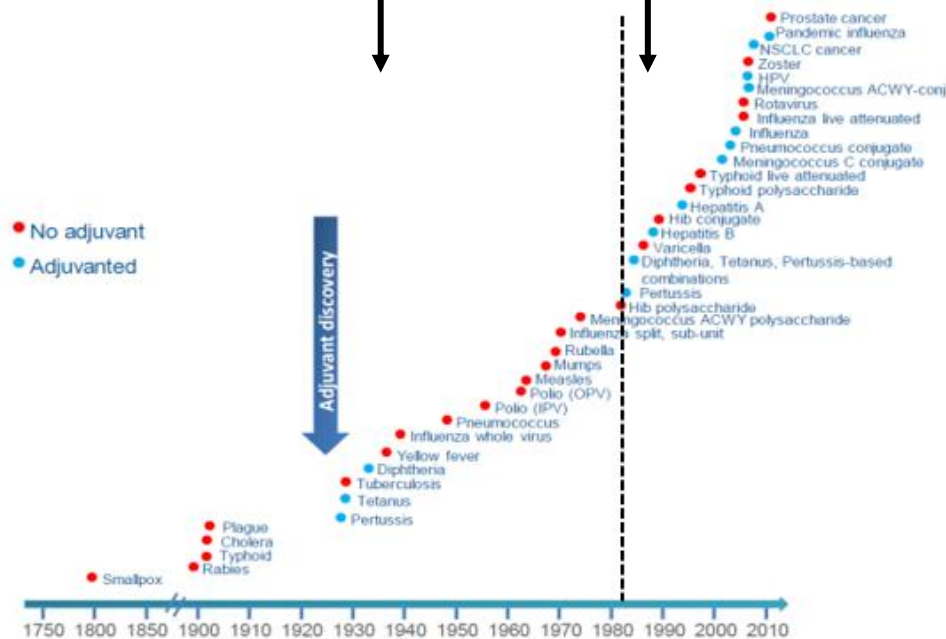


Figure 3. Licensed vaccines with or without adjuvant.

1947

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service
National Institutes of Health
Bethesda 14, Maryland
(4th Revision - March 1, 1947)

MINIMUM REQUIREMENTS: Diphtheria Toxoid

TABLE OF CONTENTS

- The Product
 - Definition, 1.2 Culture medium for toxin production, 1.3 Potency of the parent toxin
- Plain Diphtheria Toxoid
 - Formaldehyde for detoxification, 2.2 Test for detoxification, 2.3 Test for antigenicity on plain toxoid
- Alum Precipitated Diphtheria Toxoid
 - Quantity of alum allowed, 3.2 Quality of the parent plain toxoid, 3.3 Test for antigenicity on precipitated toxoid, 3.4 Volume in the final container
- Additional Specific Tests on the Product
 - Identity test, 4.2 Safety test, 4.3 Sterility test
- General Requirements
 - Preservative, 5.2 Dose, 5.3 Labeling, 5.4 Dating, 5.5 Storage, 5.6 Requirements for release
- Diphtheria Toxoid in Multiple Antigens
 - Permissible combination, 6.2 Antigenicity test on toxoid in multiple antigens, 6.3 Volume of the multiple antigen injection, 6.4 Volume of the multiple antigen final container, 6.5 Dating of the multiple antigen, 6.6 Requirements for release of multiple antigens

This is
Standard
made. 1
general

1952

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
National Institutes of Health
Bethesda 16, Maryland
4th Revision, December 15, 1952

Minimum Requirements: Tetanus Toxoid

TABLE OF CONTENTS

- The Product
 - Definition, 1.2 Culture medium for toxin production, 1.3 Potency of the parent toxin
- Plain Tetanus Toxoid
 - Formaldehyde for detoxification, 2.2 Test for detoxification, 2.3 Test for potency of plain toxoid
- Precipitated or adsorbed Tetanus Toxoid
 - Quantity of alum allowed, 3.2 Quality of the parent plain toxoid, 3.3 Test for potency of precipitated or adsorbed toxoid, 3.4 Volume in the final container
- Additional Specific Tests on the Product
 - Identity test, 4.2 Safety test, 4.3 Sterility test
- General Requirements
 - Preservative, 5.2 Dose, 5.3 Labeling, 5.4 Dating, 5.5 Storage, 5.6 Requirements for release
- Tetanus Toxoid in Combined Products
 - Permissible combinations, 6.2 Potency test of toxoid in combined products, 6.3 Volume of the injection, 6.4 Volume of the final container, 6.5 Dating, 6.6 Requirements for release

This material has been prepared for official use by the Division of Biologics Standards, National Institutes of Health, to which requests for copies may be made. It should not be listed in reading lists or periodicals as available generally.

ABA : 1970s



- 1ères alertes
- Effets locaux

Aluminium Hydroxide Granuloma

MAGDA ERDOHAZI, R. L. NEWMAN

British Medical Journal, 1971, 3, 621-623

It is well known that subcutaneous injection of triple vaccine may cause a granuloma, but it is usual for such nodules to subside without treatment after some months. In each of the two cases reported below a postimmunization granuloma was excised before its aetiology was recognized. The histological findings are of interest.



WHO Technical report 595 “Immunological adjuvants”, 1976

The formation of a small granuloma is inevitable with alum-precipitated vaccines and should be considered as a necessary requirement for effective adjuvant action. Care should be taken to see that alum-precipitated vaccines are injected intramuscularly, since the granuloma that develops after subcutaneous injection can undergo necrotic breakdown and can cause cyst and abscess formation.

ABA : 1980s



- Granulomes
- Questions sur la sécurité

MUSCLE GRANULOMAS FOLLOWING INTRAMUSCULAR INJECTION

ROBERT E. MRAK, MD, PhD

1982



1980

THE JOURNAL OF INFECTIOUS DISEASES • VOL. 141, NO. 1 • JANUARY 1980
© 1980 by The University of Chicago. 0022-1899/80/4101-0016\$00.95

NEWS

From the National Institute of Allergy and Infectious Diseases

**Summary of an International Symposium on
Potentiation of the Immune Response to Vaccines**

To date, the question of adjuvant safety has not been resolved and represents a major obstacle to the orderly development of adjuvanted vaccines. There is general consensus that adjuvants with less toxicity must be found for clinical and veterinary application. The real or perceived fear of inducing

The symposium was concluded by Dr. William E. Paul, Chief of the Laboratory of Immunology, NIAID, a position created originally for Dr. Jules Freund, one of the fathers of adjuvants. Dr. Paul emphasized that the absolute safety of adjuvants can never be guaranteed. Even though high fre-

ABA : 1980s



- Granulomes
- Questions sur la sécurité
- Utilisation croissante
- Alertes

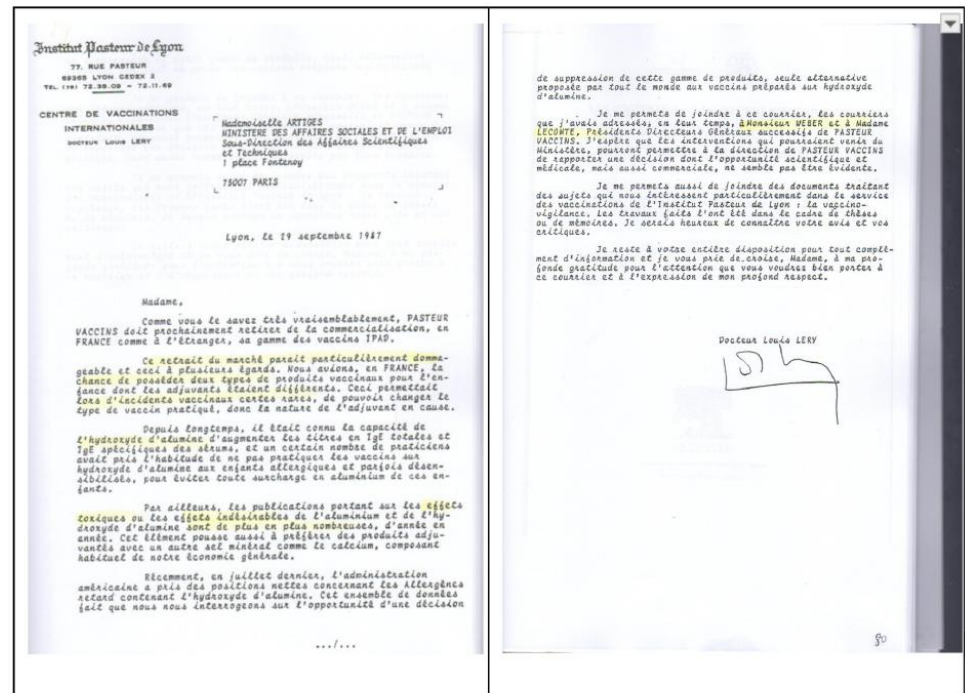
1984
Institut Mérieux
Rachète la branche production
de l'Institut Pasteur

1986
Institut Mérieux
Arrêt fabrication des vaccins sur CaP

Les chercheurs de l'Institut Pasteur ont alerté les autorités sanitaires face au choix industriel de privilégier les adjuvants aluminiques aux dépens du CaP.

« Si des accidents surviennent chez des personnes allergiques suite à une vaccination avec aluminium, le ministère de la santé en portera la responsabilité et ne pourra pas dire qu'il n'a pas été averti. »

Dr Nicole Donnat, allergologue
1984



29 septembre 1987 - Courrier du Dr Léry, responsable de l'Institut Pasteur de Lyon, au ministère de la Santé - Documentation personnelle du Pr Relyveld (Institut Pasteur) remise (à son décès) à E3M

ABA : 1980s



- Granulomes
- Questions sur la sécurité
- Utilisation croissante
- Alertes



Report on **Safety Considerations**
for the
Aluminum Component of
Alum-Precipitated Allergenic Extracts

August 21, 1987

Allergenic Products Advisory Committee
From the June 25-26, 1987, Committee Meeting

FDA 1987

« On en connaît assez sur l'aluminium pour savoir que l'on ne devrait l'injecter à personne, à moins qu'il n'y ait un réel et raisonnable bénéfice à espérer. »

ABA : 1990s



- Toxicité vs mécanismes d'action

Review

Adjuvants – a balance between toxicity and adjuvanticity

Rajesh K. Gupta^{*¶}, Edgar H. Relyveld[†], Erik B. Lindblad[‡], Bernard Bizzini[∞], Shlomo Ben-Efraim^{||} and Chander Kanta Gupta^{*}

1993

ABA : 1990s



■ Toxicité vs mécanismes d'action

■ EM/SFC ? Canada 1992 Hep B



FROM THE CCDR • DU RMTC

Report of the Working Group on the Possible Relationship between Hepatitis B Vaccination and the Chronic Fatigue Syndrome

1993

Conclusion and recommendations

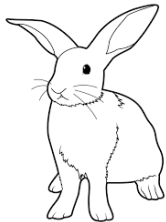
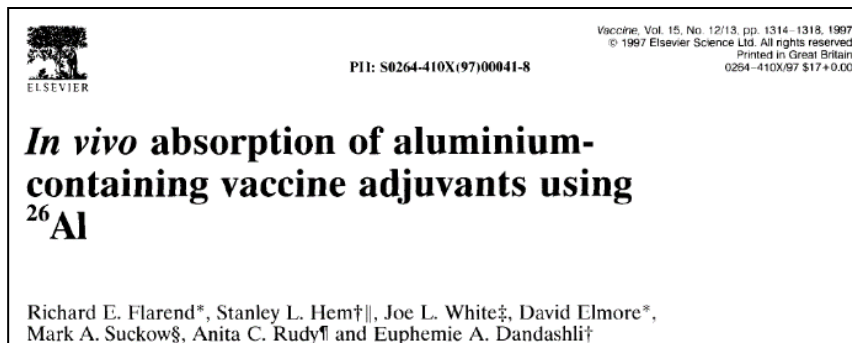
Members of the working group felt that there was no evidence linking hepatitis B vaccine administration with the appearance of CFS. The arguments for this are the following:

Therefore, members of the working group felt that there was no evidence justifying the allocation of funds for research projects on the possible relationship between CFS and hepatitis B vaccine. Concerns about CFS should not jeopardize ongoing preventive programs using HBV vaccines.

ABA : 1990s



- Toxicité vs mécanismes d'action
- EM/SFC ?
- Données expérimentales - 1997



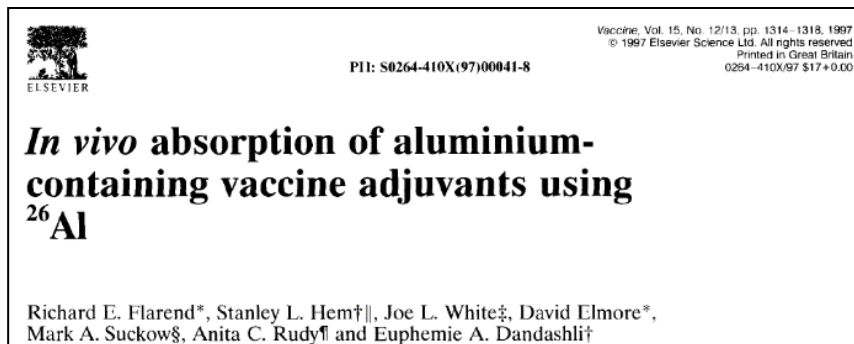
AH - AP - im
28 jours

Aluminium hydroxide (AH) and aluminium phosphate (AP) adjuvants, labelled with ^{26}Al , were injected intramuscularly (i.m.) in New Zealand White rabbits. Blood and urine samples were collected for 28 days and analysed for ^{26}Al using accelerator mass spectrometry to determine the absorption and elimination of AH and AP adjuvants. ^{26}Al was present in the first blood sample (1 h) for both adjuvants. The area under the blood level curve for 28 days indicates that three times more aluminium was absorbed from AP adjuvant than AH adjuvant. The distribution profile of aluminium to tissues was the same for both adjuvants (kidney > spleen > liver > heart > lymph node > brain). This study has demonstrated that in vivo mechanisms are available to eliminate aluminium-containing adjuvants after i.m. administration. In addition, the pharmacokinetic profiles of AH and AP adjuvants are different. © 1997 Elsevier Science Ltd.

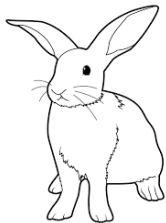
ABA : 1990s



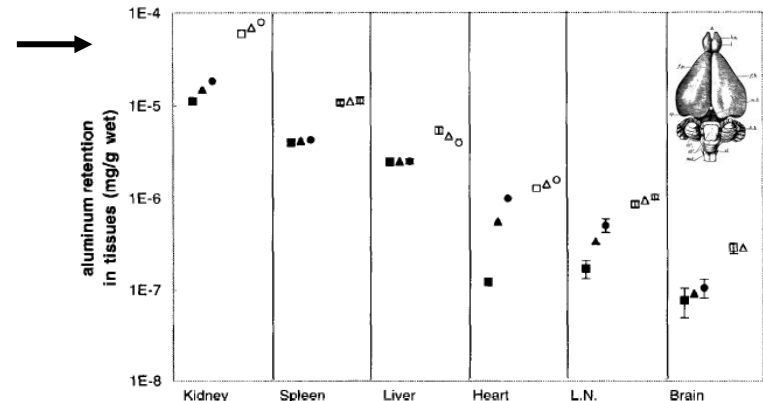
- Toxicité vs mécanismes d'action
- EM/SFC ?
- Données expérimentales - 1997



→ “Excretion of 6% AlOOH and 22% AlOHPO_4 in 28 days”



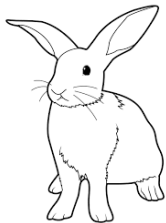
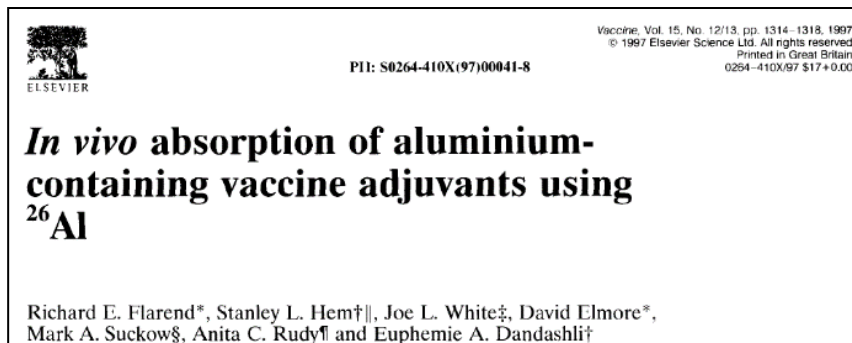
AH - AP - im
28 jours



ABA : 1990s



- Toxicité vs mécanismes d'action
- EM/SFC ?
- Données expérimentales - 1997



AH - AP - im
28 jours

ACADEMIE NATIONALE DE MÉDECINE

16, RUE BONAPARTE - 75272 PARIS CEDEX 06

TÉL : 01 42 34 57 70 - FAX : 01 40 46 87 55

Commission VII (maladies infectieuses et médecine tropicale)

Groupe de travail* sur

Les adjuvants vaccinaux: quelle actualité en 2012 ?

Pierre Bégué, Marc Girard, Hervé Bazin, Jean-François Bach.

“ Ce travail experimental, unique à ce jour, sert pour la modélisation de la pharmacocinétique des adjuvants. ”

ABA : 1990s



- Toxicité vs mécanismes d'action
- EM/SFC ?
- Données expérimentales - 1997
- Données cliniques - 1998 : MFM

1993

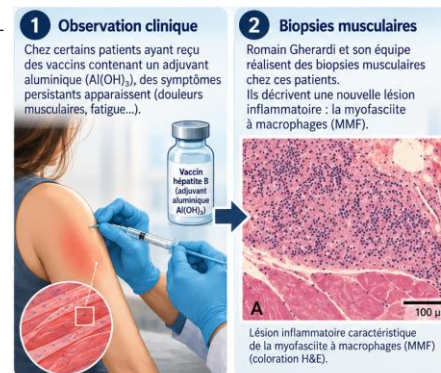
Dr Michèle Coquet CHU Bordeaux
Découverte 1^{er} cas de MFM

1994

Pr Romain Gherardi H. Mondor (Créteil)
Découverte 2^{ème} cas de MFM

Macrophagic myofasciitis: an emerging entity

R K Gherardi, M Coquet, P Chérin, F-J Authier, P Laforêt, L Bélec, D Figarella-Branger, J-M Mussini, J-F Pellissier, M Fardeau, for the Groupe d'Études et Recherche sur les Maladies Musculaires Acquisées et Dysimmunitaires (GERMMAD) de l'Association Française contre les Myopathies (AFM)



ABA : 2000s

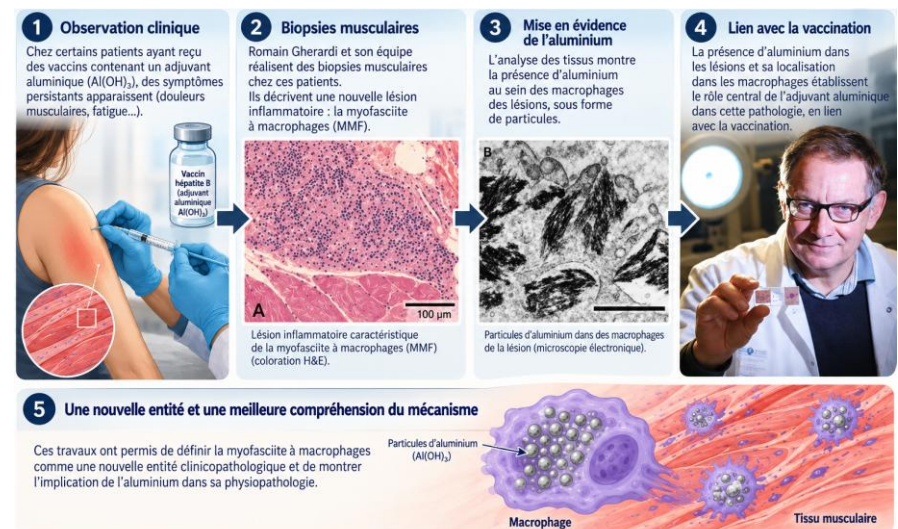
- Toxicité vs mécanismes d'action
- EM/SFC ?
- Données expérimentales - 1997
- Données cliniques - 1998 : MFM
- 2001 : Aluminium



Macrophagic myofasciitis lesions assess long-term persistence of vaccine-derived aluminium hydroxide in muscle

R. K. Gherardi,¹ M. Coquet,² P. Cherin,³ L. Belec,⁴ P. Moretto,⁵ P. A. Dreyfus,¹ J.-F. Pellissier,⁶ P. Chariot¹ and F.-J. Authier¹

Brain (2001), **124**, 1821–1831



ABA : 2000s



■ ABA et sarcomes félins

McEntee & Page 2001. J Vet Intern Med, 15:176–182
College of Veterinary Medicine

Table 1. Recommendations for the prevention and monitoring of vaccine-associated sarcomas.^a

Recommendations
1. Do not overvaccinate; vaccinate only when indicated
2. Standardize and separate vaccine injection sites
3. Use single-dose vials only
4. Keep detailed vaccine and injection records for each patient including site of administration, ^b type of vaccine or other product, manufacturer and serial number of the vaccine
5. Report vaccine-associated sarcomas to the United States Pharmacopeia
6. Decrease the use of polyvalent vaccines
7. Use nonadjuvanted vaccines
8. Avoid use of aluminum-based adjuvants
9. The indiscriminate use of feline leukemia virus vaccine should be stopped, and it is not recommended for strictly indoor cats
10. Vaccines should be administered subcutaneously ^c

^a This material in part (points 2–5) is being reproduced with the

Journal of Feline Medicine and Surgery
Volume 17, Issue 7, July 2015, Pages 606–613
© Published by SAGE on behalf of ISFM and AAEP 2015, Article Reuse Guidelines
<https://doi.org/10.1177/1098612X15588451>



Special Article

Feline injection-site sarcoma: ABCD guidelines on prevention and management

Katrin Hartmann, Michael J Day^{*}, Etienne Thiry, Albert Lloret, Tadeusz Frymus, Diane Addie, Corine Boucraut-Baralon, Herman Egberink, Tim Gruffydd-Jones, Marian C Horzinek, Margaret J Hosie, Hans Lutz, Fulvio Marsilio, Maria Grazia Pennisi, Alan D Radford, Uwe Truyen, and Karin Möstl European Advisory Board on Cat Diseases



ABA : 2000s



- ABA et sarcomes félins
- *Quelques incertitudes*



DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL VACCINE PROGRAM OFFICE PRESENTS:

WORKSHOP ON ALUMINUM IN VACCINES

Caribe Hilton International Hotel
San Juan, Puerto Rico

Jointly Sponsored by:

Task Force for Child Survival and Development

2000

The second panel discussed “what we don’t know” about aluminum-containing adjuvants and identified the following areas to be more thoroughly studied.

1. Toxicology and pharmacokinetics of aluminum adjuvants. Specifically, the processing of aluminum by infants and children.
2. Mechanisms by which aluminum adjuvants interact with the immune system.
3. Necessity of adjuvants in booster doses.
4. Definition of frequency and duration of the MMF lesion in normal people.

ABA : 2000s



- ABA et sarcomes félins
- *Quelques incertitudes*



DEPARTMENT OF HEALTH AND HUMAN SERVICES

NATIONAL VACCINE PROGRAM OFFICE PRESENTS:

WORKSHOP ON ALUMINUM IN VACCINES

Caribe Hilton International Hotel
San Juan, Puerto Rico

Jointly Sponsored by:

Task Force for Child Survival and Development



DR. GERBER: Michael Gerber, National
Institutes of Health.

Norman, the standard of 0.85 milligrams of
aluminum per dose set forth in the Code of Federal
Regulations, can you tell us where that came from and
how that was determined?

DR. BAYLOR: Unfortunately, I could not. I
mean, we have been trying to figure that out. We
have been trying to figure that out as far as going
back in the historical records and determining how
they came up with that and going back to the preamble

47

to the regulation. We just have been unsuccessful
with that but we are still trying to figure that out.

ABA : 2000s



- ABA et sarcomes félins
- *Quelques incertitudes*



Vaccine 20 (2002) S18–S23



www.elsevier.com/locate/vaccine

Aluminum salts in vaccines—US perspective[☆]

Norman W. Baylor*, William Egan, Paul Richman

Food and Drug Administration, Center for Biologics Evaluation and Research, Office of Vaccines Research and Review, Bethesda, MD, USA

Received 4 June 2001; received in revised form 20 September 2001; accepted 21 September 2001

permitted as potassium alum, i.e. 15 mg [4]. The amount of 15 mg of alum or 0.85 mg aluminum per dose was selected empirically from data that demonstrated that this amount of aluminum enhanced the antigenicity and effectiveness of the vaccine (Joan May, FDA/CBER, personal communication).

ABA : 2000s



- ABA et sarcomes félins
- *Quelques incertitudes*
- Quelques alertes



GSK 2002

En 2002, Nathalie Garçon, responsable des adjuvants chez GSK (GlaxoSmithKline), admet que « *le seul adjuvant autorisé pour la consommation humaine [l'aluminium], est le plus empirique. Personne ne sait comment il fonctionne, personne ne connaît sa biodistribution* ». Elle rajoute ensuite : « *en fait, je crois que si l'alum arrivait maintenant, il ne serait pas accepté* »⁴.

⁴ Source : Virginie Belle, in *Quand l'aluminium nous empoisonne* – Ed Max Milo 2010

ABA : 2000s



- ABA et sarcomes félins
- *Quelques* incertitudes
- Quelques alertes

Review > *Immunol Cell Biol.* 2004 Oct;82(5):488-96. doi: 10.1111/j.0818-9641.2004.01272.x.

Vaccine adjuvants: current state and future trends

Nikolai Petrovsky ¹, Julio César Aguilar

Second, the regulatory bar has been raised significantly since the days when alum was first introduced as a human adjuvant. Indeed, it is likely that if alum hadn't been in use all these years and was first put forward to regulatory bodies for approval today, it would be refused registration on the basis of safety concerns. Third, it is not possible for adjuvants to be

ABA : 2000s



- ABA et sarcomes félins
- *Quelques* incertitudes
- Quelques alertes



FEDERAL REGISTER
The Daily Journal of the United States Government

"Term infants with normal renal function may also be at risk because of their rapidly growing and immature brain and skeleton, and an immature blood-brain barrier. Until they are 1 to 2 years old, infants have lower glomerular filtration rates than adults, which affects their kidney function. The agency is concerned that young children and children with immature renal function are at a higher risk resulting from any exposure to aluminum."

— U.S. Food and Drug Administration (FDA), June 2003¹³

ABA : 2000s



- ABA et sarcomes félins
- *Quelques* incertitudes
- Quelques alertes
- Un domaine négligé - OMS 2004

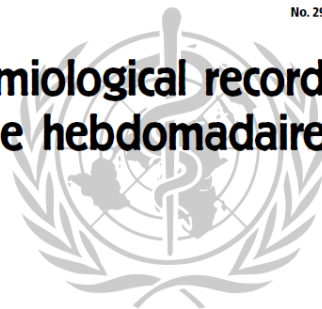


2004, 79, 265-272

Weekly epidemiological record Relevé épidémiologique hebdomadaire

16 JULY 2004, 79th YEAR / 16 JUILLET 2004, 79^e ANNÉE
No. 29, 2004, 79, 265-272
<http://www.who.int/wer>

No. 29



Les questions concernant l'innocuité exigeront une connaissance approfondie des effets des adjuvants sur la réponse immunitaire et les mécanismes associés. La réglementation actuelle devra tenir compte des données scientifiques nouvelles concernant les adjuvants. L'innocuité des adjuvants est un domaine important et négligé. Dans la mesure où les adjuvants ont leurs propres propriétés pharmacologiques, susceptibles de modifier l'immunogénicité et la sécurité des vaccins, l'évaluation de leur innocuité est indispensable.

ABA : 2000s

■ Afssaps 2003 - 2004

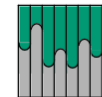


1) Etude cas-témoin MFM

Afssaps - INVS - chercheurs
fév 2002 - juillet 2003

2) Résultats présentés à la commission nationale de pharmacovigilance et au CS de l'Afssaps mai 2004

*Fréquence significativement plus élevée de
l'asthénie ainsi qu'un retentissement fonctionnel
plus important de la fatigue chez les patients
atteints, notamment sur le plan cognitif.*



CENTRE HOSPITALIER ET UNIVERSITAIRE DE BORDEAUX

DÉPARTEMENT DE PHARMACOLOGIE
Pharmacologie Clinique

ETUDE EPIDEMIOLOGIQUE EXPLORATOIRE DE LA MYOFASCITE A MACROPHAGES

Rapport d'étude
Octobre 2003

Promoteur :

Agence Française de Sécurité Sanitaire des Produits de Santé (Afssaps)

Elaboration du protocole :

Carmen Kreft-Jais, Afssaps

Jacques Ropers, Afssaps

Dominique Costagliola, Afssaps

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Romain Ghéardi, Histologie-Embryologie-Cytogénétique, Hôpital Henri Mondor, Créteil

Réalisation de l'étude :

Département de Pharmacologie, Hôpital Pellegrin, Bordeaux

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- Chef de projet : Fanny Depont
- Attachées de Recherche Clinique : Caroline Dureau, Angela Grelaud
- Analyse statistique : Nathalie Lechevallier

ABA : 2000s

■ Afssaps 2003 - 2004



1) Etude cas-témoin MFM
Afssaps - INVS - chercheurs
fév 2002 - juillet 2003

2) Résultats présentés à la commission nationale
de pharmacovigilance et au CS de l'Afssaps
mai 2004

3) CS de l'Afssaps - juin 2004

- *aucun syndrome clinique spécifique*
- *pas de remise en cause de la balance
bénéfice/risque des vaccins contenant un adjuvant
aluminique*
- *ne recommande pas, à ce jour, la réalisation de
nouvelles études épidémiologiques*



Secrétariat des Conseils
N°2004-006

CONSEIL SCIENTIFIQUE

- Séance du 05 mai 2004 -

AVIS

Objet : Myofasciite à macrophages

Le Conseil Scientifique, après en avoir délibéré, donne un avis favorable, à l'unanimité, au Directeur Général de l'Agence Française de Sécurité Sanitaire des Produits de Santé, en ce qui concerne les recommandations suivantes :

1 - L'état actuel des connaissances permet au Conseil scientifique de l'Afssaps de considérer que l'association entre l'entité histologique myofasciite à macrophages sur le site musculaire classiquement choisi pour la vaccination et l'administration de vaccins contenant un adjuvant aluminique est hautement probable.

2 - L'état actuel des connaissances ne permet pas au Conseil scientifique de l'Afssaps de considérer qu'il existe une association entre l'entité histologique myofasciite à macrophages et un syndrome clinique spécifique.

La plus grande fréquence de la fatigue observée dans l'étude épidémiologique chez les sujets présentant l'entité histologique ne permet pas de conclure à la réalité d'un lien en raison :

- de la faiblesse statistique de l'association,
- des contraintes inhérentes aux caractéristiques de l'étude,
- de la non spécificité du symptôme fatigue.

3 - En l'état actuel des connaissances, le Conseil scientifique de l'Afssaps considère qu'aucun syndrome clinique spécifique n'est retrouvé associé à la vaccination avec des vaccins contenant un adjuvant aluminique.

4 - L'état actuel des connaissances permet au Conseil scientifique de l'Afssaps de considérer qu'il n'y a pas à remettre en cause la balance bénéfice-risque des vaccins contenant un adjuvant aluminique .

5 - Au regard de ces éléments, le Conseil scientifique ne recommande pas, à ce jour, la réalisation de nouvelles études épidémiologiques .

Cet avis concorde avec l'avis rendu par le Comité scientifique pour la Sécurité des Vaccins de l'Organisation Mondiale de la Santé les 3 et 4 décembre 2003.

Le Président du Conseil scientifique

Professeur Alain GRIMFELD

ABA : 2000s



■ Afssaps 2003 - 2004



1) Etude cas-témoin MFM
Afssaps - INVS - chercheurs
fév 2002 - juillet 2003

2) Résultats présentés à la commission nationale
de pharmacovigilance et au CS de l'Afssaps
mai 2004

3) CS de l'Afssaps - juin 2004

4) Question conflits d'intérêt
E3M - nov 2004 janvier 2005
(2011 & 2015)



Aluminium et vaccins :

Les Conflits d'intérêts

Un avis donné par un CS « pourri de conflits d'intérêts »
(Président de la Mission Parlementaire sur le Mediator)

Septembre 2015

ABA : 2000s



- Afssaps 2003 - 2004

- ATSDR 2008



ATSDR Agency for Toxic Substances and Disease Registry

Aluminum is a known neurotoxin and exposure can lead to significant “alterations in motor function, sensory function, and cognitive function.”

TOXICOLOGICAL PROFILE FOR ALUMINUM

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

September 2008

ABA : 2000s



- Afssaps 2003 - 2004

- ATSDR 2008



- FDA 2008

En présence d'un représentant de l'EMA :

« Alors que beaucoup de vaccins sont donnés très tôt dans la vie, on ne sait pas quel est l'effet de l'empreinte à long terme sur le système immunitaire des petits enfants.

Nous sommes très légers sur la génotoxicité et la cancérogénicité.

Pour la toxicité de la combinaison adjuvant-antigène, nous nous concentrons sur la tolérance locale. »



FOOD AND DRUG ADMINISTRATION

+ + + + +

CENTER FOR BIOLOGICS EVALUATION AND RESEARCH

+ + + + +

NATIONAL INSTITUTES OF HEALTH

+ + + + +

NATIONAL INSTITUTE OF ALLERGY AND
INFECTIOUS DISEASES

+ + + + +

WORKSHOP ON ADJUVANTS AND ADJUVANTED
PREVENTIVE AND THERAPEUTIC VACCINES

FOR INFECTIOUS DISEASE INDICATIONS

+ + + + +

TUESDAY
DECEMBER 2, 2008

ABA : 2000s



- Afssaps 2003 - 2004
- ATSDR 2008
- FDA 2008
- WHO 2008

In 2008, The Global Advisory Committee on Vaccine Safety of the WHO concluded *"From the most recent evidence available, there is no reason to conclude that a health risk exists as a result of administration of aluminium-containing vaccines, nor is there any good reason for changing current vaccination practice. The GACVS will continue to review the evidence that might emerge from on-going studies"*.
(http://www.who.int/vaccine_safety/committee/topics/aluminium/statement_112002/en/)

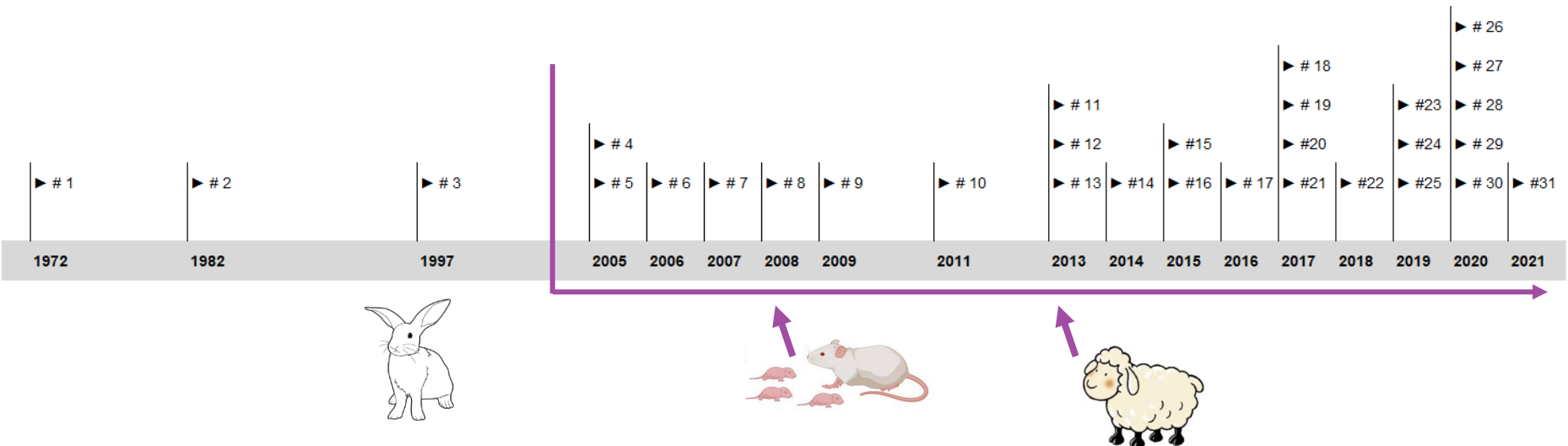


Aluminium salts have been used as vaccine adjuvants since 1928 and have an extensive safety record of hundreds of millions of doses of vaccines administered without any proven serious adverse effect.

ABA : 2000s



■ Début des études animales



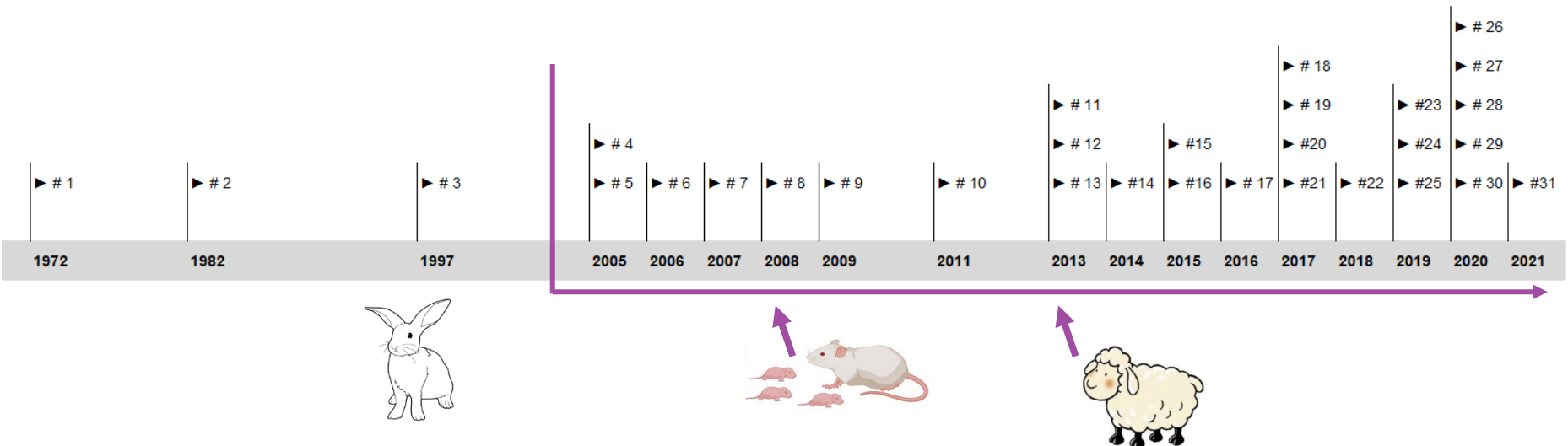
■ 3 anciens dogmes contredits, mais persistants

- Solubilisat° da milieu extracel. ? -> adjuvant observé en intracellulaire
- Elimination rapide ? -> adjuvant persiste & migre
- La dose fait le son ? -> dose-réponse non-linéaire

ABA : 2000s



■ Début des études animales



■ Persistance, translocation, effets neuro => toujours démontrés

ABA : 2010s



■ Essai clinique



Safety and immunogenicity of 2009 pandemic influenza A H1N1 vaccines in China: a multicentre, double-blind, randomised, placebo-controlled trial

Xiao-Feng Liang, Hua-Qing Wang, Jun-Zhi Wang, Han-Hua Fang, Jiang Wu, Feng-Cai Zhu, Rong-Cheng Li, Sheng-Li Xia, Yu-Liang Zhao, Fang-Jun Li, Shao-Hong Yan, Wei-Dong Yin, Kang An, Duo-Jia Feng, Xuan-Lin Cui, Feng-Chun Qi, Chang-Jun Ju, Yu-Hui Zhang, Zhi-Jun Guo, Ping-Yu Chen, Ze Chen, Kun-Ming Yan, Yu Wang

Summary

Lancet 2010; 375: 56-66

Published Online
December 16, 2009
DOI:10.1016/S0140-
6736(09)62003-1

Background The current influenza pandemic calls for a safe and effective vaccine. We assessed the safety and immunogenicity of eight formulations of 2009 pandemic influenza A H1N1 vaccine produced by ten Chinese manufacturers.

... ..

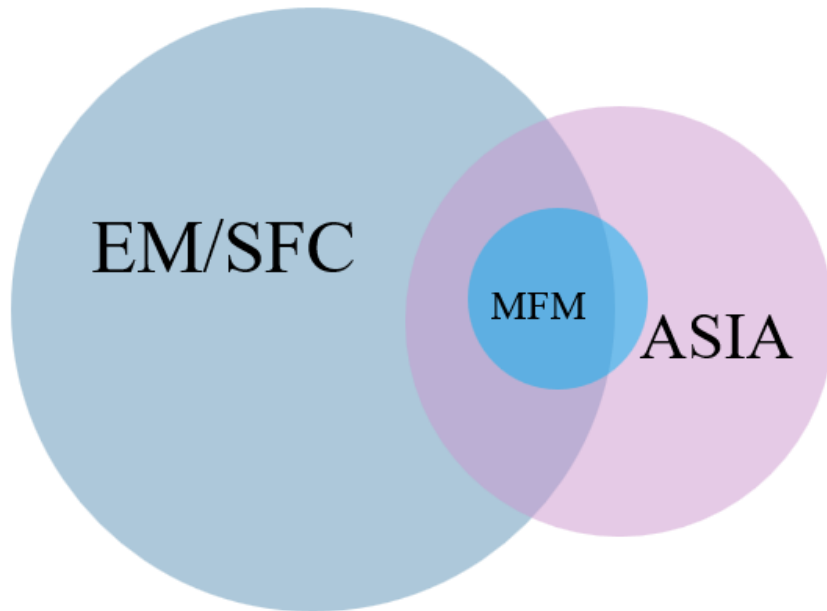


	Non-adjuvant split-virion formulation			Adjuvant split-virion formulation			Adjuvant whole-virion formulation		All vaccine formulations	Placebo
	7.5 µg	15 µg	30 µg	7.5 µg	15 µg	30 µg	5 µg	10 µg		
All adverse events	96/922 (10.3%; 8.3-12.3)	949/4540 (20.9%; 19.7-22.1)	968/3641 (26.6%; 25.2-28.0)	207/743 (27.9%; 24.6-31.1)	200/741 (27.0%; 23.8-30.2)	135/330 (40.9%; 35.6-46.2)	17/101 (16.8%; 9.4-24.3)	23/202 (11.4%; 7.0-15.8)	2594/11 220 (23.1%; 22.3-23.9)	233/1471 (15.8%; 14.0-17.1)

ABA : 2010s



- Syndrome Auto-Immun Inflammatoire induit par les Adjuvants
- ASIA



Review

‘ASIA’ – Autoimmune/inflammatory syndrome induced by adjuvants

Yehuda Shoenfeld^{a,b,*}, Nancy Agmon-Levin^a

^a The Zabludowicz Center for Autoimmune Diseases, Department of Medicine B Sheba Medical Center, Tel-Hashomer, Israel

^b Incumbent of the Laura Schwarz-kipp Chair for Research of Autoimmune Diseases, Sackler Faculty of Medicine, Tel-Aviv University, Israel



Review

Myalgia and chronic fatigue syndrome following immunization: macrophagic myofasciitis and animal studies support linkage to aluminum adjuvant persistency and diffusion in the immune system

Romain K. Gherardi^{a,b,*}, Guillemette Crépeaux^{a,c}, François-Jérôme Authier^{a,b}

^a Inserm U955 E10 (Biology of the neuromuscular system), Paris Est Créteil University, 94010 Créteil, France

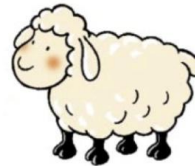
^b Neuromuscular Pathology Expert Centre, Henri Mondor University hospital, Assistance Publique-Hôpitaux de Paris, 94010 Créteil, France

^c Ecole Nationale Vétérinaire d'Alfort, Maisons-Alfort, France

ABA : 2010s



- Syndrome Auto-Immun Inflammatoire induit par les Adjuvants
- ASIA
- Modèle mouton - 2011



Immunol Res (2013) 56:317–324
DOI 10.1007/s12026-013-8404-0

ETIO PATHOGENESIS OF AUTOIMMUNITY

Autoimmune/autoinflammatory syndrome induced by adjuvants (ASIA syndrome) in commercial sheep

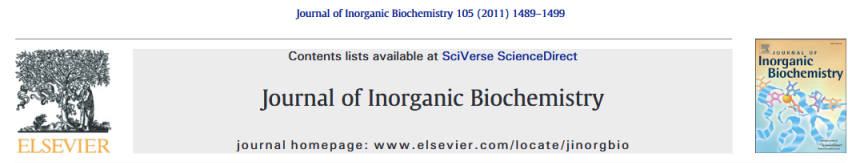
Lluís Luján · Marta Pérez · Eider Salazar · Neila Álvarez ·
Marina Gimeno · Pedro Pinczowski · Silvia Irusta · Jesús Santamaría ·
Nerea Insausti · Yerzol Cortés · Luis Figueras · Isabel Cuartielles ·
Miguel Vila · Enrique Fantova · José Luis Gracia Chapullé

Published online: 12 April 2013
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ABA : 2010s



- Syndrome Auto-Immun Inflammatoire induit par les Adjuvants
- ASIA
- Modèle mouton - 2011
- 1^{ers} travaux ABA et TSA



Do aluminum vaccine adjuvants contribute to the rising prevalence of autism?

Lucija Tomljenovic^{a,*}, Christopher A. Shaw^{a,b}

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Autoimmunity

ABSTRACT

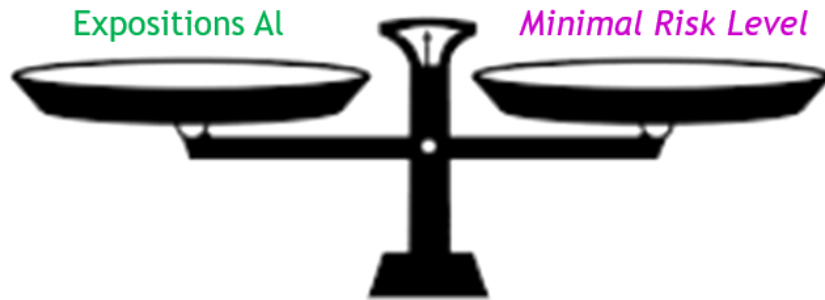
Autism spectrum disorders (ASD) are serious multisystem developmental disorders and an urgent global public health concern. Dysfunctional immunity and impaired brain function are core deficits in ASD. Aluminum (Al), the most commonly used vaccine adjuvant, is a demonstrated neurotoxin and a strong immune stimulator. Hence, adjuvant Al has the potential to induce neuroimmune disorders. When assessing adjuvant toxicity in children, two key points ought to be considered: (i) children should not be viewed as "small adults" as their unique physiology makes them much more vulnerable to toxic insults; and (ii) if exposure to Al from only few vaccines can lead to cognitive impairment and autoimmunity in adults, is it unreasonable to question whether the current pediatric schedules, often containing 18 Al adjuvanted vaccines, are safe for children? By applying Hill's criteria for establishing causality between exposure and outcome we investigated whether exposure to Al from vaccines could be contributing to the rise in ASD prevalence in the Western world. Our results show that: (i) children from countries with the highest ASD prevalence appear to have the highest exposure to Al from vaccines; (ii) the increase in exposure to Al adjuvants significantly correlates with the increase in ASD prevalence in the United States observed over the last two decades (Pearson $r = 0.92$, $p < 0.0001$); and (iii) a significant correlation exists between the amounts of Al administered to preschool children and the current prevalence of ASD in seven Western countries, particularly at 3–4 months of age (Pearson $r = 0.89$ – 0.94 , $p = 0.0018$ – 0.0248). The application of the Hill's criteria to these data indicates that the correlation between Al in vaccines and ASD may be causal. Because children represent a fraction of the population most at risk for complications following exposure to Al, a more rigorous evaluation of Al adjuvant safety seems warranted.

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ABA : 2010s



■ Etude de référence FDA - 2011



-> *MRL*

NOAEL 2001 - lactate d'Al alimentaire

7 x sup. EFSA

3,5 x sup. ANSES



Vaccine 29 (2011) 9538–9543



Contents lists available at SciVerse ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine



Updated aluminum pharmacokinetics following infant exposures through diet and vaccination

Robert J. Mitkus^{a,*}, David B. King^a, Maureen A. Hess^b, Richard A. Forshee^a, Mark O. Walderhaug^a

disease or in those exposed to high levels of aluminum via occupational inhalation. However, for infants, our study demonstrates that there is little risk for aluminum toxicity following immunizations administered according to ACIP recommendations even

Journal of Inorganic Biochemistry 181 (2018) 87–95



Contents lists available at ScienceDirect

Journal of Inorganic Biochemistry

journal homepage: www.elsevier.com/locate/jinorgbio



Review article

Critical analysis of reference studies on the toxicokinetics of aluminum-based adjuvants^{*}

Jean-Daniel Masson^{a,1}, Guillemette Crépeaux^{a,b,1}, François-Jérôme Authier^a, Christopher Exley^c, Romain K. Gherardi^{a,*}

^a INSERM U955 E10, Biologie du système neuromusculaire, Faculté de Médecine, Université Paris Est Créteil, Créteil 94010, France

^b Génétique médicale comparée des affections neuromusculaires, Ecole Nationale Vétérinaire d'Alfort, 7 Avenue du général de Gaulle, 9400 Maisons-Alfort, France

^c The Birchall Centre, Leonard-Jones Laboratories, Keele University, Staffordshire ST5 5BG, UK



ABA : 2010s



■ Etude de *référence* FDA - 2011

-> plus citée par la FDA

https://www.fda.gov/vaccines-blood-biologics/safety-availability- 70 % Rechercher

CDER-Regulated Products: shortages and discontinuations

andemics & Emerging iseases

ssue Safety & Availability

accine Safety & Availability

IV Home Test Kits

ecalls (Biologics)

eport a Problem to the enter for Biologics valuation & Research

and clinicians carefully evaluate all of the information in a marketing application and make a determination whether to license (approve) a vaccine before it can be used in the United States. Prior to licensure, as part of FDA's evaluation, FDA takes all of the ingredients of a vaccine into account, including the active ingredients as well as other substances. After FDA approves a vaccine, FDA continuously monitors its safety.

Why is aluminum in some vaccines?

Aluminum salts are incorporated into some vaccine formulations as an adjuvant. An adjuvant is a substance added to some vaccines to enhance the immune response of vaccinated individuals. The aluminum salts in some U.S. licensed vaccines are aluminum hydroxide, aluminum phosphate, alum (potassium aluminum sulfate), or mixed aluminum salts. For example: aluminum salts are used in DTaP vaccines, the pneumococcal conjugate vaccine, and hepatitis B vaccines.

Aluminum adjuvant containing vaccines have a demonstrated safety profile of over six decades of use and have only uncommonly been associated with severe local reactions. A [study conducted by FDA](#) determined that the risk to infants posed by the total aluminum exposure received from the entire recommended series of childhood vaccines over the first year of life is extremely low. This study provided additional scientific information confirming that the benefits of aluminum-containing vaccines administered during the first year of life outweigh any theoretical concerns about the potential effect of aluminum on infants. Of note, the most common source of exposure to aluminum is from eating food or drinking water.

https://www.fda.gov/vaccines-blood-biologics/safety-availability-biologics/common-ingredients-fda-approved-vi

Safety & Availability (Biologics)

Biologic Product Security

Blood Safety & Availability

CDER-Regulated Products: Shortages and Discontinuations

Pandemics & Emerging Diseases

Tissue Safety & Availability

Vaccine Safety & Availability

HIV Home Test Kits

Recalls (Biologics)

Report a Problem to the Center for Biologics Evaluation & Research

Vaccines to prevent infectious diseases are given to millions of babies, children, adolescents and adults and it is critical that they are demonstrated to be safe and effective. FDA requires that vaccines undergo a rigorous and extensive development program in the laboratory, as well as in animal studies and human clinical trials, to determine their safety and effectiveness. Highly trained FDA scientists and physicians thoroughly evaluate the information in a marketing application and make a determination whether to license (approve) a vaccine before it can be used in the United States. Prior to approval, as part of FDA's evaluation, FDA takes all of the ingredients of a vaccine into account. After FDA approves a vaccine, FDA continuously monitors its safety.

Why is aluminum in some vaccines?

Aluminum salts are incorporated into some vaccine formulations as an adjuvant. An adjuvant is a substance added to some vaccines to enhance the immune response of vaccinated individuals. The aluminum salts in some FDA-approved vaccines are aluminum hydroxide, aluminum phosphate, alum (potassium aluminum sulfate), or mixed aluminum salts. For example: aluminum salts are used in DTaP vaccines, the pneumococcal conjugate vaccine, the HPV vaccine, and hepatitis B vaccines.

Aluminum adjuvant containing vaccines have a demonstrated safety profile of over many decades of use and have only uncommonly been associated with severe local reactions. Of note, the most common source of exposure to aluminum is from eating food or drinking water.

Are other adjuvants used in FDA-approved vaccines?

Content current as of: 01/12/2024

Regulated Product(s) Biologics Vaccines

ABA : 2010s



- Etude de *référence* FDA - 2011
- Institute of Medicine (IOM) - 2012

«The vast majority of causality conclusions in the report are that the evidence was inadequate to accept or reject a causal relationship.»



Adverse Effects of Vaccines

Evidence and Causality

Editors: Kathleen Stratton, Andrew Ford, Erin Rusch, and Ellen Wright Clayton.

Authors: Committee to Review Adverse Effects of Vaccines; Institute of Medicine.

Washington (DC): [National Academies Press \(US\)](#); 2011 Aug 25.

ISBN-13: 978-0-309-21435-3 ISBN-10: 0-309-21435-1

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ABA : 2010s



- Etude de *référence* FDA - 2011
- Institute of Medicine (IOM) - 2012
- Académie de médecine - 2012
- Haut Conseil de Santé Publique - 2013



ACADEMIE NATIONALE DE MÉDECINE

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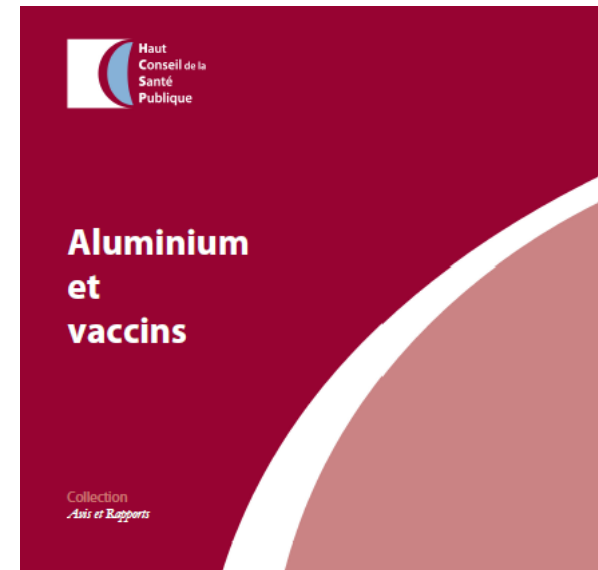
TÉL : 01 42 34 57 70 - FAX : 01 40 46 87 55

Commission VII (maladies infectieuses et médecine tropicale)

Groupe de travail* sur

Les adjuvants vaccinaux: quelle actualité en 2012 ?

Pierre Bégué, Marc Girard, Hervé Bazin, Jean-François Bach.



ABA : 2010s



- Etude de *référence* FDA - 2011
- Institute of Medicine (IOM) - 2012
- Académie de médecine - 2012
- Haut Conseil de Santé Publique - 2013



ACADEMIE NATIONALE DE MEDECINE

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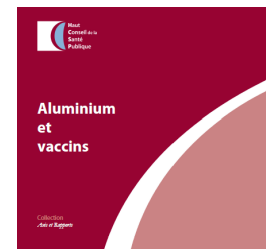
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- Données Alu alimentaire
- Dose de sécurité Al ABA
- Pas de preuves de toxicité ABA
- Remplacement long
- Risques maladies infectieuses si moratoire ABA



Ainsi, le Haut Conseil de la santé publique

- Estime que les données scientifiques disponibles à ce jour ne permettent pas de remettre en cause la sécurité des vaccins contenant de l'aluminium, au regard de leur balance bénéfices/risques.
- Recommande la poursuite des vaccinations conformément au calendrier vaccinal en vigueur.
- Met en garde contre les conséquences, en matière de réapparition de maladies infectieuses, que pourrait avoir une baisse de la couverture vaccinale résultant d'une remise en cause des vaccins contenant de l'aluminium en l'absence de justification scientifique.
- Encourage la poursuite des recherches visant à évaluer la sécurité des adjuvants disponibles et en développement.

ABA : 2010s



- Etude de *référence* FDA - 2011
- Institute of Medicine (IOM) - 2012
- Académie de médecine - 2012
- Haut Conseil de Santé Publique - 2013



ACADEMIE NATIONALE DE MEDECINE

16, RUE BONAPARTE - 75373 PARIS CEDEX 06
TÉL : 01 42 34 57 70 - FAX : 01 40 46 87 55

Commission VII (maladies infectieuses et médecine tropicale)

Groupe de travail* sur

Les adjuvants vaccinaux: quelle actualité en 2012 ?

Pierre Bégué, Marc Girard, Hervé Bazin, Jean-François Bach.



Association

*E ntraide aux
M alades de
M yofasciite à
M acrophages*

<http://www.myofasciite.fr>

Agrément National du Ministère de la Santé
Arrêté du 6 mars 2007 JO du 22 mars 2007

Les adjuvants vaccinaux : quelle actualité

Observations de l'association E3M sur le rapport de l'Académie de Médecine

Juillet 2012

Conflits d'intérêt ? Contre-vérités ?



Association

*E ntraide aux
M alades de
M yofasciite à
M acrophages*

Aluminium et Vaccins

Rapport du HCSP du 11 juillet 2013

Observations E3M - Août 2013

L'aluminium injecté lors des vaccinations migre vers le cerveau.

Quelles conséquences ?

Le HCSP choisit de rassurer dans un rapport aux nombreuses contre-vérités.

ABA : 2010s



■ Engagement politique - 2012

Mars - Groupe d'Etudes Vaccination de l'Assemblée Nationale

« Recommandation n° 3 : décider, en application du principe de précaution, d'un **moratoire** sur les adjuvants aluminiques. »

Février - François Hollande (candidat)

« L'exemple de la myofasciite à macrophages démontre, s'il le fallait, la nécessité de **faire progresser nos connaissances**. Une plus grande **vigilance** et une **réévaluation** plus régulière du rapport bénéfices/risques des différents produits m'apparaît essentielle. Cette règle s'applique aux médicaments mais aussi aux vaccins, aux principes actifs comme aux adjuvants, qu'il s'agisse d'hydroxyde d'aluminium ou d'une autre molécule. Je veillerai à ce que **tous les travaux scientifiques soient pris en compte** pour déterminer la dangerosité des produits de santé et à ce que **le doute profite au patient**. »



Avril - M. Touraine (future ministre de la Santé) à E3M :

« Dans le contexte de perte de confiance de nos concitoyens envers les institutions sanitaires, en particulier depuis la gestion catastrophique de l'épidémie de grippe A et la dénonciation de graves conflits d'intérêts ayant provoqué de trop nombreux scandales sanitaires, il faut donner les **meilleures assurances de sécurité** pour effectuer les vaccinations obligatoires dans l'intérêt de la santé de notre population. (...) »

Avril - Europe Ecologie les Verts à E3M

« L'injection au cœur même de l'organisme d'un produit neurotoxique ne peut laisser indifférent, et les alertes lancées par les chercheurs ne peuvent rester sans réponse de la part des pouvoirs publics. La **recherche** doit bénéficier immédiatement des crédits nécessaires à la compréhension du processus induit par l'injection des sels d'aluminium. Nous proposons la mise en place d'un Institut National de Recherche en Santé Environnementale, et cette question doit faire partie de ses **priorités**. Dans l'attente des résultats de ces recherches, les citoyens doivent pouvoir utiliser un **vaccin sans aluminium** afin de répondre en sécurité à l'obligation vaccinale et ceci est possible par la remise à disposition, notamment pour les enfants entrant à l'école, du DTPolio®, sans aluminium, qui n'est plus disponible, ceci sans raison sanitaire. Il est temps de prendre la mesure de ce qui s'annonce comme un **réel problème de santé publique**. »

ABA : 2010s



- Engagement citoyen - 2012 2013
- Grèves de la faim
- DGS : financement ANSM vers équipe Inserm Pr Gherardi



ABA : 2010s



- Engagement citoyen - 2012 2013
- Grèves de la faim
- DGS : financement ANSM vers équipe Inserm Pr Gherardi
- Déc 2012 - reconnaissance du lien MFM et ABA - Conseil d'Etat



« sur la base d'indices graves, précis et concordants »

ABA : 2010s



- Engagement citoyen - 2012 2013
- Grèves de la faim
- DGS : financement ANSM vers équipe Inserm Pr Gherardi
- Déc 2012 - reconnaissance du lien MFM et ABA - Conseil d'Etat
- Et la recherche ?

SPECIAL FOCUS | Vaccine Adjuvants

Editorial

Vaccine adjuvant safety: the elephant in the room

Expert Rev. Vaccines 12(7), 715–717 (2013)



Nikolai Petrovsky

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nikolai.petrovsky@flinders.
edu.au

“The ultimate research pursuit in the adjuvant field should not be to identify still more inflammatory adjuvants, but rather to find novel ways to separate adjuvant potency and reactogenicity.”

There is near universal agreement that new vaccine adjuvants are needed for the development of more effective vaccines that actually work to enhance the adaptive immune response [3]. Described by the late Charles Janeway as ‘immunolo-

from a lack of adjuvants with robust safety and tolerability [2]. In the development of vaccine adjuvants, the issue of adjuvant safety is the elephant in the room; it is the single most important issue in adjuvant development but is rarely, if ever, included as a discussion topic at vaccine meetings. Why is the issue of adjuvant safety so rarely discussed? Most likely, it is the fear

ABA : 2010s



■ Mai 2014

- Colloque E3M « Aluminium et Vaccins - L'expertise internationale nous impose d'agir »



Pr Gherardi, Authier, Exley, Shoenfeld, Luján
Directeur vaccins ANSM

- Office Parlementaire d'Evaluation des Choix Scientifiques et Technologiques - OPECST : « Les adjuvants vaccinaux : une question controversée »

Pr Gherardi, Authier, Exley, Shoenfeld, Luján, Belec
Directeur vaccins ANSM, Sanofi, E3M



ABA : 2010s



■ Mai 2014

- Colloque E3M « Aluminium et Vaccins - L'expertise internationale nous impose d'agir »



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Pr Gherardi, Authier, Exley, Shoenfeld, Luján, Belec
Directeur vaccins ANSM, Sanofi, E3M

■ Mai 2015

- « La vaccination, cela ne se discute pas. »

Marisol Touraine, ministre de la Santé,
Réponse pétition du Pr Joyeux sur vaccination DTP.



ABA : 2010s



■ CDC 2015



> [Vaccine](#). 2015 Nov 27;33(48):6736-44. doi: 10.1016/j.vaccine.2015.10.076. Epub 2015 Oct 27.



Cumulative and episodic vaccine aluminum exposure in a population-based cohort of young children

Jason M Glanz ¹, Sophia R Newcomer ², Matthew F Daley ³, David L McClure ⁴, Roger P Baxter ⁵, Michael L Jackson ⁶, Allison L Naleway ⁷, Marlene M Lugg ⁸, Frank DeStefano ⁹

Background: In addition to antigens, vaccines contain small amounts of preservatives, adjuvants, and residual substances from the manufacturing process. Some parents have concerns about the safety of these ingredients, yet no large epidemiological studies have specifically examined associations between health outcomes and vaccine ingredients, other than thimerosal. This study examined the extent to which the Vaccine Safety Datalink (VSD) could be used to study vaccine ingredient safety in children.

Results: Among 408,608 children, mean cumulative vaccine aluminum exposure increased from 1.11 to 4.00 mg between ages 92–730 days. Up-to-date children were exposed to 11–26% more aluminum from vaccines than undervaccinated children. Power analyses demonstrated that safety studies of aluminum could detect relative risks ranging from 1.1 to 5.8 for a range of adverse event incidence.

Conclusions: The safety of vaccine aluminum exposure can be feasibly studied in the VSD. However, possible biological mechanisms and confounding variables would need to be considered before conducting any studies.

ABA : 2010s



- 2016
 - Concertation citoyenne
- Président : Alain Fischer



Demandes unanimes des jurys :

- vaccins sans aluminium
- autres adjuvants (CaP)
- financement transparent et public de la recherche
- supprimer tout conflit d'intérêts chez experts qui conseillent le gouvernement
- commission d'enquête parlementaire sur question des adjuvants
- à 75 % : demandent arrêt obligat° vaccinale



=> Demandes rejetées



ABA : 2010s

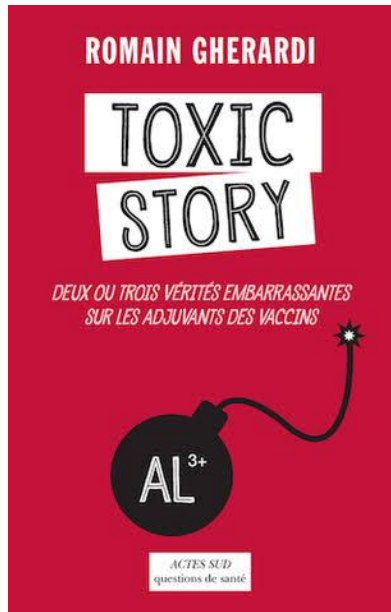
■ 2016

- L'aluminium, les vaccins et les 2 lapins

MA Poyet, Entre2Prises & E3M

<https://www.vaccinssansaluminium.org/>

- Toxic Story



Charlie Hebdo 2016



Le monde oct 2016

ABA : 2010s



■ Conseil scientifique ANSM - mars 2017



- « Volet expérimental : (...) L'effet sélectif des faibles doses (...) constitue un résultat tout à fait original. »
- « Les résultats du programme génétique et expérimental BNAA-vacc apportent des éléments contributifs et nouveaux, dont l'ANSM doit tenir compte désormais. (...) ils accroissent la plausibilité biologique d'un lien possible entre l'administration d'adjuvant aluminique et la survenue de complications post-vaccinales chez certains individus ».



Société

Aluminium dans les vaccins : le rapport qui dérange

Dans un rapport jamais rendu public depuis mars, des scientifiques pointent les risques induits par la présence d'aluminium dans les vaccins.

Par Florence Médo
Le 23 septembre 2017 à 17h05



Le passage à once vaccine obligatoire sera effectif en 2018. L'01 Oliver Coman

- « l'étude expérimentale chez la souris, (...) a été menée avec le plus grand sérieux et (...) permet (...) de progresser considérablement dans la compréhension du mode d'action des adjuvants aluminiques et des mécanismes de leurs éventuels effets secondaires. »
- « le résultat clé du projet réside dans (...) l'étude chez la souris d'éventuelles perturbations comportementales induites par l'injection d'adjuvants aluminiques. A cet égard, la mise en évidence du rôle de l'agrégation des particules et donc de la concentration massique de l'aluminium est un résultat de la plus haute importance. »
- « Ce projet a l'immense mérite de permettre de poser un cadre conceptuel aux effets secondaires retardés et à distance des adjuvants aluminiques. »

La présidente du Conseil Scientifique énonce que « les études supportées par l'Agence ont permis de faire avancer la recherche sur le sujet des adjuvants aluminiques. »

ABA : 2010s



- Conseil scientifique ANSM - mars 2017



- Oct 2017 : élargissement obligation vaccinale voté (3 -> 11, dont 8 avec ABA)



ABA : 2010s



- Conseil scientifique ANSM - mars 2017 
 - Oct 2017 : élargissement obligation vaccinale voté
 - Colloque E3M Palais du Luxembourg - nov 2017
« L'aluminium dans notre vie quotidienne - État des connaissances scientifiques Internationales. »
- > Présentation de Mold et al., 2018

ABA : 2010s



- Conseil scientifique ANSM - mars 2017
- Oct 2017 : élargissement obligation vaccinale voté
- Colloque E3M Palais du Luxembourg - nov 2017

-> Présentation de Mold et al., 2018



Aluminium in brain tissue in autism
Matthew Mold^a, Dorcas Umar^b, Andrew King^c, Christopher Exley^{a,*}



Etude *post-mortem* TSA :

- présence d'Al cellules microgliales
- concentrations élevées
- source(s) d'Al ?

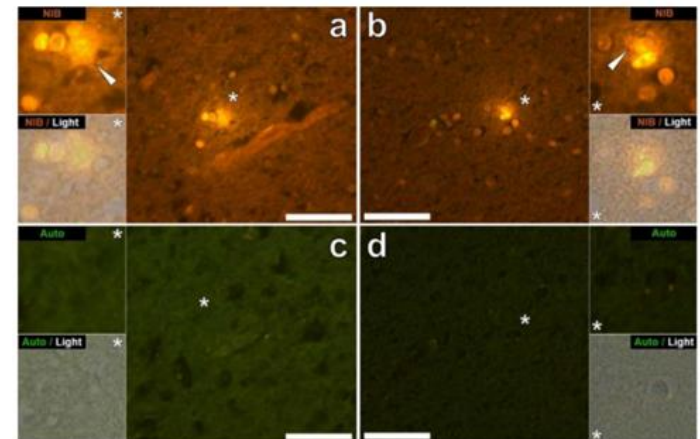


Figure 3. Intracellular aluminum in cells morphologically compatible with microglia within the parietal and temporal lobes of 29-year-old (A8) and 15-year-old (A4) male donors diagnosed with autism. Lumogallion-reactive extracellular aluminum (white arrows) producing an orange fluorescence emission was noted around likely microglial cells in the parietal (a) and temporal lobes (b) of donors A8 and A4, respectively. Non-stained adjacent (5 μ m) serial sections produced a weak green autofluorescence emission of the identical area imaged in white (c) and gray matter (d) of the respective lobes. Upper and lower panels depict magnified inserts, marked by asterisks, of the fluorescence channel and brightfield overlay. Magnification $\times 400$, scale bars 50 μ m. Copyright Elsevier (2018) [224].

ABA : 2010s



■ Absence d'études officielles - FOIA NIH - 2019



DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

National Institutes of Health
Freedom of Information Office
Building 31, Room 5B-35
31 Center Drive, MSC 2107
Bethesda, Maryland 20892-2107
phone: (301) 496-5633
fax: (301) 402-4541

Via Email: aaron@sirillp.com

July 19, 2019

Aaron Siri
Siri & Glimstad LLP
200 Park Avenue, 17th Floor
New York, NY 10166

Re: FOIA Case Number: 50822, and HHS Appeal No.: 19-0083-AA

Dear Mr. Siri:

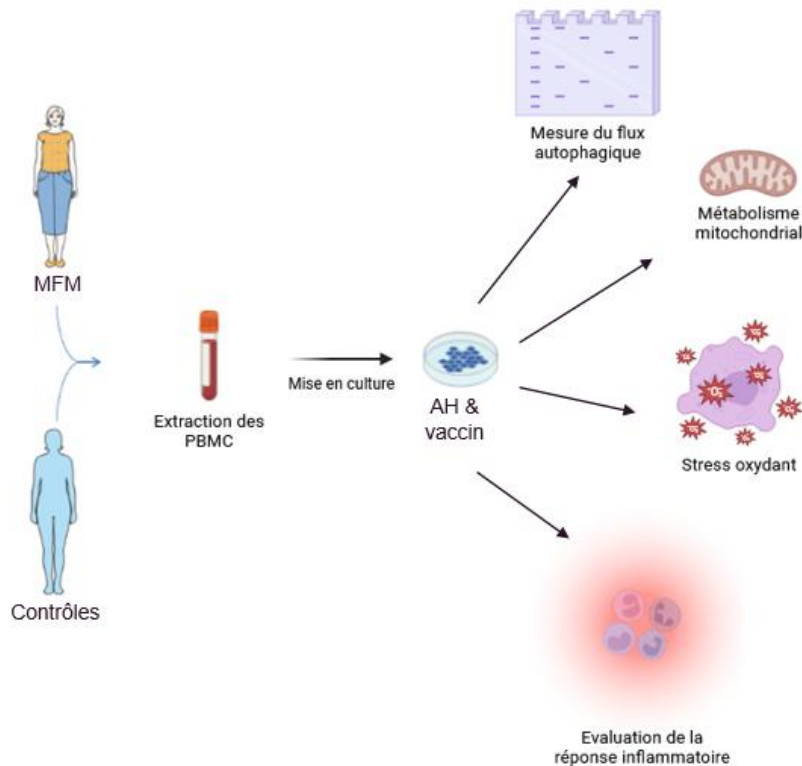
This is our final response to your Freedom of Information Act (FOIA) request addressed to the FOIA Office of the National Institutes of Health (NIH), dated February 19, 2019 and received on February 20, 2019. You requested copies of any human or animal studies involving the subcutaneous or intramuscular injection of aluminum adjuvant relied upon by the NIH to establish the safety of injecting infants and children with aluminum hydroxide, aluminum phosphate or amorphous aluminum hydroxyphosphate sulfate.

The NIH Office of Intramural Research (OIR), National Institute of Allergies and Infectious Diseases (NIAID), the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) searched their files and no records responsive to your request were located. The NIH OIR suggests using the following NIH webpages to possibly find publicly available information relevant to your request: <https://intramural.nih.gov> (annual reports), <https://clinicaltrials.gov> (human protocols), and <https://www.ncbi.nlm.nih.gov/pubmed> (published data).



ABA : 2010s

- Poursuite des études
- Financement ANR (EM/SFC et ABA)



www.nature.com/scientificreports

scientific reports

OPEN

Advances on the early cellular events occurring upon exposure of human macrophages to aluminum oxyhydroxide adjuvant

J.-D. Masson^{1,2,3}, G. Badran¹, M. A. Domdom¹, R. K. Gherardi^{1,3}, B. Mograbi¹, F. J. Authier^{1,3} & G. Crépeaux^{1,4}

Aluminum compounds are the most widely used adjuvants in veterinary and human vaccines. Despite almost a century of use and substantial advances made in recent decades about their fate and biological effects, the exact mechanism of their action has been continuously debated, from the initial "depot-theory" to the direct immune system stimulation, and remains elusive. Here we investigated the early *in vitro* response of primary human PBMCs obtained from healthy individuals to aluminum oxyhydroxide (the most commonly used adjuvant) and a whole vaccine, in terms of internalization, conventional and non-conventional autophagy pathways, inflammation, ROS production, and mitochondrial metabolism. During the first four hours of contact, aluminum oxyhydroxide particles, with or without adsorbed vaccine antigen, (1) were quickly recognized and internalized by immune cells; (2) increased and balanced two cellular clearance mechanisms, i.e. canonical autophagy and LC3-associated phagocytosis; (3) induced an inflammatory response with TNF- α production as an early event; (4) and altered mitochondrial metabolism as assessed by both decreased maximal oxygen consumption and reduced mitochondrial reserve, thus potentially limiting further adaptation to other energetic requests. Further studies should consider a multisystemic approach of the cellular adjuvant mechanism involving interconnections between clearance mechanism, inflammatory response and mitochondrial respiration.



Widespread Myalgia and Chronic Fatigue: Phagocytes from Macrophagic Myofasciitis Patients Exposed to Aluminum Oxyhydroxide-Adjuvanted Vaccine Exhibit Specific Inflammatory, Autophagic, and Mitochondrial Responses

Jean-Daniel Masson^{1,2,3}, Ghidaa Badran¹, Romain K. Gherardi^{1,2}, François-Jérôme Authier^{1,2,3} and Guillemette Crépeaux^{1,3}

¹ Institut National de la Santé Et de la Recherche Médicale, Institut Mondor de Recherche Biomedicale, Université Paris Est Créteil, F-93012 Créteil, France
² Hôpitaux Universitaires Henri Mondor, Service d'Immunologie/Centre Expert de Pathologie Neuro-musculaire, Assistance Publique-Hôpitaux de Paris, F-93012 Créteil, France
³ Ecole Nationale Vétérinaire d'Alfort, Institut Mondor de Recherche Biomedicale, F-94200 Maisons-Alfort, France
 * Correspondence: jean-daniel.masson@inserm.fr

Abstract: (1) Background: Macrophagic myofasciitis (MMF) is an inflammatory histopathological lesion demonstrating long-term biopersistence of vaccine-derived aluminum adjuvants within muscular phagocytic cells. Affected patients suffer from widespread myalgia and severe fatigue consistent with myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), a poorly understood disorder suspected to result from chronic immune stimulation by infectious and inorganic particles. (2) Methods: In this study we determined the immuno-metabolic properties of MMF phagocytic cells compared to controls, at rest and upon exposure to aluminum oxyhydroxide adjuvant, with or without adsorbed antigens, using protein quantification and an oxygen consumption assay. (3) Results: MMF and control cells similarly internalized the adjuvant and vaccine but MMF cells specifically expressed Rubicon and Nox2, two molecules unique to the LC3-associated phagocytosis (LAP) machinery, a non-canonical autophagic pathway able to downregulate canonical autophagy. MMF cells exhibited an altered inflammatory secretome, producing more pain-inducing CXCL chemokines and less TNF- α than controls, consistent with chronic myalgia and exhaustion of the immune system previously documented in ME/CFS. MMF cells exhibited mitochondrial metabolism dysfunction, with exacerbated reaction to adjuvanted vaccine, contrasting with limited spare respiratory capacity and marked proton leak weakening energy production. (4) Conclusions: MMF phagocytes seemingly use LAP to handle aluminum oxyhydroxide vaccine particles, secrete pain-inducing molecules, and exhibit exacerbated metabolic reaction to the vaccine with limited capacity to respond to ongoing energetic requests.

Keywords: myalgic encephalomyelitis/chronic fatigue syndrome; macrophagic myofasciitis; aluminum-based adjuvant; autophagy/LC3-associated phagocytosis; inflammation; mitochondrial metabolism



■ Académie de pharmacie - 2020



Review > [Med Mal Infect.](#) 2020 Feb;50(1):16-21.

Aluminum and vaccines: Current state of knowledge

J-P Goullé¹, L Grangeot-Keros²

vaccine, vaccines against pneumococcal and meningococcal C infections). On the basis of currently available data at the international level and with 90 years of experience of vaccine use and hundreds of millions of injected doses, one cannot question the safety of aluminum salts contained in vaccines. A team of French

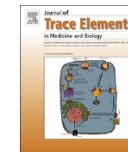
Journal of Trace Elements in Medicine and Biology 62 (2020) 126632



Contents lists available at [ScienceDirect](#)

Journal of Trace Elements in Medicine and Biology

journal homepage: www.elsevier.com/locate/jtemb



The role of aluminum adjuvants in vaccines raises issues that deserve independent, rigorous and honest science*

Guillemette Crépeaux^{a,b,*}, François-Jérôme Authier^a, Christopher Exley^c, Lluís Luján^{d,e}, Romain K. Gherardi^a

^a Univ Paris Est Creteil, INSERM, IMRB, F-94010 Creteil, France

^b EnvA, IMRB, F-94700 Maisons-Alfort, France

^c The Birchall Centre, Lennard-Jones Laboratories, Keele University, Staffordshire, ST5 5BG, United Kingdom

^d Department of Animal Pathology, University of Zaragoza, Spain

^e Instituto Universitario de Investigación Mixto Agroalimentario de Aragón (IA2), University of Zaragoza, Spain



ABA : 2020s



- Académie de pharmacie - 2020
- Rapport Pays-Bas - 2020



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Human health risk assessment
of aluminium

RIVM report 2020-0001
F. Affourtit | M.I. Bakker | M.E.J. Pronk

« Only a small proportion of the injected aluminium is thought to be present in a rapidly biologically available form. The majority of the injected aluminium will be in the form of particles, which are rapidly captured by immune cells. A significant portion of these particles will remain at the injection site inside the immune cells. The rest of the particles may be transported by immune cells to the lymphoid organs, then to the bloodstream and, at a later stage, the particles may reach distant organs like spleen, brain and liver, where they will remain mainly intracellular. The data on excretion suggest a slow dissolution of the aluminium adjuvants and a low elimination rate, which may indicate a potential for accumulation upon repeated injection. »

(RIVM, p. 41-42)

ABA : 2020s



- Académie de pharmacie - 2020
- Rapport Pays-Bas - 2020
- Quantité Al vaccins : RCP vs réalité - 2021

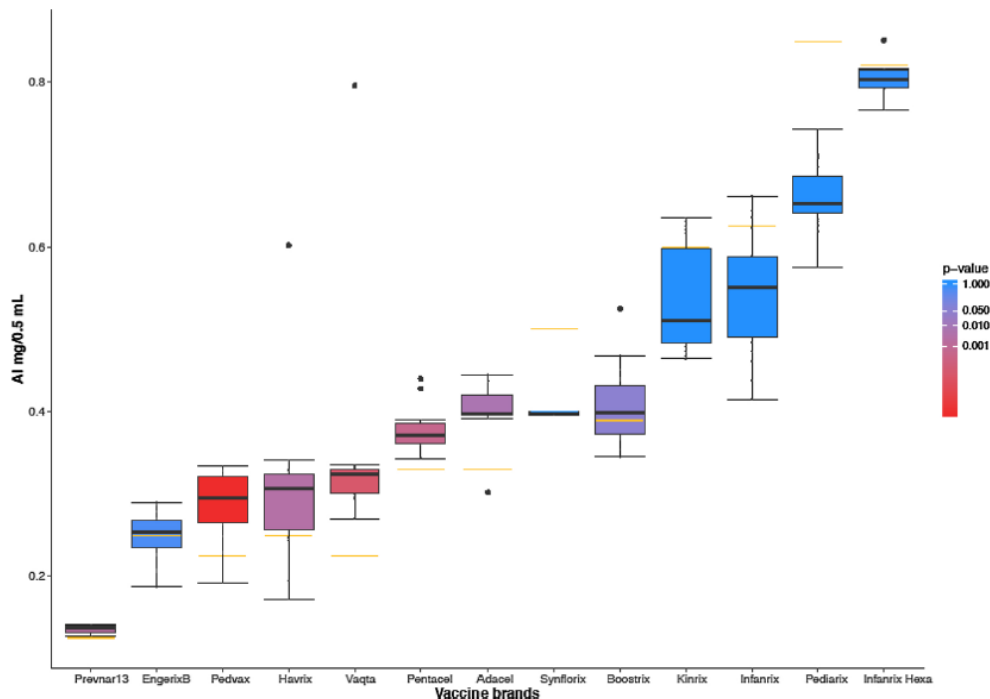


Fig. 1. Boxplots of measured aluminium concentrations (mg/0.5 mL dose) stratified per vaccine brand and compared to the manufacturers' stated amounts (yellow line). The colour gradient represents p-values of one-sided t-tests or Mann-Whitney U tests of the measured Al against the manufacturers' stated amounts. The red boxplots indicate vaccines with significantly more aluminium than that stated by the manufacturer. Boxplots in violet and blue represent data for vaccines where the measured content is either not significantly to or significantly less than the manufacturers' stated amounts. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article).



The measurement and full statistical analysis including Bayesian methods of the aluminium content of infant vaccines

Emma Shardlow^a, Caroline Linhart^a, Sameerah Connor^b, Erin Softely^b, Christopher Exley^{a,*}

^a The Birchall Centre, Lennard-Jones Laboratories, Keele University, Staffordshire, United Kingdom
^b Life Sciences, The Huskyl Building, Keele University, Staffordshire, United Kingdom

Havrix (Hep A, GSK) :
- 250 µg Al/dose (AH)
- de 172 à 602 µg/dose

ABA : 2020s



- Académie de pharmacie - 2020
- Rapport Pays-Bas - 2020
- Quantité Al vaccins : RCP vs réalité - 2021
- Krauss et al., 2022 (méthodologistes Cochrane)

Open access

Original research

BMJ Open Aluminium adjuvants versus placebo or no intervention in vaccine randomised clinical trials: a systematic review with meta-analysis and Trial Sequential Analysis



Sara Russo Krauss ¹, Marija Barbateskovic,¹ Sarah Louise Klingenberg,¹ Snezana Djuricic,¹ Sesilje Bondo Petersen,² Mette Kenfelt,³ De Zhao Kong,^{4,5} Janus C Jakobsen,^{1,6} Christian Gluud^{1,6}

(essais cliniq. phases I ou II)

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ We seem to be the first to assess the benefits and harms of aluminium adjuvants by conducting a systematic review comparing aluminium adjuvants versus placebo or no intervention in combination with all types of vaccines.
- ⇒ We included 102 randomised clinical trials from a comprehensive search with no language limitations or restrictions on outcomes reported in the trials, type of aluminium adjuvant or type of vaccine.
- ⇒ The certainty of evidence is very low and this makes it difficult to draw firm conclusions.

ABA : 2020s



- Académie de pharmacie - 2020
- Rapport Pays-Bas - 2020
- Quantité Al vaccins : RCP vs réalité - 2021
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Implications for practice and research

Considering the lack of good-quality evidence to assess beneficial and harmful effects of adding aluminium to vaccines as presented here, relevance of this adjuvant should be investigated in future studies. Questions on aluminium form, concentration and size remain unanswered due to scarcity or lack of data. Questions on the effects of aluminium adjuvants on vaccine effectiveness also remain unanswered.

(essais cliniq. phases I ou II)

ABA : 2020s



- Académie de pharmacie - 2020
- Rapport Pays-Bas - 2020
- Quantité Al vaccins : RCP vs réalité - 2021
- Krauss et al., 2022 (méthodologistes Cochrane)

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Conclusions Based on evidence at very low certainty, we were unable to identify benefits of aluminium adjuvants, which may be associated with adverse events considered non-serious.

vaccinated against. However, only one event was. None of the trials reported on quality of life. Al

(essais cliniq. phases I ou II)

ABA : 2020s



- Académie de pharmacie - 2020
- Rapport Pays-Bas - 2020
- Quantité Al vaccins : RCP vs réalité - 2021
- Krauss et al., 2022 (méthodologistes Cochrane)
- ABA et asthme : étude CDC - 2023



Published in final edited form as:
Acad Pediatr. 2023 ; 23(1): 37–46. doi:10.1016/j.acap.2022.08.006.

Association Between Aluminum Exposure From Vaccines Before Age 24 Months and Persistent Asthma at Age 24 to 59 Months

Matthew F. Daley, MD,
Institute for Health Research, Kaiser Permanente Colorado, Aurora, Colo

“CONCLUSION: In a large observational study, a positive association was found between vaccine-related aluminum exposure and persistent asthma. While recognizing the small effect sizes identified and the potential for residual confounding, additional investigation of this hypothesis appears warranted.”

ABA : 2020s



- Académie de pharmacie - 2020
 - Rapport Pays-Bas - 2020
 - Quantité Al vaccins : RCP vs réalité - 2021
 - Krauss et al., 2022 (méthodologistes Cochrane)
 - ABA et asthme : étude CDC - 2023
-
- Etude danoise - 2025

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Related Features

VISUAL ABSTRACT

Original Research | 15 July 2025

Aluminum-Adsorbed Vaccines and Chronic Diseases in Childhood: A Nationwide Cohort Study FREE

Authors: Niklas Worm Andersson, MD, PhD , Ingrid Bech Svalgaard, MSc, Stine Skovbo Hoffmann, MD, PhD , and Anders Hviid, MSc, DMSc  [AUTHOR, ARTICLE, & DISCLOSURE INFORMATION](#)



Conclusion:

This nationwide cohort study did not find evidence supporting an increased risk for autoimmune, atopic or allergic, or neurodevelopmental disorders associated with early childhood exposure to aluminum-adsorbed vaccines. For most outcomes, the findings were inconsistent with moderate to large relative increases in risk, although small relative effects, particularly for some rarer disorders, could not be statistically excluded.

ABA : 2020s



- Académie de pharmacie - 2020
- Rapport Pays-Bas - 2020
- Quantité Al vaccins : RCP vs réalité - 2021
- Krauss et al., 2022 (méthodologistes Cochrane)
- ABA et asthme : étude CDC - 2023

- Etude danoise - 2025
- commentaires en ligne
- Crépeaux et al., 2026
- Jablonowski & Hooker 2026



Aluminium adjuvants and childhood health: a call for science

Guillemette Crépeaux^{a,b,*}, Jeremy R. Hammond^c, Jonathan B. Handley^d, Brian Hooker^e, Karl Jablonowski^f, Lluís Luján^g, James Lyons-Weiler^{h,i}, Marika Nosten-Bertrand^j, Christopher A. Shaw^k, Yehuda Shoenfeld^l, Lucija Tomljenovic^c, Christopher Exley^m

REVIEW ARTICLE

Neurodevelopmental Disorder Associated with Aluminum-Adsorbed Vaccines: Reanalysis of Data from a Danish Nationwide Cohort Study

Karl Jablonowski, PhD; Brian Hooker, PhD

ABA : 2020s



- Académie de pharmacie - 2020
- Rapport Pays-Bas - 2020
- Quantité Al vaccins : RCP vs réalité - 2021
- Krauss et al., 2022 (méthodologistes Cochrane)
- ABA et asthme : étude CDC - 2023

- Etude danoise - 2025
- commentaires en ligne
- Crépeaux et al., 2026
- Jablonowski & Hooker 2026

- Etude canadienne - 2026

CONCLUSIONS

Current evidence does not support causal associations between aluminium adjuvanted vaccines and serious or long term health outcomes. The most consistently

RESEARCH

Aluminium adjuvants in vaccines and potential health effects: systematic review

Pamela Doyon-Plourde,¹ Jeffrey Chong,¹ Elissa M Abrams,^{1,2,3} Robert Pless,¹ Kelsey Young,¹ Matthew Tunis,¹ Joseline Zafack¹

BMJ

ABA : 2020s



■ FDA - Al iv - 2025



Small Volume Parenteral Drug Products and Pharmacy Bulk Packages for Parenteral Nutrition: Aluminum Content and Labeling Recommendations Guidance for Industry

DRAFT GUIDANCE

This guidance document is being distributed for comment purposes only.

Comments and suggestions regarding this draft document should be submitted within 60 days of publication in the *Federal Register* of the notice announcing the availability of the draft guidance. Submit electronic comments to <https://www.regulations.gov>. Submit written comments to the Dockets Management Staff (HFA-305), Food and Drug Administration, 5630 Fishers Lane, Rm. 1061, Rockville, MD 20852. All comments should be identified with the docket number listed in the notice of availability that publishes in the *Federal Register*.

For questions regarding this draft document, contact (CDER) Thao Vu at 240-402-2690.

U.S. Department of Health and Human Services
Food and Drug Administration
Center for Drug Evaluation and Research (CDER)

July 2025
Clinical/Medical
Revision 1



Aluminum toxicity from prolonged use of parenteral nutrition (PN) represents a major safety concern, particularly in patients with renal impairment or pediatric patients with immature renal function. This guidance is intended to assist sponsors and applicants of small volume parenteral

■ ANSES - Al alimentaire - 2025



VTR_{Long terme, orale}
= 40 µg/kg pc/jour

Du fait de l'existence de nouvelles études mettant en évidence des effets neurotoxiques de type performance cognitive à des doses plus faibles (Cao *et al.* 2016), le CES VSR ne retient pas les VTR long terme par voie orale existantes. Ainsi, le CES VSR décide de proposer une nouvelle VTR long terme par voie orale.

=> /3,5

<https://www.anses.fr/fr/content/exposition-aluminium-par-alimentation>
<https://www.anses.fr/sites/default/files/AP-VSR2023-MPEX-0137-RA.pdf>

<https://www.fda.gov/media/163799/download>

ABA : 2020s



■ FDA - Al iv - 2025



Small Volume Parenteral Drug Products and Pharmacy Bulk Packages for Parenteral Nutrition: Aluminum Content and Labeling Recommendations Guidance for Industry

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July 2025
Clinical/Medical
Revision 1



Aluminum toxicity from prolonged use of parenteral nutrition (PN) represents a major safety concern, particularly in patients with renal impairment or pediatric patients with immature renal function. This guidance is intended to assist sponsors and applicants of small volume parenteral

■ ANSES - Al alimentaire - 2025



-> ABA ?



Maisons-Alfort, 15 09 2026



Objet : Signalement d'erreurs scientifiques dans un rapport ANSES

À la suite de la publication du rapport de l'Anses relatif à l'aluminium

<https://www.anses.fr/fr/content/exposition-aluminium-par-alimentation>
<https://www.anses.fr/sites/default/files/AP-VSR2023-MPEX-0137-RA.pdf>

<https://www.fda.gov/media/163799/download>

ABA : 2020s



■ FDA - Al iv - 2025

■ ANSES - Al alimentaire - 2025

■ Dose Al vaccins



Regulatory limits of aluminium content of vaccines have not been set based on toxicological studies

Loïc Angrand^a, Romain K. Gherardi^a, Guillemette Crépeaux^{a,b,*}

^a Univ Paris Est Créteil, INSERM, IMRB, Créteil F-94010, France

^b Ecole Nationale Vétérinaire d'Alfort, EvryA, IMRB, Maisons-Alfort F-94700, France

ARTICLE INFO

Keywords:
Aluminium-Based Adjuvant
Vaccine safety
Regulatory standards
Toxicological evaluation

ABSTRACT

Aluminium-Based Adjuvants (ABAs) have been used in vaccines since the 1920s to boost immune responses. Despite their widespread use, their mechanisms of action remain only partially understood, and growing concerns exist about their long-term safety, particularly in vulnerable populations. This study examines the regulatory history of the aluminium content limit in vaccines and identifies major gaps in toxicological and epidemiological evaluation.

Through a detailed review of regulatory records, historical archives, Freedom of Information Act (FOIA) requests and responses, and scientific literature, we found that the current aluminium threshold of 0.05 mg per dose was set in the mid-20th century based on immunological efficacy - not on toxicological data- and remains in place despite changes in vaccination schedules and cumulative exposure. The key documents supporting this limit, which date back to 1947 and 1952, do not evaluate the potential toxicity of ABAs and are, in any case, no longer relevant to the current vaccination schedule.

There is an urgent need for independent pharmacokinetic and toxicological studies, transparent access to proprietary adjuvant compound, and a comeback to safer alternatives such as biocompatible calcium phosphate. Updating these standards is crucial for strengthening public confidence in vaccination policies.

■ 0,850 mg/dose ?

■ Efficacité, pas sécurité

■ Pas de définition de doses de sécurité

ABA : 2020s



- FDA - Al iv - 2025
- ANSES - Al alimentaire - 2025
- Dose Al vaccins

- ACIP - déc 2025



- Présentation brève ABA & MFM
 - > intérêt réel
 - > domaine sous-financé
 - > comment étudier ces questions



Vidéo

<https://www.youtube.com/live/kUgXRUpKal4>
A partir de 5h55

Diapos

<https://www.cdc.gov/acip/downloads/slides-2025-12-04-05/01-Griffin-aluminum-adjuvants-508.pdf>

ABA : 2020s



- FDA - Al iv - 2025

- ANSES - Al alimentaire - 2025

- Dose Al vaccins

- ACIP - déc 2025



- Maison Blanche - été 2026



(c) develop additional alternative adjuvants to aluminum and conduct comparative safety and efficacy studies;

ABA : 2020s



■ Été 2026



Syndrome de fatigue chronique/encéphalomyélite myalgique : de quoi s'agit-il, quelle en est la cause et la fréquence ?

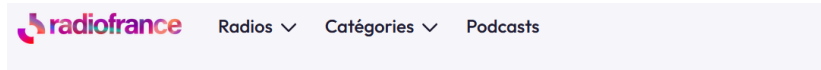
L'encéphalomyélite myalgique, appelée aussi syndrome de fatigue chronique, est une maladie chronique qui provoque **un épuisement intense et durable que le repos ne permet pas de soulager**. Elle s'accompagne de **troubles cognitifs** (troubles de la mémoire, de l'attention, brouillard cérébral...), d'un **sommeil non-réparateur** ainsi que d'un symptôme central : le **malaise post-effort**.

L'encéphalomyélite myalgique ou syndrome de fatigue chronique apparaît souvent brusquement. Néanmoins, la maladie peut s'installer progressivement chez certaines personnes, sans signe annonciateur.

Sa cause exacte reste inconnue. Dans la majorité des cas, la maladie débute après une infection, souvent virale. Elle a été observée après des infections par le virus d'Epstein-Barr, d'autres herpès-virus, le cytomégalo virus, des entérovirus ou des coronavirus. Elle peut aussi être déclenchée par divers événements (opération chirurgicale, exposition à des toxiques, traumatisme ou perturbations du système immunitaire).

Les estimations disponibles suggèrent que cette maladie concernait environ 200 000 adultes en France avant la pandémie de COVID-19 et que le nombre de personnes atteintes auraient augmenté fortement depuis la pandémie. Il n'existe pas d'étude épidémiologique nationale à ce jour.

Elle touche des personnes de tous âges et de tous milieux sociaux, y compris des enfants et des adolescents, et principalement des femmes.



Pour en savoir plus sur l'étude de la toxicité des composés aluminiques dans l'organisme, cette étude co-réalisée par le Pr Guillemette Crépeaux examine l'historique réglementaire de la limite de teneur en aluminium dans les vaccins et met en évidence d'importantes lacunes dans l'évaluation toxicologique et épidémiologique : <https://pubmed.ncbi.nlm.nih.gov/40876523/>

ABA : bilan ?



Les adjuvants à base d'aluminium
100 ans d'utilisation, 100 ans d'alertes ?



Instances réglementaires



Chercheurs



Décideurs publics



Justice



Sociétés savantes



Média



Citoyens / population



ABA : bilan ?



Les adjuvants à base d'aluminium *100 ans d'utilisation, 100 ans d'alertes ?*

- Officiellement *safe*
- Arguments persistants et obsolètes



(29 sept)

Les principaux adjuvants

L'ensemble des données disponibles conduisent aujourd'hui les experts à considérer **les sels d'aluminium** comme l'adjuvant de choix pour augmenter l'efficacité des vaccins dirigés contre des pathogènes requérant des taux importants d'anticorps pour leur prévention.

Les sels d'aluminium figurent parmi les adjuvants les plus utilisés dans le monde avec un recul d'utilisation de plus de 90 années et des centaines de millions de doses injectées.

Adjuvant safety



Fact

Adjuvants have been used safely in vaccines for decades.

Aluminum salts, such as aluminum hydroxide, aluminum phosphate, and aluminum potassium sulfate have been used safely in vaccines for more than 70 years. Aluminum salts were initially used in the 1930s, 1940s, and 1950s with diphtheria and tetanus vaccines after it was found they strengthened the body's immune response to these vaccines.

Newer adjuvants have been developed to target specific components of the body's immune response, so that protection against disease is stronger and lasts longer.

In all cases, [vaccines containing adjuvants](#) are tested for safety and effectiveness in clinical trials before they are licensed for use in the United States, and these vaccines are continuously monitored by CDC and FDA once they are approved.

A detailed illustration of a medical syringe with a needle, shown injecting a virus particle. The virus particle is depicted as a grey, irregular, star-like shape with several small dots around it, representing viral particles or components.

Les adjuvants à base d'aluminium *100 ans d'utilisation, 100 ans d'alertes ?*



- Officiellement *safe*
- Arguments persistants et obsolètes
- Obligat° /recommandat° vaccinales ++



Calendrier simplifié des vaccinations



Santé
publique
France

[illegible]

* = ABA

ABA : bilan ?



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- Alertes
- Recherches
- consensus
- moins d'équipes
- + d'attaques
- + de mauvaises études



... les ABA en 2025

- 2 groupes



L. Lugin



G. Crépeaux F.J. Authier

ABA : bilan ?



Les adjuvants à base d'aluminium *100 ans d'utilisation, 100 ans d'alertes ?*

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- Lien MFM et ABA : 14 arrêts Conseil d'Etat

- *Quelques* avancées institutionnelles

- Prudence Aluminium

- ...

ABA : bilan ?



Les adjuvants à base d'aluminium *100 ans d'utilisation, 100 ans d'alertes ?*





*« Si l'aluminium
était toxique on
le saurait ! »*



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