Mail Stop 6010

May 12, 2006

Michael D. Dale
President and Chief Executive Officer
ATS Medical, Inc.
3905 Annapolis Lane, Suite 105
Minneapolis, Minnesota 55447

Re: ATS Medical, Inc.
Registration Statement on Form S-4 Filed April 18, 2006
File No. 333-133341

Dear Mr. Dale:

We have reviewed your filing and have the following comments. Where indicated, we think you should revise your document in response to these comments. If you disagree, we will consider your explanation as to why our comment is inapplicable or a revision is unnecessary. Please be as detailed as necessary in your explanation. 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 understand that the purpose of our review process is to assist you in your compliance with the applicable disclosure requirements and to enhance the overall disclosure in your filing. We look forward to working with you in these respects. We welcome any questions you may have about our comments or on any other aspect of our review. Feel free to call us at the telephone numbers listed at the end of this letter.

Proxy Statement/Prospectus

1. Please revise so that the cover page of the proxy statement/prospectus does not exceed one page. Refer to Item 501 of Regulation S-K.

2. Please include the summary term sheet required by Item 1001 of Regulation M-A.

3. Under the federal proxy rules, the term “information statement” is used when proxy authorization or consent is not being solicited from shareholders. Since 3F Therapeutics is soliciting consents, please use the term “consent solicitation statement” rather than “information statement.”

Questions and Answers About the Merger, page 1

4. Please provide cross-references to the more detailed discussion of each topic addressed in the Q&A included in the body of the proxy statement.

What will 3F Therapeutics Stockholders Receive in the Merger?, page 1

5. Revise your disclosure to include summaries of the escrow and potential milestone payments as a separate Q&As so this answer is not so lengthy.

6. State how many shares of ATS Medical the 3F shareholders will receive on a per share basis upon completion of the merger, excluding escrow shares and milestone shares and estimating the shortfall reduction that may occur.

7. Rather than overstating what 3F stockholders "will receive," revise to state what they actually will receive upon completion of the merger, and disclose that they may receive additional shares sometime in the future from the escrowed shares and in connection with the achievement of milestones.

8. In an appropriate location in the filing, expand to discuss in more detail how the shortfall would be determined, what is included in "net operating assets," and how significant the difference might be, since it would reduce the shares 3F Therapeutics holders would receive.

9. Please revise to disclose how soon after (i) completion of the merger, (ii)expiration of the escrow period and (iii) achievement of milestones you will commence distributions of ATS stock to former 3F stockholders.

10. For the purpose of calculating a reduction in the escrow shares as a result of any shortfall, indemnification, and other claims, disclose the per share value that will apply to the 3F shares.

11. Expand to disclose how the Abby litigation could affect the number of shares the 3F Therapeutics holders may ultimately receive.

12. In an appropriate section of the proxy statement/prospectus, disclose the circumstances under which 3F would determine to deposit up to 25,000 shares into escrow to cover future expenses of the stockholder representative.

13. Since appraisal rights are the only alternative for 3F Therapeutics shareholders, expand to discuss after the question "What will 3F stockholders receive in the merger? In order for a 3F shareholder to be able to evaluate whether to consent or seek appraisal rights, ensure that the disclosure adequately informs shareholders of what they are going to receive in this merger, and tell them what the minimum is that they could receive on a per-share

basis. Also disclose how their ability to seek appraisal rights would be affected if they submit a consent.

Will the Merger Dilute the Ownership of ATS Medical Shareholders?, page 2

14. Revise to disclose the dilutive effect of the merger on existing ATS shareholders using estimated net operating assets and assuming you issue 8,100,000, 9,000,000 or 19,000,000 shares of common stock to 3F stockholders.

What are Holders of 3F Therapeutics Options and Warrants Required to Do . . ., page 5

15. We note your disclosure here that 3F warrant and optionholders "will need to" sign and the agreement to exercise or terminate their options. Please revise your disclosure here and throughout your filing to clarify that 3F optionholders are not "required" to execute this agreement and that the options do not by their terms terminate upon the completion of the merger. Also clarify what will happen to outstanding the options and warrants if shareholders do not exercise or terminate them prior to consummation of the merger.

How Quickly Can 3F Therapeutic Stockholders Sell Shares of ATS Medical . . ., page 5

16. Disclose the number of shares of ATS common stock that are subject to lock-up agreements and disclose when those shares become freely tradable.

What Do ATS Medical Shareholders and 3F Therapeutic Stockholders Need To Do Now?, page 7

17. Please revise your disclosure to explain why the parties to the merger agreement "believe it is advisable to maximize the number of consents" from 3F stockholders. For instance, if you are seeking to reduce the number of 3F shareholders who seek appraisal rights under Delaware law, so state.

Interests of Certain Persons in the Merger, page 9

18. Quantify each of the benefits that each of 3F's directors and executive officers is expected to receive as a result of the merger, including amounts payable under severance provisions.

Recovery of Edwards Lifesciences Holdback Amount, page 13

19. We note your disclosure in the final sentence that amounts recovered in excess of $2,000,000 "shall be paid to the 3F Therapeutics stockholder representative." In an appropriate section of your filing, please disclose how and when these funds would be distributed to former 3F stockholders.

Selected Financial Information, page 18

Selected Historical Financial Information of 3F Therapeutics, page 19

20. Please revise to include five years of Selected Financial Data as required by Item 301 of Regulation S-K.

Unaudited Pro Forma Condensed Combined Financial Statements of ATS Medical, Inc. and 3F Therapeutics, Inc., page 20

21. Please revise to present pro forma adjustments on a gross basis and in self-balancing form. Please also reference each adjustment to an applicable explaining footnote. Refer to Article 11-02(b)(6) of Regulation S-X.

Notes to Unaudited Pro Forma Condensed Combined Financial Statements, page 23

22. Revise Note (a) to clearly disclose how you determined the value assigned to the common shares issued and the basis for determining that value. Please include all significant assumptions and estimates that were used.

23. Please expand Note (a) to clarify that up to19 million shares may be issued in the merger, to clarify the circumstances that may lead to issuance of the contingent shares and to explain why only 9 million shares are used in preparing the pro forma financial data. Clarify how you plan to account for any contingent consideration.

24. While we understand that the purchase allocation maybe preliminary, the pro forma data should allocate purchase price to specific tangible and intangible assets using management's best estimates. Accompanying disclosure should highlight uncertainties where the allocation is preliminary. Please revise.

25. As a related matter, we see on pages 37 and 112 that 3-F Therapeutics is currently developing new products. We also see that 3-F Therapeutics expends a significant amount on research and development. Tell us why the pro forma data should not include an estimated charge for in-process research and development. We reiterate that the purchase allocation should reflect your best estimates with appropriate disclosure about uncertainties.

26. Please describe your basis for concluding that the fair value of the deferred revenue is equal to the carrying amount presented on 3F Therapeutics' balance sheet.

27. Please update the purchase price allocation and related disclosures to reflect any preliminary valuations or other studies available as of the most recent practicable date. We assume that you are not currently aware of any probable material allocations or adjustments, not reflected herein, that are likely to be recorded. In addition, please revise

footnote (1) to disclose when the allocation is expected to be finalized and to describe the information on which you are waiting.

Note Regarding Forward-Looking Statements, page 26

28. Please relocate this disclosure so that your Risk Factors section immediately follows your Summary section.

Risk Factors, page 27

29. Please revise the penultimate sentence of the introductory paragraph to eliminate the implication that you have not discussed all material risks, and revise your risk factors section as necessary to include a discussion of all material risks.

If the Conditions to the Merger Are Not Met, the Merger May Not Occur, page 29

30. Disclose that, as a result of the legal proceeding referenced on page 81, ATS has notified 3F that it reserves the right to terminate the merger agreement.

The majority of the shares issuable in the merger are contingent…, page 40

31. For a 3F Therapeutics shareholder, this seems like the most important risk and should be relocated to near the front of the risk factors section.

General information about shareholder approval, page 41

32. We note the statement on page 42 that "approval of the increase in authorized capital stock described in Proposal 2 below is not a condition to the approval of any other proposal." This is inconsistent with the following sentence which says that approval of proposal 2 "is necessary" so that ATS Medical has enough shares to issue in the merger.

33. Clarify in the second paragraph on page 43 whether the condition regarding appraisal is waivable and what the consequences would be if a higher percentage sought appraisal rights. State where the funds would come from for paying those who seek appraisal rights.

Proposal 1: The Merger, page 44

Background of the Merger, page 44

34. Describe the negotiations that took place regarding arrangements for executive officers and directors of 3F to receive employment, severance or other forms of compensation in addition to the per share amounts to be received by all existing security holders. Explain

how the negotiations regarding these arrangements affected negotiations regarding material terms of the proposed merger.

35. Revise to identify the directors who abstained and voted against entering into the merger agreement with 3F and their reasons for doing so, if known.

36. We note your disclosure regarding the November 9, 2005 ATS board meeting. Please expand your disclosure with regard to possible strategic transactions ATS considered as alternatives to the proposed merger. Identify the alternatives and explain why they were rejected.

Opinion of ATS Medical's Financial Advisor, page 51

37. Please provide us with the materials that Piper Jaffray provided to the ATS board in connection with this transaction.

38. Expand the disclosure on pages 58 and 59 to quantify the amount paid (and to be paid in the event the proposed merger is consummated) to Piper Jaffray for all services it provided in connection with this transaction, as well as all fees and other payments for services paid by ATS during the preceding two years. Please also apply this comment to the disclosure on page 65 regarding services provided by UBS to 3F.

Opinion of 3F Therapeutics' Financial Advisor, page 59

39. Please provide us with the materials that UBS provided to the 3F board in connection with this transaction.

Legal Proceedings, page 81

40. Expand to state the amount of damages and other relief being sought by Mr. Abbey in this litigation. Also, identify the "certain stockholders" who entered into the special escrow agreement.

Composition of the Board of Directors of ATS Medical Following the Merger, page 91

41. Disclose that Mr. Koentopf is not standing for re-election to the board because, as stated in your Form 8-K filed March 23, 2006, he disagrees with he strategic direction of ATS reflected in the decision to acquire 3F.

Certain Information Concerning 3F Therapeutics, page 110

Patents and Proprietary Technology, 115

42. Please provide the duration and effect of each material patent.

Results of Operations, page 123

43. Please tell us about and expand to further clarify the nature and timing of 3F Therapeutics' obligations under the various agreements with Edwards as referred to under "Supply and Distribution Agreements" on page 114. Also tell us and expand to explain why the pattern of revenue is appropriate in GAAP. The written response should be detailed and specific.

44. Please revise to discuss the nature and accounting for the cost of license fee revenues of $1.3 million during 2005.

Cost of Product Revenues, page 124

45. We see that cost of product revenues as a percentage of product revenues increased to 98% during 2005. 3F Therapeutics attributes that decrease in gross margin to increased manufacturing costs and fixed prices for products sold to Edwards. Please expand to quantify the affect on gross margin of each of the two factors. Please also disclose why manufacturing costs increased. Clarify whether you are selling products to Edwards at a loss, and if so, tell us and disclose how you are accounting for any losses anticipated under the arrangement.

Cash Management, page 126

46. Expand to disclose in more detail the reasons for the $775,000 "employee-related expenses."

Executive Officers and Significant Employees of 3F Therapeutics, page 127

47. Expand to discuss the related party transactions noted in footnote 10 on page FS-15, and identify each of the parties.

Security Ownership of Certain Beneficial Owners and Management, page 130

48. Please revise to identify the natural persons who beneficially own shares held by the non-public entities named in the table.

49. Disclose the position held by each individual in the appropriate footnote if not already disclosed on page 127. Also, identify Mr. Skokos as chairman of the board of directors.

Proposal 2: Approval of Amendment to Restated Articles . . ., page 144

50. Revise your disclosure to indicate the number of authorized, unreserved and unissued shares of common stock that will be available for future issuances giving effect to (i) the

approval of the increase in the number of authorized shares and (ii) the issuance of 19,000,000 shares in connection with the merger.

51. State, if true, that the merger cannot take place unless shareholders also approve this proposal.

Financial Statements of 3F Therapeutics, Inc.

General

52. Please update the financial statements when required by Rule 3-12 of Regulation S-X.

Note 1. Nature of Business and Summary of Significant Accounting Policies, page FS-6

Product Revenue, page FS-7

53. We see your use of distributors to generate sales. Please tell us about the nature and extent of post-shipment obligations, return and exchange policies, warranties, and price protection or other similar discounts, rebates or credits offered to these parties. Describe how these matters, if any, are considered in your revenue practices. Please expand the revenue policy disclosure to address any significant matters addressed in your response.

Appendix C

54. Remove the language in the second paragraph on page C-3 that implies and/or explicitly states that investors may not rely on the fairness opinion. With regard to the last sentence in this paragraph, expand to state that the fairness advisor has given its approval.

Item 22. Undertakings, page II-2

55. Include the undertakings required by Item 512(a) of Regulation S-K. See Section II.F of SEC Release 33-6578 (April 23, 1985).

Exhibit 4.6

56. It is not clear how 3F shareholders who receive this consent solicitation statement will communicate their consent. It appears that there should be a form a consent that they can sign, date, and return. Please advise.

Exhibit 5.1

57. We note that the registrant does not currently have sufficient authorized and unissued shares to complete the merger; therefore, explain the basis for counsel's opinion that the shares will be "validly issued."

Exhibit 8.1

58. Given the first sentence in the penultimate paragraph, please file an updated opinion on the date you plan to go effective on the registration statement. Please remove limiting language in the last paragraph that the opinion is addressed "solely" to [the registrant] and that it "may not be relief upon by any other person…," or make clear that shareholders are entitled to rely on the opinion.

Exhibits 23.1 and 23.2

59. Please present updated accountants' consents with any amendment to the filing.

Form 10-K for ATS Medical, Inc. for the year ended December 31, 2005
Consolidated Financial Statements

Note 6. Long-Term Debt, page F-13

60. We see that you have issued convertible notes and that you may incur liquidated damages or penalties pursuant to a registration rights agreement. Please refer to the guidance provided in the Division of Corporation Finance's Current Accounting and Disclosure Issues Outline at http://www.sec.gov and address the following:

- Please ensure that you have fully disclosed all of the material terms of the convertible notes and warrants, including but not limited to, the conditions under which you or the holder may convert into common shares, the conversion rate and all conditions that may result in adjustments to that rate, any conditions under which you or the holder may accelerate payment of the notes, the interest rate and the conditions that result in adjustments to that rate and cashless exercise provisions of the warrants. Likewise, please clearly describe the material terms of the registration rights agreements, including the conditions under which you would be required to pay liquidated damages.

- Tell us how you have considered the guidance provided in EITF 05-4 The Effect of a Liquidated Damages Clause on a Freestanding Financial Instrument Subject to Issue No. 00-19 in concluding how to account for these instruments. While we note that the EITF has not reached a consensus on this issue and has deferred deliberation until the FASB addresses certain questions which could impact a conclusion on this issue, please tell us how you considered the guidance in EITF 05-4 and the different views on this issue as outlined in Issue Summary No. 1 to EITF 05-4 in analyzing the registration rights agreement and in considering whether you are required to bifurcate the conversion option from the debt host.

- Tell us how you have applied the guidance in EITF Issue 00-19 in evaluating whether any features of your convertible notes are embedded derivatives that you should separate from the debt host, record as liabilities and account for at fair value under SFAS 133. Specifically respond with respect to the conversion feature. In that regard, it appears that the notes may not meet the definition of conventional convertible in paragraph 4 of EITF Issue 00-19 since the notes have a feature wherein the conversion price is reset under certain circumstances. We also note that you currently have insufficient shares to satisfy the convertible notes in shares. Please provide us with your analysis of each of the embedded features under paragraphs 12-32 of EITF 00-19.

Your response should thoroughly support your accounting for the convertible notes and tell us what you did to identify any embedded derivatives requiring bifurcation pursuant to SFAS 133.

61. In addition, it appears that the warrants issued in connection with the notes are also subject to the same registration rights agreement noted above for the convertible debt. As a result, we note the accounting and classification of these freestanding instruments may also be impacted depending on your view as to the appropriate accounting for the instruments under EITF 00-19 and your consideration of EITF 05-4. We also note that your warrants have a cashless exercise provision and that you currently have insufficient shares to satisfy the convertible debt and the warrant obligations in shares. Please advise in detail.

Note 16, Quarterly Financial Data, page F-18

62. Tell us why none of the $1.8 million of production variances and ramp-up costs related to prior quarters. Explain why you believe the entire charge is a fourth quarter event.

* * * * *

As appropriate, please amend your registration statement in response to these comments. You may wish to provide us with marked copies of the amendment to expedite our review. Please furnish a cover letter with your amendment that keys your responses to our comments and provides any requested supplemental information. Detailed cover letters greatly facilitate our review. Please understand that we may have additional comments after reviewing your amendment and responses to our comments.

We urge all persons who are responsible for the accuracy and adequacy of the disclosure in the filings reviewed by the staff to be certain that they have provided all information investors require for an informed decision. 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 the company requests acceleration of the effective date of the pending registration statement, it should furnish a letter, at the time of such request, 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.

In addition, please be advised that the Division of Enforcement has access to all information you provide to the staff of the Division of Corporation Finance in connection with our review of your filing or in response to our comments on your filing.

We will consider a written request for acceleration of the effective date of the registration statement as a 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 the securities specified in the above registration statement. We will act on the request and, pursuant to delegated authority, grant acceleration of the effective date.

We direct your attention to Rules 460 and 461 regarding requesting acceleration of a registration statement. Please allow adequate time after the filing of any amendment for further review before submitting a request for acceleration. Please provide this request at least two business days in advance of the requested effective date.

You may contact Kristin Lochhead at (202) 551-3664 or Gary Todd at (202) 551-3605 if you have questions regarding comments on the financial statements and related matters. Please contact Donald C. Hunt at (202) 551-3647 or me at (202) 551-3800 with any other questions.

Sincerely,

Peggy A. Fisher
Assistant Director

cc (via fax): Timothy S Hearn, Esq. – Dorsey & Whitney LLP