Mail Stop 4720 June 9, 2010

Mr. Daniel Tassé
Chairman and Chief Executive Officer
Ikaria, Inc.
6 State Route 173
Clinton, New Jersey 08809

Re: Ikaria, Inc.
Registration Statement on Form S-1
Filed May 13, 2010
File No. 333-166792

Dear Mr. Tassé:

We have reviewed your registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure. After reviewing this information, we may raise additional comments.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

FORM S-1

General

1. Please provide us proofs of all graphic, visual, or photographic information you will provide in the printed prospectus prior to its use, for example in a preliminary prospectus. Please note we may have comments regarding these materials.

2. Please note that where we provide examples to illustrate what we mean by our comments, they are examples and not complete lists. If our comments are applicable

to portions of the filing that we have not cited as examples, please make the appropriate changes in accordance with our comments.

3. Please update the discussion in your prospectus to the most recent date practicable.

4. Please note that our comments on your request for confidential treatment will be provided under separate cover.

5. Please note that when you file a pre-effective amendment containing pricing-related information, we may have additional comments. As you are likely aware, you must file this amendment prior to circulating the prospectus.

6. Please note that when you file a pre-effective amendment that includes your price range, it must be bona fide. We interpret this to mean that your range may not exceed $2 if you price below $20 and 10% if you price above $20.

Prospectus Summary
Company Overview, page 1

7. We note your use of non-GAAP-based compound annual growth rates. You should balance this data with additional data to put the information in the proper context. In that regard please provide the amounts of EBITDA, adjusted EBITDA, net income and adjusted net income for each of 2007, 2008 and 2009 as well as the annual growth rate of each from 2007 to 2008 and 2008 to 2009. You should also provide the GAAP-based CAGR fro net income. If you are unable to calculate the GAAP-based CAGR please explain why this is so. An explanation of "compound annual growth rate" should be provided. Please briefly disclose the extent to which the growth in sales data reflects price or volume changes. If this additional information is too detailed for the summary, please relocate this information to the main body of the prospectus.

8. Please briefly describe the geographical distribution of your sales and include more detail regarding such distribution in your "Business" section.

9. Please revise the discussion in the third paragraph of this section to define the term "INOcal calibration gases."

Critical Care Market, page 2

10. Please expand the discussion to clarify what portion of the estimated market is attributed to the specific type of products and services you provide.

Our Corporate Information, page 5

11. We note your statements in the last paragraph of this section concerning the lack of independent verification of third party data and your own estimates. Moreover, you note that the third party sources you refer to in the document "do not guarantee the accuracy or completeness of such information." This may imply that you do not have to take responsibility for information from third parties you include in the prospectus. Please remove this language.

Prospectus Summary – General

12. Please expand the discussion to include a separately captioned subsection immediately following the section entitled "Critical Care Market" which new section will provide a brief discussion of the material events that will occur upon consummation of the offering, including:
    - Conversion of outstanding shares of non-voting common stock and series A and series B preferred stock into shares of common stock;
    - A new term loan including the use of proceeds from the loan, the interest rate on the new loan and estimated additional interest costs to be incurred;
    - A reduction in cash, working capital, and total assets; and
    - The payment of a $130 million cash dividend, to whom, and for what reason.

Risk Factors
General

13. Please include a separate and appropriately captioned risk factor explaining that contemporaneously with the receipt of $200 million of proceeds from the offering, the company will dividend $130 million to its current shareholders, which action will not benefit the shareholders purchasing the company's shares in the offering.

"We are the sole manufacturer of INOMAX and we only have one FDA inspected facility…," page 16

14. Please clarify whether the construction of the Coppell facility is completed and the facility is currently ready to begin the manufacture of INOMAX upon receipt of FDA approval. Please expand the discussion to state when you anticipate FDA inspection of the Coppell facility to occur and the time required to obtain FDA approval of the facility.

"We rely on other manufacturers for components of our drug-delivery systems…," page 16

15. Please disclose whether you are substantially dependent on any of your raw material or component suppliers. If so, please identify them here and identify the products that

are dependent on the raw materials or components. Additionally, disclose the material terms of your contract with any such suppliers in the Business section and if you have not already done so, file the related contracts as exhibits to your S-1.

"We exclusively license patents covering INOMAX …," page 17

16. Please expand the discussion to clarify what obligations, if any, MGH has subsequent to the expiration of the patents in 2013.

17. Please consider including an additional risk factor under its own heading which addresses the fact that Linde, one of your controlling entities and the party from whom you acquired INO Therapeutics, has a supply and cooperation agreement with you in effect until March 2027, and that Linde can begin commercializing INOMAX in North America after March 27, 2013.

"Clinical trials of product candidates are expensive…," page 23

18. Please define the phrase "the trial was underpowered."

19. In this risk discussion, you describe various factors that may delay or prevent regulatory approval or commercialization of your products. If you have identified any safety issues or undesirable side effects, please revise the disclosure to add a new risk factor which discusses the issues you have experienced to date in your preclinical and clinical studies.

"If we are unable to expand our sales and marketing capabilities…," page 24

20. Please expand the risk factor discussion to address the impact of the 2013 expiration of your patents covering INOMAX.

"Failure to achieve our revenue targets or raise additional funds…," page 25

21. Please expand the discussion to address the additional funding and time that may be required to obtain FDA approval for INOMAX for other indications as well as the development of LUCASSIN and IK-5001.

22. Please present the risks pertaining to dilution and debt covenants under separate risk subheadings.

"Our substantial indebtedness may limit cash flow available…," page 26

23. Please update the discussion as necessary to describe the May 2010 credit agreement, including how the new agreement and use of proceeds from the May 2010 agreement

may address the risks currently described in this risk factor and/or present additional risks to the company and its continued operations.

"If we fail to attract and retain senior management and key scientific and engineering personnel…," page 31

24. Please identify the individuals upon whom you are dependent and state the extent to which you have employment agreements with these individuals.

25. If any of your key personnel intend to retire or resign in the near future, please revise the discussion to address such departure and the potential impact on your organization.

26. To the extent you have experienced problems attracting and retaining key employees and management personnel in the recent past, please revise the discussion to describe these problems.

"Our employees may engage in misconduct or other improper activities…," page 31

27. To the extent you have experienced problems of the nature described in this risk factor in the recent past, please revise the discussion to describe these problems.

"We rely on third-party manufacturers…," page 35
"We rely on third parties to conduct clinical trials…," page 36

28. We note you may be substantially dependent on one or more of these agreements. If you are, please file copies of these agreements as exhibits and discuss them in greater detail in your business section. If you do not believe you are substantially dependent upon these agreements, please provide an analysis supporting your determination. See Item 601(b)(10)(ii)(B) of Regulation S-K.

Use of Proceeds, page 41

29. It appears that concurrent with the proposed offering of $200 million of common stock, the company will also incur $250 million of indebtedness. As a result, on or about the closing of the offering, the company will have approximately $450 million available to it. We understand that from this aggregate amount, the company intends to use $175 million to repay outstanding indebtedness and $130 million to pay a dividend to its current shareholders. Accordingly, it appears that the discussion of the use of the proceeds from the offering should be expanded to also describe the concurrent loan transaction, the aforementioned use of proceeds, and the anticipated use of net available cash of approximately $140 million after all these transactions occur.

30. Please expand the discussion to indicate the approximate amount of the proceeds that will be allocated to development of your product and product candidates, foreign expansion, and acquisition and in-licensing opportunities, respectively. With regard to the amounts you anticipate to allocate to specific pipeline products you expect to fund, please state the stage of development you expect the additional funding will enable you to attain, respectively.

Management's Discussion and Analysis of Financial Condition and Results of Operations

Selected Consolidated Financial Data, page 55

31. Please label the "Combined" column on pages 10 and 55 as unaudited.

Financial Operations Overview

Research and Development Expenses, page 58

32. You disclose that patents protecting INOMAX, your only marketed product, will expire in 2011 and 2013. Please revise your disclosure to quantify the reasonably likely impact of this loss of patent protection on your future operating results.

Critical Accounting Policies and Estimates

Revenue Recognition, page 62

33. Under the tier-based billing model, you plan to recognize revenues on a "straight-line basis," except for customers who select one of the top two capped tier options. Please disclose if material, the amount of fee revenue deferred for customers who select one of the top two capped tier options. Explain and quantify the expected impact on your revenues to be recognized from your 2010 implementation of the tier-based billing model and elimination of the expense limitation program, particularly the impact of "changes in customer usage patterns."

Research and Development Expenses, page 63

34. Please revise your critical accounting estimate disclosure to discuss the following factors relating to your accrued research and development expenses:

- How accurate the estimate/assumption has been in the past
- How much the estimate/assumption is reasonably likely to change in the future

Valuation of Long-Lived Assets and Intangible Assets, page 64

35. Please disclose any significant assumptions used in your valuations such as the relief from royalty method, including the royalty rate and discount rate.

Share-Based Compensation, page 65

36. Please disclose whether the valuations used to determine the fair value of your equity instruments were contemporaneous or retrospective. If you do not have an estimated offering price in your next filing, we will defer our evaluation of stock-based compensation until your estimated offering price is specified. Please continue to provide us with updates to the requested analysis for all equity-related transactions through the effectiveness date of your registration statement.

Contractual Obligations, page 77

37. Please revise this table to include interest payments related to your long term debt.

Business – Overview, page 80

38. We note the reference in the third paragraph to the survey you conducted. Please expand the discussion to clarify what percentage of the costs incurred for non-approved indications were reimbursed by governmental or third party payors.

Sales Driven by Deep Relationships in Critical Care, page 83

39. Please quantify the "high retention rates" referred to on page 84.

Disease Background and Market Opportunity, page 93

40. Please revise the disclosure to identify the "published study."

LUCASSIN – Orphan Therapeutics, page 103

41. Please quantify the minimum royalty payments payable to Orphan and the specified royalty obligations you assumed with respect to third parties.

Patents and Proprietary Rights, page 108

42. With respect to IK-5001, IK-1001, and IK-600X, please expand each discussion to indicate when the US and foreign patents expire, respectively.

Management, page 127

43. Mr. Richard Wichansky, your principal financial and accounting officer, has been omitted from the list of executive officers. Please advise or revise.

Potential Payments Upon Termination and a Change in Control, page 149

44. With respect to the payments to Ms. Larkin, please expand the discussion to explain the specific purpose for the payments of $243,979 and $412,500, respectively, and provide the term of the professional services agreement. In this regard, we note the bullet point presentation in the second paragraph under "Employment Agreements, Severance and Change in Control Arrangements."

Business Agreements with Linde, page 163

45. Please confirm that all of the agreements described in this section have been filed as exhibits. If not, please do so or provide a detailed analysis concerning why such agreements do not need to be filed as exhibits.

Consolidated Financial Statements

46. Please update your filing with audited financial statements through March 31, 2010 in accordance with Rule 3-12 of Regulation S-X.

Notes to Consolidated Financial Statements

(4) Business Combinations and Asset Acquisition, page F-15

47. You use the relief from royalty method to value acquired trademarks and trade names. Please describe the factors that you considered in determining the appropriateness of this valuation method.

(17) Unaudited Pro Forma Balance Sheet and Net Income Per Share, page F-37

48. Please explain why the dividend payable of $130 million is not reflected in the pro forma accumulated deficit.

We urge all persons who are responsible for the accuracy and adequacy of the disclosure in the filing to be certain that the filing includes the information the Securities Act of 1933 and all applicable Securities Act rules require. Since the company and its management are in possession of all facts relating to a company's disclosure, they are responsible for the accuracy and adequacy of the disclosures they have made.

Notwithstanding our comments, in the event you request acceleration of the effective date of the pending registration statement please provide a written statement from the company acknowledging that:

- should the Commission or the staff, acting pursuant to delegated authority, declare the filing effective, it does not foreclose the Commission from taking any action with respect to the filing;

- the action of the Commission or the staff, acting pursuant to delegated authority, in declaring the filing effective, does not relieve the company from its full responsibility for the adequacy and accuracy of the disclosure in the filing; and

- the company may not assert staff comments and the declaration of effectiveness as a defense in any proceeding initiated by the Commission or any person under the federal securities laws of the United States.

Please refer to Rules 460 and 461 regarding requests for acceleration. We will consider a written request for acceleration of the effective date of the registration statement as confirmation of the fact that those requesting acceleration are aware of their respective responsibilities under the Securities Act of 1933 and the Securities Exchange Act of 1934 as they relate to the proposed public offering of securities specified in the above registration statement. Please allow adequate time for us to review any amendment prior to the requested effective date of the registration statement.

You may contact Franklin Wyman at (202) 551-3660 or Mary Mast at (202) 551-3613 if you have questions regarding comments on the financial statements and related matters. Please contact John Krug, Senior Counsel, at (202) 551-3862, Suzanne Hayes, Branch Chief, at (202) 551-3675, Dan Greenspan, Special Counsel, at (202) 551-3623, or me at (202) 551-3715 with any other questions.

Sincerely,

Jeffrey Riedler
Assistant Director

cc: Steven D. Singer, Esq.
Lia Der Marderosian, Esq.
Wilmer Cutler Pickering Hale and Dorr LLP
60 State Street
Boston, Massachusetts 02109