グリホサートカリウム塩

要旨及び評価結果

（ヒトに対する毒性）

検索期間：2006 年 7 月 1 日～2009 年 12 月 31 日

評価対象：適合性区分 a に該当する文献

シンジェンタジャパン株式会社

Short summary of relevant and reliable articles from category a) with / without restrictions)

3031 Toxicokinetics of glyphosate and its metabolite aminomethyl phosphonic acid in rats .

Author	Anadon A; Martinez-Larranaga M R; Martinez M A; Castellano V J; Martinez M; Martin M T; Nozal M J; Bernal J L
Source	Toxicology letters, (2009 Oct 08) Vol. 190, No. 1, pp. 91-5. Electronic Publication Date: 14 Jul 2009
Title	Toxicokinetics of glyphosate and its metabolite aminomethyl phosphonic acid in rats .
Unique ID	3031

Short Summary with assessment and conclusion:
The publication is providing additional information on blood plasma concentrations of glyphosate and AMPA, as well as elimination after oral and i.v. application of glyphosate.
Rats were divided into two groups of 80 animals each, one group (Group 1) received a single oral gavage administration of 400 mg/kg bw glyphosate and the other group (Group 2) received a single i.v. injection of 100 mg/kg bw glyphosate.
Intravenous injection is more rapidly excreted than oral simply because of lag time for gastro intestinal tract absorption and entry into the blood stream. That reported, half-lives for i.v (0.345 and 9.99 hours for α and β phases respectively) versus oral (4.17 and 14.38 hours for α and β phases respectively) are all very rapid elimination kinetics, emphasizing the low duration of any systemic exposure to glyphosate, irrespective of the route.
Study report meets basic scientific principles, and is comparable to actual kinetics guidelines (large number of test animals used, standard deviations and mass balance not reported).

Short summary of relevant and reliable articles from category a) with / without restrictions)

140 Agricultural pesticide use and pancreatic cancer risk in the Agricultural Health Study Cohort.

Author	Andreotti, Gabriella (Correspondence); Freeman, Laura E. Beane; Coble, Joseph; Silverman, Debra T.; Alavanja, Michael C. R.
Source	International Journal of Cancer, (15 May 2009) Vol. 124, No. 10, pp. 2495-2500. Refs: 25 ISSN: 0020-7136; E-ISSN: 1097-0215 CODEN: IJCNAW
Title	Agricultural pesticide use and pancreatic cancer risk in the Agricultural Health Study Cohort.
Unique ID	140

Short Summary with assessment and conclusion:

This was a case-control study conducted in the Agricultural Health Study cohort in Iowa and North Carolina, USA. The study population comprised licensed private and commercial pesticide applicators and their spouses. The health outcome of interest was incident pancreatic cancer, and was captured from population-based state cancer registries; it was defined as codes C25.0 – C25.9 in the International Classification of Diseases 10th Revision (ICD-10). The exposure of interest was glyphosate use, and was captured by self-administered questionnaire; exposure status was classified in two different ways: ever vs. never exposure, and number of exposure days. Data for 93 pancreatic cancer cases and 82,503 controls were analyzed using logistic regression. The reported an odds ratio (OR) and 95% confidence interval (CI) of 1.1 (0.6, 1.7) for participants who self-reported to have ever used glyphosate compared to those who self-reported to have never used it. Age group, cigarette smoking, diabetes, and applicator type were adjusted for in this analysis. The reported OR and 95% CI for participants with ≤184 days of exposure compared to those who self-reported to have never used it was 1.9 (0.9, 3.8). The OR and 95% CI for participants with ≥185 days compared to those who self-reported to have never used it was 1.2 (0.6, 2.6). The reported value for p-trend was 0.85. Age group, cigarette smoking, and diabetes were adjusted for in this analysis. These results suggest that there is not a statistically significant difference in pancreatic cancer incidence among exposure groups at the 0.05 significance level. This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because exposure classification was based on self-reported glyphosate use, an indirect method by which to estimate exposure status of study participants. No biological evidence is provided to support exposure classification of study participants. Misclassification of exposure is possible in this study.

Short summary of relevant and reliable articles from category a) with / without restrictions)

1697 In utero pesticide exposure and childhood morbidity.

Author	Weselak, Mandy; Arbuckle, Tye E.; Wigle, Donald T.; Krewski, Daniel
Source	Environmental Research, (JAN 2007) Vol. 103, No. 1, pp. 79-86.
Title	In utero pesticide exposure and childhood morbidity.
Unique ID	1697

Short Summary with assessment and conclusion:
This was a retrospective cohort study conducted in Canada as part of the Ontario Farm Family Health Study (OFFHS). The study population comprised children of married couples, or couples living as married, who lived year-round on a farm with reported agricultural product sales of at least $50,000 in 1986. Wives were aged 44 years or younger. The health outcomes of interest were chronic bronchitis or cough, asthma, hayfever or allergies in children, and was captured via questionnaire; it was defined as self-reported physician diagnosis. The exposure of interest was reported farm use of glyphosate during pregnancy, and was self-reported via questionnaire. Data from 3,405 children were analyzed using logistic regression and generalized estimating equations. The reported adjusted ORs and 95% CIs for children with reported glyphosate use during pregnancy compared to those without was 0.71 (0.21, 2.35) for persistent cough or bronchitis, 0.82 (0.35, 1.90) for asthma, and 0.98 (0.46, 2.10) for hayfever or allergies. Analyses for persistent cough or bronchitis were adjusted for child's age at time of questionnaire, father's age at conception, income, breast feeding, and mother's age at conception. Analyses for asthma were adjusted for child's age at time of questionnaire, and father's education level. Analyses for hayfever or allergies were adjusted for child's age at time of questionnaire, father's age at conception, mother's age at conception, and father's education level. These results suggest that there is not a statistically significant difference in odds of persistent cough or bronchitis, asthma, or hayfever or allergies among exposure groups at the 0.05 significance level. This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because exposure classification was based on self-reported glyphosate use, an indirect method by which to estimate exposure status of study participants. No biological evidence is provided to support exposure classification of study participants. Additionally, outcome classification was based on self-report of physician diagnosis. Misclassification of either exposure, outcome, or both is possible in this study.

Short summary of relevant and reliable articles from category a) with / without restrictions)

2196 Pesticide exposure as risk factor for non-Hodgkin lymphoma including histopathological subgroup analysis.

Author	Eriksson Mikael; Hardell Lennart; Carlberg Michael; Akerman Mans
Source	International journal of cancer, (2008 Oct 01) Vol. 123, No. 7, pp. 1657-63.
Title	Pesticide exposure as risk factor for non-Hodgkin lymphoma including histopathological subgroup analysis.
Unique ID	2196

Short Summary with assessment and conclusion:

This was a case control study conducted in Sweden. The study population comprised consecutive patients aged 18-74 years with newly diagnosed Non-Hodgkin lymphoma (NHL), and population controls selected from the same health service region. The health outcome of interest was NHL and its subtypes; diagnosis was confirmed by a pathologist. The exposure of interest was self-reported exposure or non-exposure to glyphosate, and number of days exposed; it was self-reported via questionnaire and, in some cases, interview. Data from 910 NHL cases and 1,016 controls were analyzed using logistic regression. The reported OR and 95% CI for participants exposed to glyphosate compared to those not exposed was 2.02 (1.10, 3.71). The reported OR and 95% CI for participants with 10 or fewer exposure days compared to those not exposed was 1.69 (0.70, 4.07), and the reported OR and 95% CI for participants with more than 10 exposure days compared to those not exposed was 2.36 (1.04, 5.37). When comparing participants with self-reported exposure and those with self-reported non-exposure reported ORs and 95% CIs were 1.87 (0.998, 3.51) for B-cell lymphomas, 3.35 (1.42, 7.89) for lymphocytic lymphoma/B-CLL (SLL/CLL), 1.89 (0.62, 5.79) for follicular, grade I-III (FL), 1.22 (0.44, 3.35) for diffuse large B-cell lymphoma (DLBCL), 1.63 (0.53, 4.96) for other specified B-cell lymphoma, 1.47 (0.33, 6.61) for unspecified B-cell lymphoma, 2.29 (0.51, 10.4) for T-cell lymphomas, and 5.63 (1.44, 22.0) for unspecified non-Hodgkin lymphoma. Controls were frequency matched on 10 year age and sex; analyses were adjusted for year of diagnosis for cases and of enrollment in controls. These results suggest that there is a statistically significant difference in odds of glyphosate exposure between NHL and non-NHL cases at the 0.05 significance level. Results were statistically significant for participants with more than 10 exposure days, but not for those with 10 or fewer compared to those who were non-exposed. This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because exposure classification was based on self-reported glyphosate use, an indirect method by which to estimate exposure status of study participants. No biological evidence is provided to support exposure classification of study participants. Misclassification of exposure is possible in this study.

Short summary of relevant and reliable articles from category a) with / without restrictions)

2206 Pesticide use and colorectal cancer risk in the Agricultural Health Study.

Author	Lee, Won Jin; Sandler, Dale P.; Blair, Aaron; Samanic, Claudine; Cross, Amanda J.; Alavanja, Michael C. R.
Source	Int. J. Cancer, Volume 121, Issue 2, Page 339-346, Publication Year 2007
Title	Pesticide use and colorectal cancer risk in the Agricultural Health Study.
Unique ID	2206

Short Summary with assessment and conclusion:
This was a case-control study conducted in the Agricultural Health Study cohort in Iowa and North Carolina, USA. The study population comprised certified pesticide applicators and their spouses. The health outcome of interest was incident colorectal cancer, and was captured from a cancer registry. The exposure of interest was self-reported ever or never exposure to glyphosate, and was captured by questionnaire. Data for 305 colorectal cancer cases, and 56,508 non-cases were analyzed using unconditional multivariate logistic regression. The reported ORs and 95% CIs were 1.2 (0.9, 1.6) for colorectal cancer, 1.0 (0.7, 1.5) for colon cancer, and 1.6 (0.9, 2.9) for rectum cancer. Analyses were adjusted for age, state of residence, smoking history, and total pesticide application days for any pesticide. These results suggest that there is no statistically significant difference between odds of glyphosate exposure between cases and non-cases of colorectal cancer, colon cancer, or rectum cancer at the 0.05 significance level. This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because exposure classification was based on self-reported glyphosate use, an indirect method by which to estimate exposure status of study participants. No biological evidence is provided to support exposure classification of study participants. Misclassification of exposure is possible in this study.

Short summary of relevant and reliable articles from category a) with / without restrictions)

2209 Pesticides and adult respiratory outcomes in the agricultural health study.

Author	Hoppin, Jane A.; Umbach, David M.; London, Stephanie J.; Lynch, Charles F.; Alavanja, Michael C. R.; Sandler, Dale P.
Source	Ann. N. Y. Acad. Sci., Volume 1076, Issue Living in a Chemical World, Page 343-354, Publication Year 2006
Title	Pesticides and adult respiratory outcomes in the agricultural health study.
Unique ID	2209

Short Summary with assessment and conclusion:
This was a cross-sectional study conducted in the Agricultural Health Study cohort in Iowa and North Carolina, USA. The study population comprised private and commercial pesticide applicators and their spouses. The health outcome of interest was self-reported wheeze, and was captured by self-administered questionnaire; it was defined as having had at least one reported episode of wheezing or whistling in the chest in the past 12 months. The exposure of interest was self-reported glyphosate use in the year before enrollment, and was captured by self-administered questionnaire. Data from 17,920 farmers and 2,255 commercial applicators were analyzed using logistic regression. Reported ORs and 95% CIs comparing participants with self-reported glyphosate use and those without were 1.05 (0.94, 1.17) among farmers, and 1.14 (0.83, 1.57) among commercial applicators. Analyses were adjusted for age, BMI, smoking, asthma/atopy, and previous use of pesticide. Analyses among commercial applicators also adjusted for chlorimuron-ethyl, and those among farmers also adjusted for state. These results suggest that there is no statistically significant difference in odds of self-reported glyphosate use and wheeze among either farmers or commercial applicators at the 0.05 significance level. This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because exposure classification was based on self-reported glyphosate use, an indirect method by which to estimate exposure status of study participants. No biological evidence is provided to support exposure classification of study participants. Additionally, outcome classification was based on self-report. Misclassification of either exposure, outcome, or both is possible in this study.

グリホサートカリウム塩

要旨及び評価結果

（生活環境動植物及び家畜に対する毒性）

検索期間：2006 年 7 月 1 日～2009 年 12 月 31 日

評価対象：適合性区分 a に該当する文献

シンジェンタジャパン株式会社

Short summary of relevant and reliable articles from category a) with / without restrictions)

100 Acute and chronic toxicity of glyphosate compounds to glochidia and juveniles of Lampsilis siliquoidea (Unionidae).

Author	Bringolf Robert B; Cope W Gregory; Mosher Shad; Barnhart M Chris; Shea Damian
Source	Environmental toxicology and chemistry, (2007 Oct) Vol. 26, No. 10, pp. 2094-100.
Title	Acute and chronic toxicity of glyphosate compounds to glochidia and juveniles of Lampsilis siliquoidea (Unionidae).
Unique ID	100

Short Summary with assessment and conclusion:
The article describes acute and chronic toxicity tests with different forms of glyphosate and different glyphosate formulations on juveniles and glochidia of the freshwater mussel Lampsilis siliquoidea. Acute 48 EC50 values for the different glyphosate forms (4.6 - 200 mg/L) and glyphosate formulations (2.9 - 148 mg/L) are reported, which are partially considered relevant for risk assessment. As no raw data are provided, the test doses used for the acute test are not reported and the analytical methods are not clearly described, the article is regarded reliable with restrictions.

Short summary of relevant and reliable articles from category a) with / without restrictions)

413 Combination effects of herbicides on plants and algae: do species and test systems matter?

Author	Cedergreen, Nina; Kudsk, Per; Mathiassen, Solvejg K.; Streibig, Jens C.
Source	Pest Management Science (2007), 63(3), 282-295
Title	Combination effects of herbicides on plants and algae: do species and test systems matter?
Unique ID	413

Short Summary with assessment and conclusion:

In this study, the toxicity of technical grade glyphosate (95%) on the terrestrail plants Tripleurospermum inodorum (ED50 = 18 ± 1 g a.s./ha) and Stellaria media (ED50 = 16 ± 3 g a.s./ha), the aquatic plant Lemna minor (EC50 = 17.2 ± 1.1 mg a.s./ha) and the alga Pseudokirchneriella subcapitata (EC50 = 55.1 ± 2.5 mg a.s./ha) was calculated. As no analytical verifications were conducted for any of the tests with either terrestrial or aquatic species, some important methodological details are insufficiently reported and no raw data are available to verify ED/EC50 values, the article is considered reliable with restrictions.

Short summary of relevant and reliable articles from category a) with / without restrictions)

834 Effect of glyphosate on growth of four freshwater species of phytoplankton: a microplate bioassay.

Author	Vendrell E; Ferraz D Gomez De Barreda; Sabater C; Carrasco J M
Source	Bulletin of environmental contamination and toxicology, (2009 May) Vol. 82, No. 5, pp. 538-42. Electronic Publication Date: 6 Mar 2009
Title	Effect of glyphosate on growth of four freshwater species of phytoplankton: a microplate bioassay.
Unique ID	834

Short Summary with assessment and conclusion:
In this article the effect of technical glyphosate (97.5%) on the growth of four freshwater algae species was tested in a 72 hour exposure test. EC50 values based on area under the growth curve are reported, which ranged between 24.5 and 41.7 mg/L. As the test concentrations were not analytically verified and no raw data are presented, the article is considered reliable with restrictions.

Short summary of relevant and reliable articles from category a) with / without restrictions)

1124 Evaluating the Effects of Forestry Herbicides on Fish Development Using Rapid Phenotypic Screens

Author	Stehr, Carla M; Linbo, Tiffany L; Baldwin, David H; Scholz, Nathaniel L; Incardona, John P
Source	North American Journal of Fisheries Management [N. Am. J. Fish. Manage.]. Vol. 29, no. 4, pp. 975-984. Aug 2009. ISSN: 0275-5947 E-ISSN: 1548-8675 DOI: 10.1577/M08-173.1 Published by: American Fisheries Society, 5410 Grosvenor Ln. Bethesda MD 20814-2199 U
Title	Evaluating the Effects of Forestry Herbicides on Fish Development Using Rapid Phenotypic Screens
Unique ID	1124

Short Summary with assessment and conclusion:
In this article the developmental effects (anatomy, morphology, body length, touch response) of glyphosate on zebra fish embryos after 5 days of exposure were assessed. No significant effects were observed at the highest test concentration of 100 mg/L. As the test concentrations were not analytically verified and the raw data are not presented, the article is considered reliable with restrictions.

Short summary of relevant and reliable articles from category a) with / without restrictions)

3012 Toxicity and effects of a glyphosate -based herbicide on the Neotropical fish Prochilodus lineatus.

Author	Langiano Vivian Do Carmo; Martinez Claudia B R
Source	Comparative biochemistry and physiology. Toxicology and pharmacology : CBP, (2008 Mar) Vol. 147, No. 2, pp. 222-31. Electronic Publication Date: 26 Sep 2007
Title	Toxicity and effects of a glyphosate -based herbicide on the Neotropical fish Prochilodus lineatus.
Unique ID	3012

Short Summary with assessment and conclusion:
In this article acute and sub-lethal endpoints for the neotropical fish Prochilodus lineatus after exposure to the glyphosate formulation Roundup® are reported. The determined 96 h LC50 of 13.69 mg/L is considered relevant for risk assessment. As the test concentrations were not analytically verified, no raw data are presented and no confidence intervals are given for the 96 h LC50, the article is considered as reliable with restrictions (NOTE: probably not relevant because of the formulation used).

Short summary of relevant and reliable articles from category a) with / without restrictions)

3016 Toxicity evaluation of three pesticides on non-target aquatic and soil organisms: commercial formulation versus active ingredient.

Author	Pereira Joana L; Antunes Sara C; Castro Bruno B; Marques Catarina R; Goncalves Ana M M; Goncalves Fernando; Pereira Ruth
Source	Ecotoxicology (London, England), (2009 May) Vol. 18, No. 4, pp. 455-63. Electronic Publication Date: 10 Feb 2009
Title	Toxicity evaluation of three pesticides on non-target aquatic and soil organisms: commercial formulation versus active ingredient.
Unique ID	3016

Short Summary with assessment and conclusion:
In this article, acute endpoints for Daphnia magna and the green algae Pseudokirchneriella subcapitata after exposure to the glyphosate formulation Spasor® or the active substance glyphosate are reported, i.e. 307 mg/L (> 2000 mg/L) for Daphnia magna and 71 mg/L (129 mg/L) for P. subcapitata. As the test concentrations were not analytically verified and no raw data are presented, the article is considered reliable with restrictions.

Short summary of relevant and reliable articles from category a) with / without restrictions)

3084 Understanding the net effects of pesticides on amphibian trematode infections.

Author	Rohr Jason R; Raffel Thomas R; Sessions Stanley K; Hudson Peter J
Source	Ecological applications : a publication of the Ecological Society of America, (2008 Oct) Vol. 18, No. 7, pp. 1743-53.
Title	Understanding the net effects of pesticides on amphibian trematode infections.
Unique ID	3084

Short Summary with assessment and conclusion:

This study showed no significant effects of technical grade glyphosate (98%) on all the species involved in an amphibian trematode infection (i.e. the trematode Echinostoma trivolvis and its first and second intermediate hosts, the snail Planorbella trivolvis and tadpoles of the green frog Rana clamitans) when applied at 3.7 mg/L separatedly. A general NOEC of 3.7 mg/L can therefore be established. As some general methodological information is lacking and the tested individuals for all species were taken from natural sources with unknown previous history of chemical exposure/applications, which could make up the glyphosate effects, the article is considered reliable with restrictions.