

Contents

| | |
|---|-----------|
| SUMMARY | 1 |
| What Are Dietary Reference Intakes?, 2 | |
| Comparison of Recommended Dietary Allowances and Adequate Intakes, 6 | |
| Approach for Setting Dietary Reference Intakes, 6 | |
| Criteria and Proposed Values for Tolerable Upper Intake Levels, 12 | |
| Using Dietary Reference Intakes to Assess the Nutrient Intake of Groups, 14 | |
| How to Meet Recommended Dietary Allowances or Adequate Intakes, 14 | |
| Recommendations, 15 | |
| 1 INTRODUCTION TO DIETARY REFERENCE INTAKES | 17 |
| What Are Dietary Reference Intakes?, 17 | |
| Categories of Dietary Reference Intakes, 18 | |
| Parameters for Dietary Reference Intakes, 23 | |
| Summary, 26 | |
| References, 26 | |
| 2 THE B VITAMINS AND CHOLINE: OVERVIEW AND METHODS | 27 |
| Overview, 27 | |
| Methodological Considerations, 28 | |
| Estimates of Laboratory Values, 34 | |

| | | |
|----------|---|-----------|
| | Estimates of Nutrient Intake, 35 | |
| | Dietary Intakes in the United States and Canada, 36 | |
| | Summary, 38 | |
| | References, 38 | |
| 3 | A MODEL FOR THE DEVELOPMENT OF TOLERABLE UPPER INTAKE LEVELS | 41 |
| | Background, 41 | |
| | A Model for the Derivation of Tolerable Upper Intake Levels, 42 | |
| | Risk Assessment and Food Safety, 42 | |
| | Application of the Risk Assessment Model to Nutrients, 47 | |
| | Steps in the Development of the Tolerable Upper Intake Level, 50 | |
| | References, 56 | |
| 4 | THIAMIN | 58 |
| | Summary, 58 | |
| | Background Information, 58 | |
| | Selection of Indicators for Estimating the Requirement for Thiamin, 60 | |
| | Factors Affecting the Thiamin Requirement, 62 | |
| | Findings by Life Stage and Gender Group, 65 | |
| | Intake of Thiamin, 79 | |
| | Tolerable Upper Intake Levels, 81 | |
| | Research Recommendations for Thiamin, 82 | |
| | References, 83 | |
| 5 | RIBOFLAVIN | 87 |
| | Summary, 87 | |
| | Background Information, 87 | |
| | Selection of Indicators for Estimating the Requirement for Riboflavin, 90 | |
| | Factors Affecting the Riboflavin Requirement, 95 | |
| | Approaches for Deriving the Estimated Average Requirement, 97 | |
| | Findings by Life Stage and Gender Group, 103 | |
| | Intake of Riboflavin, 113 | |
| | Tolerable Upper Intake Levels, 115 | |
| | Research Recommendations for Riboflavin, 117 | |
| | References, 117 | |

| | | |
|----------|---|------------|
| 6 | NIACIN | 123 |
| | Summary, 123 | |
| | Background Information, 123 | |
| | Selection of Indicators for Estimating the Requirement for Niacin, 126 | |
| | Factors Affecting the Niacin Requirement, 128 | |
| | Findings by Life Stage and Gender Group, 130 | |
| | Intake of Niacin, 137 | |
| | Tolerable Upper Intake Levels, 138 | |
| | Research Recommendations for Niacin, 145 | |
| | References, 145 | |
| 7 | VITAMIN B₆ | 150 |
| | Summary, 150 | |
| | Background Information, 150 | |
| | Selection of Indicators for Estimating the Requirement for Vitamin B ₆ , 154 | |
| | Factors Affecting the Vitamin B ₆ Requirement, 160 | |
| | Findings by Life Stage and Gender Group, 164 | |
| | Intake of Vitamin B ₆ , 179 | |
| | Tolerable Upper Intake Levels, 182 | |
| | Research Recommendations for Vitamin B ₆ , 188 | |
| | References, 188 | |
| 8 | FOLATE | 196 |
| | Summary, 196 | |
| | Background Information, 197 | |
| | Selection of Indicators for Estimating the Requirement for Folate, 200 | |
| | Methodological Issues, 205 | |
| | Factors Affecting the Folate Requirement, 207 | |
| | Findings by Life Stage and Gender Group, 214 | |
| | Reducing Risk of Developmental Disorders and Chronic Degenerative Disease, 240 | |
| | Intake of Folate, 269 | |
| | Tolerable Upper Intake Levels, 273 | |
| | Research Recommendations for Folate, 283 | |
| | References, 284 | |
| 9 | VITAMIN B₁₂ | 306 |
| | Summary, 306 | |
| | Background Information, 307 | |

| | |
|--|------------|
| Selection of Indicators for Estimating the Requirement for Vitamin B ₁₂ , 312 | |
| Methodological Issues, 315 | |
| Diagnosis, 316 | |
| Factors Affecting the Vitamin B ₁₂ Requirement, 318 | |
| Findings by Life Stage and Gender Group, 322 | |
| Intake of Vitamin B ₁₂ , 342 | |
| Tolerable Upper Intake Levels, 346 | |
| Research Recommendations for Vitamin B ₁₂ , 348 | |
| References, 348 | |
| 10 PANTOTHENIC ACID | 357 |
| Summary, 357 | |
| Background Information, 357 | |
| Selection of Indicators for Estimating the Requirement for Pantothenic Acid, 359 | |
| Factors Affecting the Pantothenic Acid Requirement, 361 | |
| Findings by Life Stage and Gender Group, 362 | |
| Intake of Pantothenic Acid, 368 | |
| Tolerable Upper Intake Levels, 370 | |
| Research Recommendations for Pantothenic Acid, 371 | |
| References, 371 | |
| 11 BIOTIN | 374 |
| Summary, 374 | |
| Background Information, 374 | |
| Selection of Indicators for Estimating the Requirement for Biotin, 378 | |
| Factors Affecting the Biotin Requirement, 380 | |
| Findings by Life Stage and Gender Group, 380 | |
| Intake of Biotin, 384 | |
| Tolerable Upper Intake Levels, 384 | |
| Research Recommendations for Biotin, 385 | |
| References, 386 | |
| 12 CHOLINE | 390 |
| Summary, 390 | |
| Background Information, 390 | |
| Selection of Indicators for Estimating the Requirement for Choline, 396 | |
| Factors Affecting the Choline Requirement, 398 | |
| Findings by Life Stage and Gender Group, 400 | |

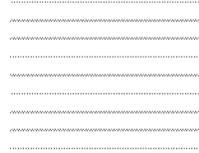
| | |
|--|------------|
| Intake of Choline, 406 | |
| Tolerable Upper Intake Levels, 408 | |
| Research Recommendations for Choline, 413 | |
| References, 414 | |
| 13 USES OF DIETARY REFERENCE INTAKES | 423 |
| Overview, 423 | |
| Using Recommended Dietary Allowances, 424 | |
| Using Adequate Intakes, 425 | |
| Using Tolerable Upper Intake Levels, 426 | |
| Using Estimated Average Requirements, 427 | |
| Other Uses of Dietary Reference Intakes, 432 | |
| Specific Applications, 432 | |
| Summary, 435 | |
| References, 436 | |
| 14 A RESEARCH AGENDA | 437 |
| Approach, 437 | |
| Important Features of Studies to Estimate Requirements, 438 | |
| Major Knowledge Gaps, 439 | |
| The Research Agenda, 442 | |
| APPENDIXES: | |
| A Origin and Framework of the Development of Dietary Reference Intakes, 443 | |
| B Acknowledgments, 448 | |
| C Système International d'Unités, 451 | |
| D Search Strategies, 453 | |
| E Methodological Problems Associated with Laboratory Values and Food Composition Data for B Vitamins, 456 | |
| F Dietary Intake Data from the Boston Nutritional Status Survey, 1981–1984, 460 | |
| G Dietary Intake Data from the Continuing Survey of Food Intakes by Individuals (CSFII), 1994–1995, 466 | |
| H Dietary Intake Data from the Third National Health and Nutrition Examination Survey (NHANES III), 1988–1994, 478 | |
| I Daily Intakes of B Vitamins by Canadian Men and Women, 1990, 1993, 502 | |
| J Options for Dealing with Uncertainties in Developing Tolerable Upper Intake Levels, 507 | |
| K Blood Concentrations of Folate and Vitamin B ₁₂ from the Third National Health and Nutrition Examination Survey (NHANES III), 1988–1994, 512 | |

- L** Methylentetrahydrofolate Reductase, 520
- M** Evidence from Animal Studies on the Etiology of Neural Tube Defects, 523
- N** Estimation of the Period Covered by Vitamin B₁₂ Stores, 527
- O** Biographical Sketches, 531
- P** Glossary and Abbreviations, 537

INDEX**541**

SUMMARY TABLE, Dietary Reference Intakes: Recommended Intakes for Individuals, 566

DRI



DIETARY REFERENCE INTAKES

FOR

*Thiamin, Riboflavin,
Niacin, Vitamin B₆,
Folate, Vitamin B₁₂,
Pantothenic Acid,
Biotin, and Choline*

