**Course Introduction:** Updated Dec. 23, 15

- **Course overview:** This course provides core knowledge in the basic science and molecular biology of dysbiosis as well as the evidence-based clinical interventions used for effective health optimization and disease treatment. Students/attendees will gain a detailed understanding of the pathophysiology, clinical presentations, and therapeutic interventions. Consideration and contextualization includes the four components of evidence-based medicine/healthcare (clinical expertise, patient preference, research evidence, resource availability/ socioeconomic context) to aid the data-analysis and treatment decision-making processes.

- **Topic overview:** New information on the “human microbiome” and “dysbiosis” is being published on a weekly basis, and healthcare providers and the general public alike are all becoming more aware of the role of microbes in human health and disease. Clinicians need a structured understanding of this material in order to take effective clinical action and in order to separate the helpful from the hype-ful with regard to clinical assessments and therapeutic interventions.

- **Clinician instructor overview:** Dr Vasquez (“DrV”) has been intensely studying this field since the mid-1990s when he first started studying functional medicine; what started out as a clinical and intellectual interest soon became a personal interest when DrV—then in his final year of chiropractic college—fell ill with a dysbiosis-induced disease. Later in clinical practice, DrV achieved impressive and sometimes amazing results by addressing the microbial component of persistent inflammatory disorders such as psoriasis, rheumatoid arthritis, and other forms of autoimmunity. DrV’s landmark paper *Nutritional and Botanical Treatments Against “Silent Infections” and Gastrointestinal Dysbiosis, Commonly Overlooked Causes of Neuromusculoskeletal Inflammation and Chronic Health Problems* (*Nutr Perspectives* 2006) is one of the most popular clinical papers detailing these topics, consistently ranked in the top 1% of papers on academia.edu with more than 5,200 downloads. DrV previously taught this information for the Institute for Functional Medicine, where he was faculty for more than 10 years.

**Instructor: Alex Vasquez DC ND DO FACN**

- **Biographical sketch:** Dr Alex Vasquez holds three doctoral degrees as a graduate of University of Western States (Doctor of Chiropractic, 1996), Bastyr University (Doctor of Naturopathic Medicine, 1999), and University of North Texas Health Science Center, Texas College of Osteopathic Medicine (Doctor of Osteopathic Medicine, 2010). Dr Vasquez is the author of many textbooks, including *Integrative Orthopedics* (2004, 2012), *Integrative Rheumatology* (2006, 2014), *Musculoskeletal Pain: Expanded Clinical Strategies* (published by the Institute for Functional Medicine, 2008), *Chiropractic and Naturopathic Mastery of Common Clinical Disorders* (2009), *Integrative Medicine and Functional Medicine for Chronic Hypertension* (2011), *Migraine Headaches, Hypothyroidism, and Fibromyalgia* (2012), and *Mitochondrial Nutrition and Endoplasmic Reticulum Stress in Primary Care* (2014), and the previous version of this current book, *Dysbiosis in Human Disease*, which is an excerpt from the 700-page textbook *Functional Inflammation: Volume 1*. “DrV” has also written more than 100 letters and articles for professional magazines and medical journals such as *British Medical Journal* (BMJ), *TheLancet.com*, *Annals of Pharmacotherapy*, *Journal of Clinical Endocrinology and Metabolism*, *Journal of the American Medical Association* (JAMA), *Alternative Therapies in Health and Medicine*, *Journal of the American Osteopathic Association* (JAOA), *Joint Commission Journal on Quality and Patient Safety*, and *Journal of Clinical Orthopaedics*. Dr Vasquez is a featured speaker for more than 300 seminars and conferences worldwide, where he has presented his work on functional medicine and alternative treatments for chronic health problems.
Nutritional Perspectives, Journal of Manipulative and Physiological Therapeutics (JMPT), Current Allergy and Asthma Reports, Integrative Medicine, and Arthritis & Rheumatism, the Official Journal of the American College of Rheumatology. Dr Vasquez lectures worldwide to healthcare professionals and provides expert consultations to physicians and patients internationally. The former Editor of Naturopathy Digest and a reviewer for Journal of Naturopathic Medicine and Autoimmune Diseases and PLOS One and Alternative Therapies in Health and Medicine, Dr Vasquez is currently the Chief Editor of International Journal of Human Nutrition and Functional Medicine. All of DrV’s books are available at amazon.com/author/alexvasquez, videos at Vimeo.com/DrVasquez, recordings at iTunes. DrV’s personal websites include InflammationMastery.com, AntiViralNutrition.com, and facebook.com/InflammationMastery

Course Content and Criteria for Successful Completion/Passing—Outline and Checklist: Students are requested to participate in any on-line/live discussions. For many people, the conversations and discussions are really where this information “comes to life” and where new perspectives can be shared and integrated. Even for students who might generally prefer to work alone, the reading of and (hopefully) participation in course discussions is ensured to provide a broader perspective on the material that what one could attain solo. Participation in any forums or live discussions is optional/ancillary and not included in the core CE/CME program.

1. ☐ Pretest—sampling of material: CE/CME standards require a pretest to assess the preexisting learning gap and to allow "before and after" comparison to assess the post-instruction attainment of knowledge. The pretest also allows students/attendees to become familiar with the software interface, test system compatibility on multiple devices, and the terminology, concepts, level of detail, and clinical applications of the information. No minimum passing score is required; students/attendees are encouraged to take the test without studying, preferably prior to reading the clinical monograph.

2. ☐ Monograph—reading of clinical monograph and completing the first test: The text portion of the clinical monograph contains 144 pages with 635 footnotes/citations, providing 70,500 words not including diagrams, footnotes, textboxes and exercises. Rounding to 71,000 words to include diagrams and textboxes, and using 12,000 words per hour as the standard per Distance Education Accrediting Commission: 71,000 words of text / 12,000 words per hour = 5.9 hours = 6 hours awarded for the reading of this textbook, including diagrams, textboxes, and some of the footnotes. One hour is credited for the examination process, which students/attendees may complete by using the book (ie, "open-book test"). Passing this section and receiving 7 hours of CE/CME credit requires achieving a minimum score of 70% on the first test which is specific to the printed monograph. Students/attendees are allowed to take the test up to five times; the highest score is used for evaluation.

3. ☐ Videos—viewing video presentations and completing the second test: Professionally produced and edited presentations are delivered via the learning management system (LMS) online interface; viewing is required prior to accessing the second test. Passing this section and receiving 7 hours of CE/CME credit requires achieving a minimum score of 70% on the second test which is specific to the presented videos. Students/attendees are allowed to take the test up to five times; the highest score is used for evaluation.

4. ☐ Certificate: Students/attendees print or download the Certificate of Achievement and documentation/certification of CE/CME hours after completing parts 1,2,3 described above.

Course Delivery: The intellectual content of this course is delivered primarily via two media—printed monograph and online videos. Students/attendees have 120 days from the time of entry (following population of all course materials) in order to complete the course. Additional time can be requested.

1. The clinical monograph: Just as with any College or University course, you'll need to access the required textbook, and currently the book is available either in full-color and in black-and-white, per your preference. The cost of the book is very low, and of course the information will be valuable for the entirety of your career. The discount codes are valid at CreateSpace.com (the publisher of Amazon.com) with slower printing and shipping, while you can have the book delivered overnight from Amazon.com and other bookstores. Theoretically, a person might be able to pass the course without having accessed the book, but the purpose of this course is learning, not simply passing. A maximum of seven (7) hours of CE/CME is awarded for the reading of the clinical monograph Human Microbiome and Dysbiosis in Clinical Disease and passing the text-specific online test. Students/attendees purchase the text per their preference of delivery speed, and either full-color or black-and-white printing. Readers should note that the book includes text, diagrams, presentation slides, and password-protected access to more than 10 hours of instructional video—this instructional video is informational/supportive and is not part of the CE/CME program.
   - Full retail with immediate shipping: http://www.amazon.com/dp/0990620417/
   - Full-color, discount available, slower shipping: https://www.createspace.com/5518130; discount: Q4QKVJBX

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Clinical and Dysbiosis in Human Microbiome

Course Goals and Objectives:

- Discuss the role of microbial molecules and metabolites in the generation of disease and how to assess and intervene for prevention and treatment of microbe-induced disease
- Identify the pathologic effects/consequences of microbial colonization and know how to assess and intervene for prevention and treatment of microbe-induced disease
- Describe the pathophysiology and treatment of microbe-mediated disease
- Describe the importance, assessment, consequences, and provisional treatment of microbial colonizations per location
- Demonstrate competence in the subject matter by achieving a score of 70% or higher on the final examination
- Illustrate the ability to make proper clinical decisions based on the cases and information provided
- Interpret laboratory tests and clinical presentations to arrive at the proper assessment/diagnosis and the corresponding treatment of the condition
- Identify important indicators of dysbiotic disease
- Employ/Use laboratory assessments and therapeutic interventions appropriate for the assessment, monitoring, and treatment of microbiome imbalances and dysbiosis-induced disease
- Determine proper clinical actions, doses of drugs and other therapeutics.
- Identify mechanisms by which microbes contribute to persistent disease in the absence of overt infection.
- Advise and educate patients about the role of microbes in their illness in order to enhance patient understanding and treatment compliance.

Accreditations for continuing education / continuing medical education (CE/CME):

- CME (medical, pharmacy, nursing): This program awards a maximum of 14 hours of CE/CME for medical physicians (MD, DO, ND), pharmacists, nurses and nurse practitioners.
- Chiropractic CE credits: Perhaps surprisingly, continuing education (CE) accreditation for chiropractic doctors is much more complicated than is CME for medical doctors because each state in the USA plus the provinces of Canada each have their own applications, requirements, limitations, costs, and deadlines. This course will NOT have chiropractic accreditation for all states, due to costs and logistics (e.g., deadlines) and because not all states allow online/distance education for chiropractic CE. If your state does not allow online/distance education, please write to your state chiropractic board and encourage them to join the rest of the world in online education and digital communication.

2. The video presentations: A maximum of seven (7) hours of CE/CME is awarded for the viewing of the course-specific presentation videos and passing the video-specific online test.

States approved:

- CO
- CT
- DE
- DC
- GA
- IA
- ID
- IL
- MD
- MI
- MT
- NM
- OH
- OR
- ND
- NE
- WA
- KS Approval pending
- RI
- SC
- UT
- VA
- WA
- WI
- WY
- OK

States that do not accept online CE:

- FL
- IN
- KY
- LA
- MS
- OK
- MS
- OH
- OR

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Course Access, Required Resources, Contact and Disclosures:

- **Course textbook**—described above with various methods of delivery and discounts; students purchase their preferred format of book (either full-color or black-and-white printing) and delivery speed/method.
- **Videos, assessments, printing/downloading of certificate**—high-speed internet access with standard and current software, specifically including an interface-compatible internet browser; students/attendees enter the course via hyperlink at [www.ICHNFM.ORG](http://www.ICHNFM.ORG) or more directly via [www.NutritionAndFunctionalMedicine.org](http://www.NutritionAndFunctionalMedicine.org). Certificate of completion can be downloaded in PDF format and/or printed via student's/attendee's printer.
- **Instructor contact**: avasquez@ichnfm.org
- **Instructor disclosures**: Dr. Vasquez has served as a consultant researcher and lecturer for Biotics Research Corporation.

Required and Recommended Resources:

- **Required technology**: High-speed internet and compatible computer system(s) and software program(s)
- **Required textbook**: Human Microbiome and Dysbiosis in Clinical Disease
  - Full-Color Version: [https://www.createspace.com/5518130](https://www.createspace.com/5518130) with Discount Code: Q4QKVJBX
  - Discounted Black/White Printing: [https://www.createspace.com/5520172](https://www.createspace.com/5520172) with Discount Code: 9BZJ32PJ
- **Recommended medical references**: Such as Merck Manual [https://www.merckmanuals.com/](https://www.merckmanuals.com/)
  - Microbiology: [http://textbookofbacteriology.net/](http://textbookofbacteriology.net/)

Behavioral Expectations and Terms of Use:

ICHNF is committed to creating and maintaining a work environment conducive of optimal teaching and learning, and free from drama and unpleasantness. Among members/students/instructors/attendees, professional-level communication and behavior is expected per common courtesy and standards of etiquette/netiquette. Use of any ICHNF websites/forums/courses/programs implies agreement with ICHNF Terms of Use: [http://www.intihumanutrfunctionmed.org/terms_of_use.html](http://www.intihumanutrfunctionmed.org/terms_of_use.html). Inappropriate behavior or misuse of ICHNF materials, as judged solely by ICHNF administration, will be judged as forfeiture of access/participation and will result in expulsion/exclusion, without refund if applicable.
This current course sample provides an opportunity to ensure that your computer/mobile systems are compatible with our content delivery and to see the general method of teaching, which generally follows the 4-part format enumerated below, following this introduction. Typically, the introduction will also include the syllabus, provided either/both in HTML and PDF formats; please see this sample syllabus.

1. **Pre-test**: The first component is the pre-test. Quality educational programs and continuing medical education (CME) standards require a pre-test: an assessment given at the start of a course to allow both the students/attendees and the professors/administrators to assess knowledge at course entry. The advantage this provides students/attendees is that it allows them to become familiar with the testing methodologies, delivery, and the topics of the course and the vocabulary; all of these are important, particularly the initial building of the intellectual infrastructure that will later be filled with details. The benefit for the professors/administrators is that the assessment of knowledge allows gauging of the students' knowledge to help guide the need for either more introductory information if pretest performance is low or more advanced information if pretest performance is high; also the differential between the pretest performance and the final exam performance allows professors/administrators a means by which to assess teaching effectiveness, areas for improvement, and the performance of one group versus another, thereby helping to guide the need for prerequisite learning, additional resources, etc.

2. **Reading materials / clinical monographs**: The second component is the reading material, provided in book/monograph form or as articles, book chapters or excerpts. Reading is an active process that allows students/attendees the opportunity to visually see and study the course material. Although passive learning is popular because it is easy and passive, both ease and passivity are antithetical to active engagement, which is universally held as an important component of any effective learning process or program. Books provide an opportunity to spend time with the information, to let it "sink in" in the pace and style of the reader. Studies have clearly shown that students gain cognitive advantages by actively reading, not simply by passively watching. Written materials and printed diagrams are preferred by students whose personal means of learning is facilitated by access to visual information; also the printed book format allows highlighting and note-taking in a way that facilitates learning for students/attendees who learn by physical and tactile means.
   a. For sample publications, please see: [http://www.ichnfm.org/publications_journal.html](http://www.ichnfm.org/publications_journal.html)

3. **Expert videos**: The third component of most ICHNFM online programs is the audio-video presentation, which compliments the reading material by providing an additional means by which to access the material, specifically with additional graphs, verbal means of communication (the syntax of which is always different from written communication), moving and interactive diagrams, and of course the "audio digital" means of learning, which is a preferred means for some students.
   a. For sample videos, please see: [https://vimeo.com/ichnfm/videos](https://vimeo.com/ichnfm/videos)

4. **Final exam / certifying post-test**: The forth and final component after the written and audio/video learning is the final exam, the post-test that leads to the Certificate of Course Completion. This allows both students/attendees and the professors/administrators to assess the gains in knowledge and skill and to assess the effectiveness of knowledge-transmission to promote program improvements and the "in real time" enhancement of learning resources, as needed. *How can a final exam help "in real time" for current students?* Professors/admin can provide supplemental emphasis or learning materials if necessary. These can be added to the course and/or provided outside of the course via email/hyperlink or forum conversations.

You will find this to be a very convenient and effective learning approach: 1) pre-test for familiarity and baseline assessment, 2) reading text, studying diagrams, taking notes, 3) watching expert content delivery, and learning the "conversational style" of the material, and 4) finishing with a final assessment. Self-paced multi-modal learning all from the convenience of your home, office, or favorite cafe or local gym: multi-modal learning allows you to access the material in various ways and various environments to help the material "sink in" via various learning styles, allowing you to make impressive gains in knowledge acquisition and clinical skill-building.
Introduction: Welcome to International College of Human Nutrition and Functional Medicine (ICHNFM) and the available free sample course, which provides you an opportunity to see the layout, content samples, and technical delivery.

Learning and Teaching Styles: Among the many considerations that shape the process of knowledge transfer, five of which shape ICHNFM content delivery are the following:

- **Different people have different learning styles, but everyone benefits from a mix of different approaches:** ICHNFM content delivery meets 4 of the 4 main learning styles:
  1. **Visual learning:** Via graphs, charts, illustrations, and text
  2. **Physical / kinesthetic learning:** Printed books allow highlighting, note-taking, drawing, and hand-written exercises and sample exams to provide a physical-tactile component to learning. People get to actually “touch” the information, draw on it, follow the diagrams physically and mentally. Additionally, with mobile learning, attendees/students can review the videos while exercising or while somehow active but not seated in front of a computer.
  3. **Auditory-digital learning:** Learning by hearing words, concepts, and conversations.
  4. **Auditory-tonal learning:** Learning by hearing tones, emphasis, repetition, rhymes, acronyms, voices, emotions.

- **People learn at their own pace, in their own style:** ICHNFM provides flexibility in timing and methods of access.

- **People need time to review and repeat the information:** Our delivery systems allow for review and rumination, to allow the information to "sink in"; note that this contrasts with the one-time exposure of conferences, which typically only provide superficial exposure to new material. For detailed information that requires practical application in clinical practice, one-time "conference exposures" are among the worst ways to transmit new material.

- **People learn via interaction and conversation:** ICHNFM provides opportunities via forums and conversations for students/attendees to learn the material and to gain additional perspectives.

- **People learn by accountability, feedback, and correction:** One of the greatest adages in modern medical education is that "Assessment drives learning." (Leinster S. Assessment in medical training. Lancet. 2003 Nov) Without assessments, students can delude themselves into thinking they understand the material simply because they learn some vocabulary and some new concepts; we all need to be held to high standards so that we can learn material not simply superficially but to some level of practicality and applicability en route to mastery. Great teachers provide this perspective, challenge, and opportunity.

Assessment of clinical competence

Val Wass, Cees Van der Vleuten, John Shatzer, Roger Jones

Tests of clinical competence, which allow decisions to be made about medical qualification and fitness to practise, must be designed with respect to key issues including blueprinting, validity, reliability, and standard setting, as well as clarity about their formative or summative function. Multiple choice questions, essays, and oral examinations could be used to test factual recall and applied knowledge, but more sophisticated methods are needed to assess clinical performance, including directly observed long and short cases, objective structured clinical examinations, and the use of standardised patients. The goal of assessment in medical education remains the development of reliable measurements of student performance which, as well as having predictive value for subsequent clinical competence, also have a formative, educational role.

**Assessment drives learning:** Many people argue that this statement is incorrect and that the curriculum is the key in any clinical course. In reality, students feel overloaded by work and respond by studying only for the parts of the course that are assessed. To promote learning, assessment should be educational and formative—students should learn from tests and receive feedback on which to build their knowledge and skills. Pragmatically, assessment is the most appropriate engine on which to harness the curriculum.

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<tr>
<th>Hour</th>
<th>Teaching subjects</th>
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<tbody>
<tr>
<td><strong>#1</strong></td>
<td><strong>Online pretest of 50 questions:</strong> allows new students/attendees to interact with the information, concepts, and vocabulary and also to appreciate the level of knowledge acquisition that is expected, so that the appropriate amount of time and effort will be spent with the reading and lecture materials.</td>
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| **2-7** | **Reading of required textbook:**  
- 144 pages with footnotes = 130 pages of pure text in the endnote version  
- 70,500 words not including diagrams, footnotes, textboxes, and exercises, very information dense with 635 footnotes/citations; this work also includes questions/exercises.  
- Rounding to 71,000 words to include diagrams, textboxes, and some of the footnotes.  
- Awarded for the reading of this textbook: $\frac{71,000}{12,000} = 5.9$ hours = 6 hours awarded for the reading of this textbook, including diagrams, textboxes, and some of the footnotes. |
| **8** | **Audio/video presentation:** Introduction to the human microbiome and dysbiosis; terms and definitions, clinical relevance and contextualization |
| **9** | **Audio/video presentation:** Microbial molecules relevant to human disease and dysfunction with emphasis on the following:  
- Fibromyalgia  
- Chronic fatigue syndrome / systemic exercise intolerance disease  
- Migraine, seizure, epilepsy  
- Systemic inflammation  
- Rheumatoid arthritis and other inflammatory and autoimmune diseases |
| **10** | **Audio/video presentation:** Physiologic and pathophysiologic responses  
- Inflammatory responses, exemplified by the TLR-NFkB system  
- Molecular mimicry and immune cross-reactivity  
- Enhanced presentation of autoantigens  
- Bystander activation  
- Haptenization and the formation of neoautoantigens  
- Altered vitamin D metabolism and reception  
- Biofilms  
- Central sensitization, microbiome-gut-brain axis |
| **11** | **Audio/video presentation:** Clinical prototypes of microbiome-triggered diseases  
- Impaired cognition  
- Pain syndromes, especially fibromyalgia  
- Vasculitis and arthritis  
- Reactive arthritis  
- Bonus topic: psoriasis |
| **12** | **Audio/video presentation:** Clinical assessment and management |
| **13** | **Audio/video presentation:** Brain-gut relationships; effects on neurotransmission |
| **14** | **Online examination covering written and lecture materials** |

*This section is being updated to provide more detail.*