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SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, D.C. 20549

REGISTRATION STATEMENT

ON

FORM S-3

REGISTRATION STATEMENT

UNDER

THE SECURITIES ACT OF 1933

AVI BIOPHARMA, INC.

(Exact name of registrant as specified in its charter)

OREGON	**93-0797222**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

ONE S.W. COLUMBIA, SUITE 1105
PORTLAND, OR 97258
(503) 227-0554

(Address, including zip code, and telephone number, including area code of registrant's principal executive offices)

DENIS R. BURGER, PH.D.
CHIEF EXECUTIVE OFFICER
AVI BIOPHARMA, INC.
ONE S.W. COLUMBIA, SUITE 1105
PORTLAND, OR 97258
(503) 227-0554

(Name, address, including zip code, and telephone number, including area code of agent for service)

COPY TO:
ROBERT A. STOUT, ESQ.
HURLEY, LYNCH & RE, P.C.
747 SW INDUSTRIAL WAY, BEND, OR 97702

Approximate date of commencement of proposed sale to the public: As soon as **practicable** after the effective date of this Registration Statement.

If the only securities being registered on this form are being offered pursuant to dividend or interest reinvestment plans, please check the following box. / /

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, other than securities offered only in connection with dividend or interest investment plans, check the following box. /x/

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. / /

If this form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. / /

If this form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. / /

If delivery of the prospectus is expected to be made pursuant to Rule 434, please check the following box. / /

CALCULATION OF REGISTRATION FEE

Title of securities to be registered	**Amount to be registered**	**Proposed maximum offering price per share[2]**	**Proposed maximum aggregate offering price**	**Amount of registration fee**
Common Stock, $.0001 par value[1]	4,795,775	$9.24	$44,312,961	$11,078.24

TOTAL	4,795,775	$9.24	$44,312,961	$11,078.24

(1) Includes 3,000,000 shares of our Common Stock issuable under a warrant held by Medtronic Asset Management, Inc. and 352,113 shares of our Common Stock issuable under our Investment Agreement with Medtronic Asset Management, Inc.

(2) The offering price is estimated solely for the purpose of calculating the registration fee in accordance with Rule 457(c) using the average of the high and low price reported by the Nasdaq National Market for the Common Stock on August 22, 2001 which was approximately $9.24.

THE REGISTRANT HEREBY AMENDS THIS REGISTRATION STATEMENT ON SUCH DATE OR DATES AS MAY BE NECESSARY TO DELAY ITS EFFECTIVE DATE UNTIL THE REGISTRANT SHALL FILE A FURTHER AMENDMENT WHICH SPECIFICALLY STATES THAT THIS REGISTRATION STATEMENT SHALL THEREAFTER BECOME EFFECTIVE IN ACCORDANCE WITH SECTION 8(a) OF THE SECURITIES ACT OF 1933 OR UNTIL THE REGISTRATION STATEMENT SHALL BECOME EFFECTIVE ON SUCH DATE AS THE COMMISSION, ACTING PURSUANT TO SAID SECTION 8(a), MAY DETERMINE.

SELLING SHAREHOLDERS' PROSPECTUS

AVI BIOPHARMA, INC.
4,795,775 COMMON SHARES
NASDAQ NATIONAL MARKET
AVII

THIS INVESTMENT INVOLVES A HIGH DEGREE OF RISK. YOU SHOULD PURCHASE SHARES ONLY IF YOU CAN AFFORD A COMPLETE LOSS OF YOUR INVESTMENT. SEE RISK FACTORS BEGINNING ON PAGE 8.

NEITHER THE SECURITIES AND EXCHANGE COMMISSION NOR ANY STATE SECURITIES COMMISSION HAS APPROVED OR DISAPPROVED THE COMMON SHARES, OR DETERMINED IF THIS PROSPECTUS IS TRUTHFUL OR COMPLETE. ANY REPRESENTATION TO THE CONTRARY IS A CRIMINAL OFFENSE.

- This is an offering of Common Shares by existing shareholders of AVI BioPharma, Inc. or by pledgees, donees, transferees, or other successors in interest that receive such Common Shares as a gift, distribution, or other non-sale related transfer.—The selling shareholders will receive all of the proceeds from the sale of the Common Shares, less any commissions or discounts paid to brokers or other agents. We will not receive any of the proceeds from the sale of the Common Shares.

- The selling shareholders may offer and sell the Common Shares on the Nasdaq National Market at prevailing market prices, or in privately negotiated transactions at prices other than the market price. On August 22, 2001, the closing sale price for our Common Shares on the Nasdaq National Market was $9.04.

- The Common Shares were or will be obtained by the selling shareholders in transactions that were exempt from the registration requirements of the Securities Act of 1933, as amended, and represent approximately 20.75% of the Company's outstanding Common Stock.

August 28, 2001

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INCORPORATION OF CERTAIN DOCUMENTS BY REFERENCE

The following documents that we filed with the Securities and Exchange Commission are incorporated by reference in this Prospectus:

(1) our Annual Report on Form 10-K for the year ended December 31, 2000, which we refer to in the rest of this document as our Annual Report;

(2) our Report on Form 10-Q dated May 10, 2001, for the quarter ended March 31, 2001;

(3) our Report on Form 10-Q dated August 14, 2001, for the quarter ended June 30, 2001;

(4) our Report on Form 8-K filed on July 2, 2001 and relating to an event on June 20, 2001;

(5) our Report on Form 8-K filed on June 6, 2001 and relating to an event on May 22, 2001; and

(6) our definitive proxy statement for our 2001 Annual Meeting of Shareholders filed April 16, 2001.

In addition, all documents which we file with the Securities and Exchange Commission ("Commission") pursuant to Section 13, 14 or 15(d) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), after the date of the Registration Statement and before termination of the offering of Common Shares, including all annual reports on Form 10-K, and all filings on Forms 10-Q and 8-K, will be deemed to be incorporated by reference in this Prospectus and to be a part of this Prospectus from the date those documents are filed. Any statement contained in a document which is incorporated, or deemed to be incorporated, by reference into this Prospectus, shall be considered modified or superseded for purposes of this Prospectus to the extent that a statement contained in this Prospectus or in any other subsequently filed document which also is, or is deemed to be, incorporated by reference herein modifies or supersedes such statement. Any such statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this Prospectus.

You may request a copy of any document incorporated by reference in this Prospectus at no cost. To receive a copy, write or call us at AVI BioPharma, Inc., One S.W. Columbia, Suite 1105, Portland, Oregon 97258, Attention: Mr. Alan P. Timmins (503) 227-0554.

We are subject to the informational requirements of the Exchange Act and file reports and other information with the Commission. Reports and other information which we file with the Commission, including the Registration Statement on Form S-3 of which this Prospectus is a part, may be inspected and copied at the public reference facilities of the Commission at Judiciary Plaza, 450 Fifth Street, N.W., Room 1024, Washington, D.C. 20549, at prescribed rates. The Commission's telephone number is 1-800-SEC-0330. These materials may be obtained electronically by visiting the Commission's web site on the Internet at http://www.sec.gov. Our Common Stock is listed on the Nasdaq National Market. Reports, proxy statements and other Company materials also can be inspected at 1735 K Street, N.W., Washington, D.C. 20006-1506.

SUMMARY

MANY OF THE MATTERS SET FORTH IN THIS PROSPECTUS CONTAIN FORWARD-LOOKING STATEMENTS THAT ARE SUBJECT TO RISKS AND UNCERTAINTIES THAT COULD CAUSE ACTUAL RESULTS TO DIFFER MATERIALLY FROM THOSE SET FORTH HEREIN. WE REFER YOU TO CAUTIONARY INFORMATION CONTAINED ELSEWHERE HEREIN AND IN OTHER DOCUMENTS WE FILE WITH THE SECURITIES AND EXCHANGE COMMISSION FROM TIME TO TIME.

OUR COMPANY

BUSINESS

We are a biopharmaceutical company developing therapeutic products based on our two distinct core (platform) technologies, cancer immunotherapy and NeuGene antisense. Our principal products target life-threatening diseases, with initial applications in pancreatic and colorectal cancers, cardiovascular restenosis, and infectious disease as summarized in the following table.

Technology	Product	Indication	Stage
Cancer immunotherapy	Avicine therapeutic vaccine	Cancer	Clinical
	Xactin monoclonal antibodies		
		Cancer	Pre-clinical
NeuGene antisense	Resten-NG	Restenosis	Clinical
	Oncomyc-NG	Cancer	Pre-clinical
	NeuBiotics	Infectious disease	Pre-clinical

Currently approved drugs or other therapies for these diseases often prove to be ineffective in treating advanced stages of these diseases or produce numerous undesirable side effects. Our pre-clinical and clinical studies indicate that our two core technologies may produce significantly fewer side effects and offer more effective treatment options than currently approved products for these diseases. Our technologies are protected by a strong patent position including 46 issued patents and 64 applications pending. Each of our lead products, Avicine and Resten-NG, addresses a large market estimated to exceed $1 billion worldwide.

CANCER IMMUNOTHERAPY

We have completed three Phase I and two Phase II clinical trials with Avicine, our therapeutic cancer vaccine, which is our most advanced product. We started Phase III clinical trials in January 2001. Avicine is administered to patients who already have cancer to stimulate an immune response that may be effective in fighting the existing cancer. The therapeutic benefit of a cancer vaccine depends on the existence of specific target sites, called tumor antigens, on cancer cells. The target for Avicine is a hormone called human chorionic gonadotropin, or hCG, which is responsible for stimulating fetal development during pregnancy. It is also a tumor antigen on all major types of cancer, including cancers of the colon, pancreas, prostate, lung and breast. We believe that hCG plays an important role in the spread of cancer. The effectiveness of Avicine is based on stimulating an immune response against hCG.

From our clinical studies involving more than 200 patients, we believe that Avicine is a safe and essentially non-toxic therapy capable of producing a specific immune response in most patients. Further, the patients who mounted an immune response to hCG lived longer on average than patients treated with chemotherapy. We intend to investigate further the use of Avicine alone and in conjunction with chemotherapy in Phase II and Phase III clinical trials.

In April 2000, we entered into an alliance with SuperGen, Inc. for shared development and marketing rights for Avicine. Under the terms of the agreement, AVI and SuperGen, Inc. will equally share in future clinical development and FDA registration costs as well as in profits from product sales in the United States. Closing of the transaction occurred in July 2000.

We have an exclusive product license agreement with Abgenix, Inc. for the use of its technology to produce fully human monoclonal antibodies against hCG cancer targets, which we call Xactin antibodies. These Xactin antibodies are directed at targets identified by our Avicine clinical trials. Two

Xactin antibodies are in pre-clinical development and are designed to treat cancer patients as a standalone therapy or in combination with Avicine.

NEUGENE ANTISENSE

We have developed gene-inactivating compounds called NeuGene antisense drugs that we believe are more stable, specific, efficacious, and safe than other antisense or gene-inactivating technologies. Our NeuGene drugs are distinguished by a novel chemical structure which differs from the earlier generation structures of competing technologies.

NeuGenes are synthetic drugs that are designed to block the function of specific genetic sequences involved in the disease process. Targeting specific genetic sequences provides for greater selectivity than is available through conventional drugs. NeuGenes have the potential to provide safe and effective treatment for a wide range of human diseases.

We have completed pre-clinical studies using our NeuGene compounds in the treatment of restenosis, which is the blockage of arteries following balloon angioplasty, and cancer. We finished a Phase I clinical trial of Resten-NG for restenosis in April 2000 and a Phase II clinical study commenced in June 2000. We began Phase I testing of the oral formulation of Resten-NG in July 2000. We completed a Phase I clinical trial of Oncomyc-NG in cancer and plan to commence a Phase I/II clinical trial in June 2001. We also have completed preclinical trials for NeuGene compounds in the treatment of polycystic kidney disease and cytochrome P450 3A4, a liver enzyme, with Phase I/II clinical trials planned for late 2001 and commenced preclinical trials on NeuGenes to treat inflammation. Finally, we intend to complete pre-clinical development of our first NeuGene-based antibiotic, called NeuBiotics, later this year. As described under "Business—Collaborative Agreements—Medtronic Agreement," we have entered a licensing arrangement with Medtronic, Inc. ("Medtronic") for Medtronic to develop and use certain antisense compounds, in conjunction with Medtronic devices, to combat vascular disease, including restenosis.

DEVELOPMENT AND COMMERCIALIZATION STRATEGY

Our experience and resources enable us to initiate drug discovery and development and to move drug candidates through pre-clinical development and into Phase I and II human clinical trials. Our near-term strategy is to co-develop products with strategic partners or to license the marketing rights for our products to pharmaceutical partners after we complete one or more Phase II clinical trials. In this manner, costs associated with late-stage clinical development and marketing will be shared with, or the responsibility of, our strategic partners. With additional resources we may consider assuming greater responsibility for the late-stage clinical development and marketing opportunities of future product candidates.

Our executive offices are located at One SW Columbia, Suite 1105, Portland, Oregon 97258, and we can be reached at (503) 227-0554. Our World Wide Web address is "http://www.avibio.com." Information on our web site does not constitute a part of this prospectus.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Prospectus contains forward-looking statements regarding our plans, expectations, estimates and beliefs. Our actual results could differ materially from those discussed in, or implied by, these forward-looking statements. Forward-looking statements are identified by words such as "believe," "anticipate," "expect," "intend," "plan," "will," "may," and other similar expressions. In addition, any statements that refer to expectations, projections or other characterizations of future events or circumstances are forward-looking statements. We have based these forward-looking statements largely

on our expectations. Forward-looking statements in this Prospectus include, but are not necessarily limited to, those relating to:

- our intention to introduce new products

- FDA or other regulatory approval for our products
- our expectations about the markets for our products
- acceptance of our products in the marketplace
- our future capital needs
- success of our patent applications

Forward-looking statements are subject to risks and uncertainties, certain of which are beyond our control. Actual results could differ materially from those anticipated as a result of the factors described in the "Risk Factors" and detailed in our other Securities and Exchange Commission filings, including among others:

- the effect of regulation by the FDA and other governmental agencies
- delays in obtaining, or our inability to obtain, approval by the FDA or other regulatory authorities for our products
- research and development efforts, including delays in developing, or the failure to develop, our products
- the development of competing or more effective products by other parties
- the results of pre-clinical and clinical testing
- uncertainty of market acceptance of our products
- problems that we may face in manufacturing, marketing, and distributing our products
- our inability to raise additional capital when needed
- delays in the issuance of, or the failure to obtain, patents for certain on our products and technologies
- problems with important suppliers and business partners

We do not undertake any obligation to update or revise any forward-looking statements contained in this Prospectus or incorporated by reference, whether as a result of new information, future events or otherwise. Because of these risks and uncertainties, the forward-looking events and circumstances discussed in this Prospectus might not transpire. Factors that cause actual results or conditions to differ from those anticipated by these and other forward-looking statements include those more fully described in the "Risk Factors" section and elsewhere in this Prospectus.

NOTES TO READERS OF THIS PROSPECTUS

We were incorporated in Oregon in 1980. When we refer to "us," "we," "our," "the Company" and "AVI" in this Prospectus, we mean AVI BioPharma, Inc., and its consolidated subsidiaries. Our executive offices are located at One S.W. Columbia, Suite 1105, Portland, Oregon 97258. Our telephone number at that location is (503) 227-0554. Information contained on our websites does not constitute part of this Prospectus.

We are subject to the informational requirements of the Exchange Act and file reports and other information with the Commission. Reports and other information which we file with the Commission, may be inspected and copied at the public reference facilities of the Commission at Judiciary Plaza, 450 Fifth Street, N.W., Room 1024, Washington, D.C. 20549, at prescribed rates. The Commission's telephone number is 1-800-SEC-0330. These materials may be obtained electronically by visiting the Commission's website on the Internet at http://www.sec.gov. Reports, proxy statements and other Company materials also can be inspected at 1735 K Street, N.W., Washington, D.C. 20006-1506 or obtained directly from the Company at the address and telephone listed above.

This Prospectus includes our trademarks and registered trademarks, including Avicine(TM), NEUGene(R) and Xactin(TM). Each other trademark, trade name or service mark appearing in this Prospectus belongs to its holder.

RISK FACTORS

AN INVESTMENT IN OUR COMMON STOCK INVOLVES A HIGH DEGREE OF RISK. YOU SHOULD CAREFULLY CONSIDER THE SPECIFIC FACTORS LISTED BELOW, TOGETHER WITH THE CAUTIONARY STATEMENT THAT FOLLOWS THIS SECTION AND THE OTHER INFORMATION INCLUDED IN THIS PROSPECTUS, BEFORE PURCHASING SHARES IN THIS OFFERING. IF THE POSSIBILITIES DESCRIBED AS RISKS BELOW ACTUALLY OCCUR, OUR OPERATING RESULTS AND FINANCIAL CONDITION WOULD LIKELY SUFFER, AND THE TRADING PRICE OF OUR COMMON STOCK MAY FALL, CAUSING YOU TO LOSE SOME OR ALL OF YOUR INVESTMENT IN THE SHARES WE ARE OFFERING.

RISKS RELATING TO OUR BUSINESS

OUR PRODUCTS ARE IN AN EARLY STAGE OF DEVELOPMENT AND MAY NOT BE DETERMINED TO BE SAFE OR EFFECTIVE.

Although we began operations in 1980, we are only in the early stages of clinical development with our NeuGene antisense pharmaceutical products. We have devoted almost all of our time to research and development of our technology and products, protecting our proprietary rights and establishing strategic alliances. Our proposed products are in the pre-clinical or clinical stages of development and will require significant further research, development, clinical testing and regulatory clearances. We have no products available for sale and we do not expect to have any products available for sale for several years. Our proposed products are subject to development risks. These risks include the possibilities that any of the products could be found to be ineffective or toxic, or could fail to receive necessary regulatory clearances. Although we have obtained favorable results in Phase II trials using Avicine to treat colorectal cancer patients, we cannot assure that we will obtain similar results in the contemplated Phase III trial protocol. We have not received any significant revenues from the sale of products and we cannot assure investors that we will successfully develop marketable products, that our sales will increase or that we will become profitable. Third parties may develop superior or equivalent, but less expensive, products.

WE HAVE INCURRED NET LOSSES SINCE OUR INCEPTION, AND WE MAY NOT ACHIEVE OR SUSTAIN PROFITABILITY.

We incurred a net operating loss of $8.3 million in 1999 and of $9.2 million in 2000. "Net operating loss" represents the amount by which our expenses, other than interest expense, exceed revenues. As of December 31, 2000, our accumulated deficit was $60.3 million. Our losses have resulted principally from expenses incurred in research and development of our technology and products and from selling, general and administrative expenses that we have incurred while building our business infrastructure. We expect to continue to incur significant operating losses in the future as we continue our research and development efforts and seek to obtain regulatory approval of our products. Our ability to achieve profitability depends on our ability to complete development of our products, obtain regulatory approvals and market our products. It is uncertain when, if ever, we will become profitable.

IF WE FAIL TO ATTRACT SIGNIFICANT ADDITIONAL CAPITAL, WE MAY BE UNABLE TO CONTINUE TO SUCCESSFULLY DEVELOP OUR PRODUCTS.

Since we began operations, we have obtained operating funds primarily by selling shares of our company. Based on our current plans, we believe that current cash balances will be sufficient to meet our operating needs for at least the next 24 months. Furthermore, the actual amount of funds that we will need will be determined by many factors, some of which are beyond our control. These factors include the success of our research and development efforts, the status of our pre-clinical and clinical testing, costs relating to securing regulatory approvals and the costs and timing of obtaining new patent rights, regulatory changes, competition and technological developments in the market. We may need funds sooner than currently anticipated.

We anticipate that we may need to obtain additional funds during or at the end of this 24-month period. If necessary, potential sources of additional funding include strategic relationships, public or private sales of shares of our common stock or debt or other arrangements. We do not have any committed sources of additional financing at this time. It is uncertain whether we can obtain additional funding when we need it on terms that will be acceptable to us or at all. If we raise funds by selling additional shares of our common stock or securities convertible into our common stock, the ownership interest of our existing shareholders will be diluted. If we are unable to obtain financing when needed, our business and future prospects would be materially adversely affected.

IF WE FAIL TO RECEIVE NECESSARY REGULATORY APPROVALS, WE WILL BE UNABLE TO COMMERCIALIZE OUR PRODUCTS.

All of our products are subject to extensive regulation by the United States Food and Drug Administration, or FDA, and by comparable agencies in other countries. The FDA and comparable agencies require new pharmaceutical products to undergo lengthy and detailed clinical testing procedures and other costly and time-consuming compliance procedures. Avicine has completed three Phase I and two Phase II studies and just started Phase III trials. Our first NeuGene Antisense drug, Resten-NG, completed Phase I trials but has not yet entered Phase II efficacy studies. We cannot predict when we will initiate and complete our clinical trials or when we will be able to submit our products for regulatory review. Even if we submit a new drug application, there may be delays in obtaining regulatory approvals, if we obtain them at all. Sales of our products outside the United States will also be subject to regulatory requirements governing clinical trials and product approval. These requirements vary from country to country and could delay introduction of our products in those countries. We cannot assure you that any of our products will receive marketing approval from the FDA or comparable foreign agencies.

WE MAY FAIL TO COMPETE EFFECTIVELY, PARTICULARLY AGAINST LARGER, MORE ESTABLISHED PHARMACEUTICAL COMPANIES, CAUSING OUR BUSINESS TO SUFFER.

The biotechnology industry is highly competitive. We compete with companies in the United States and abroad that are engaged in the development of pharmaceutical technologies and products. They include: biotechnology, pharmaceutical, chemical and other companies; academic and scientific institutions; governmental agencies; and public and private research organizations.

Many of these companies and many of our other competitors have much greater financial and technical resources and production and marketing capabilities than we do. Our industry is characterized by extensive research and development and rapid technological progress. Competitors may successfully develop and market superior or less expensive products which render our products less valuable or unmarketable.

WE HAVE LIMITED OPERATING EXPERIENCE

We have engaged solely in the development of pharmaceutical technology. Although some of our management have experience in biotechnology company operations, we have limited experience in manufacturing or selling pharmaceutical products. We also have only limited experience in negotiating and maintaining strategic relationships, and in conducting clinical trials and other later-stage phases of the regulatory approval process. We cannot assure investors that we will successfully engage in any of these activities.

WE HAVE LIMITED MANUFACTURING CAPABILITY

While we believe that we can produce materials for Phase I and Phase II clinical trials at our existing facilities, we will need to expand our commercial manufacturing capabilities for products in the future if we elect not to or cannot contract with others to manufacture our products. This expansion may occur in stages, each of which would require regulatory approval, and product demand could at times exceed supply capacity. We have not selected a site for any expanded facilities and cannot predict the amount we will expend for construction of such facilities. We cannot assure if or when the FDA will determine that such facilities comply with Good Manufacturing Practices. The projected location and construction of any facilities will depend on regulatory approvals, product development, pharmaceutical partners and capital resources, among other factors. We have not obtained regulatory approvals for any productions facilities for our products, nor can we assure investors that we will be able to do so.

IF WE LOSE KEY PERSONNEL OR ARE UNABLE TO ATTRACT AND RETAIN ADDITIONAL, HIGHLY-SKILLED PERSONNEL REQUIRED FOR OUR ACTIVITIES, OUR BUSINESS WILL SUFFER.

Our success will depend to a large extent on the abilities and continued service of several key employees, including Drs. Denis Burger, Patrick Iversen, David Mason and Dwight Weller. The loss of any of these key employees could significantly delay the achievement of our goals. Competition for qualified personnel in our industry is intense, and our success will depend on our ability to attract and retain highly skilled personnel.

ASSERTING, DEFENDING AND MAINTAINING OUR INTELLECTUAL PROPERTY RIGHTS COULD BE DIFFICULT AND COSTLY, AND OUR FAILURE TO DO SO WILL HARM OUR ABILITY TO COMPETE AND THE RESULTS OF OUR OPERATIONS.

Our success will depend on our existing patents and licenses, and our ability to obtain additional patents in the future. We have been issued 46 patents and have filed an additional 64 patent applications in the United States, Canada, Europe, Australia and Japan. We license the composition,

manufacturing and use of Avicine in all fields, except fertility regulation from The Ohio State University, and we license other patents for certain complementary technologies from others.

We cannot assure investors that our pending patent applications will result in patents being issued in the United States or foreign countries. In addition, we cannot guarantee that patents which have been or will be issued will afford meaningful protection for our technology and products. Competitors may develop products similar to ours which do not conflict with our patents. Others may challenge our patents and, as a result, our patents could be narrowed or invalidated. The patent position of biotechnology firms generally is highly uncertain, involves complex legal and factual questions, and has recently been the subject of much litigation. No consistent policy has emerged from the United States Patent and Trademark Office, or USPTO, or the courts regarding the breadth of claims allowed or the degree of protection afforded under biotechnology patents. In addition, there is a substantial backlog of biotechnology patent applications at the USPTOs and the approval or rejection of patents may take several years.

Our success will also depend partly on our ability to operate without infringing upon the proprietary rights of others, as well as our ability to prevent others from infringing on our proprietary rights. We may be required at times to take legal action to protect our proprietary rights and, despite our best efforts, we may be sued for infringing on the patent rights of others. Patent litigation is costly and, even if we prevail, the cost of such litigation could adversely affect our financial condition. If we do not prevail, in addition to any damages we might have to pay, we could be required to stop the infringing activity or obtain a license. We cannot be certain that any required license would be available to us on acceptable terms, or at all. If we fail to obtain a license, our business might be materially adversely affected.

To help protect our proprietary rights in unpatented trade secrets, we require our employees, consultants and advisors to execute confidentiality agreements. However, we cannot guarantee that these agreements will provide us with adequate protection if confidential information is used or disclosed improperly. In addition, in some situations, these agreements may conflict with, or be subject to, the rights of third parties with whom our employees, consultants or advisors have prior employment or consulting relationships. Further, others may independently develop substantially equivalent proprietary information and techniques, or otherwise gain access to our trade secrets.

IF OUR STRATEGIC RELATIONSHIPS ARE UNSUCCESSFUL, OUR BUSINESS COULD BE HARMED.

Our strategic relationships with SuperGen, Inc., Medtronic, Exelixis, Inc. and others are important to our success. The development, improvement and marketing of many of our key therapeutic products are or will be dependent on the efforts of our strategic partners. For example, under the SuperGen, Inc. relationship, we may fail to achieve clinical and sales milestones; Avicine may fail to achieve regulatory approval; Avicine may not be commercially successful; SuperGen, Inc. may fail to perform its obligations under our agreements, such as failing to devote sufficient resources to marketing Avicine; and our agreements with SuperGen, Inc. may be terminated against our will. Similarly, under the Medtronic relationship, we are dependent on Medtronic to achieve clinical and other milestones, to obtain regulatory approval and to commercially exploit our antisense compounds, including Resten-NG™, in certain treatments of vascular disease; which products may not be developed or, if developed may not be commercially successful; if Medtronic fails to perform its obligations under our agreements, such as failing to devote sufficient resources to development or to market such products. We may also need additional future funding, including for operations, product development and our other activities. We may receive additional funding from our strategic partners, including SuperGen, Inc. and Medtronic, under existing agreements. However, we cannot assure you that we will receive any additional payments from SuperGen or Medtronic or that the relationships will be commercially successful. The transactions contemplated by our agreements with strategic partners,

including the equity purchases and cash payments, are subject to numerous risks and conditions. The occurrence of any of these events could severely harm our business.

WE HAVE LIMITED SALES CAPABILITY AND MAY NOT BE ABLE TO SUCCESSFULLY COMMERCIALIZE OUR PRODUCTS.

We have been engaged solely in the development of pharmaceutical technology. Although some of our management have experience in biotechnology company operations, we have limited experience in manufacturing or selling pharmaceutical products. We also have only limited experience in negotiating and maintaining strategic relationships, and in conducting clinical trials and other later-stage phases of the regulatory approval process. We cannot assure investors that we will successfully engage in any of these activities.

WE MAY BE SUBJECT TO PRODUCT LIABILITY LAWSUITS AND OUR INSURANCE MAY NOT BE ADEQUATE TO COVER DAMAGES.

The use of our products will expose us to the risk of product liability claims. Although we intend to obtain product liability insurance coverage, we cannot guarantee that product liability insurance will continue to be available to us on acceptable terms or that our coverage will be sufficient to cover all claims against us. A product liability claim, even one without merit or for which we have substantial coverage, could result in significant legal defense costs, thereby increasing our expenses, lowering our earnings and, depending on revenues, potentially resulting in additional losses.

CONTINUING EFFORTS OF GOVERNMENT AND THIRD-PARTY PAYERS TO CONTAIN OR REDUCE THE COSTS OF HEALTH CARE MAY ADVERSELY AFFECT OUR REVENUES AND FUTURE PROFITABILITY.

In addition to obtaining regulatory approval, the successful commercialization of our products will depend on our ability to obtain reimbursement for the cost of the product and treatment. Government authorities, private health insurers and other organizations, such as health maintenance organizations are increasingly challenging the prices charged for medical products and services. Also, the trend toward managed health care in the United States, the growth of healthcare organizations such as HMOs, and legislative proposals to reform healthcare and government insurance programs could significantly influence the purchase of healthcare services and products, resulting in lower prices and reducing demand for our products. The cost containment measures that healthcare providers are instituting and any healthcare reform could affect our ability to sell our products and may have a material adverse effect on our operations. We cannot assure investors that reimbursement in the United States or foreign countries will be available for any of our products, that any reimbursement granted will be maintained, or that limits on reimbursement available from third-party payors will not reduce the demand for, or the price of, our products. The lack or inadequacy of third-party reimbursements for our products would have a material adverse effect on our operations. We cannot forecast what additional legislation or regulation relating to the healthcare industry or third-party coverage and reimbursement may be enacted in the future, or what effect the legislation or regulation would have on our business.

IF WE FAIL TO ESTABLISH STRATEGIC RELATIONSHIPS WITH LARGER PHARMACEUTICAL PARTNERS, OUR BUSINESS MAY SUFFER.

We do not intend to conduct late-stage (Phase III) human clinical trials ourselves. We anticipate entering into relationships with larger pharmaceutical companies to conduct later pharmaceutical trials and to market our products and we also plan to continue to use contract manufacturing for late stage clinical and commercial quantities of our products. We may be unable to enter into corporate partnerships which could impede our ability to bring our products to market. We cannot assure

investors that any corporate partnerships, if entered, will be on favorable terms or will result in the successful development or marketing of our products. If we are unsuccessful in establishing advantageous clinical testing, manufacturing and marketing relationships, we are not likely to generate significant revenues and become profitable.

RISKS RELATED TO SHARE OWNERSHIP

OUR RIGHT TO ISSUE PREFERRED STOCK, OUR CLASSIFIED BOARD OF DIRECTORS AND OREGON ANTI-TAKEOVER LAWS MAY PREVENT YOU FROM REALIZING A PREMIUM.

Our authorized capital consists of 50,000,000 shares of common stock and 2,000,000 shares of preferred stock. Our board of directors, without any further vote by the shareholders, has the authority to issue preferred shares and to determine the price, preferences, rights and restrictions, including voting and dividend rights, of these shares. The rights of the holders of shares of common stock may be affected by the rights of holders of any preferred shares that our board of directors may issue in the future. For example, our board of directors may allow the issuance of preferred shares with more voting rights, higher dividend payments or more favorable rights upon dissolution, than the shares of common stock. If preferred shares are issued in the future, it may also be more difficult for others to acquire a majority of our outstanding voting shares.

In addition, we have a "classified" board of directors, which means that only one-half of our directors are eligible for election each year. Therefore, if shareholders wish to change the composition of our Board of Directors, it could take at least two years to remove a majority of the existing directors or to change all directors. Having a classified board of directors may, in some circumstances, deter or delay mergers, tender offers or other possible transactions which may be favored by some or a majority of our shareholders.

The Oregon Control Share Act and Business Combination Act limit parties who acquire a significant amount of voting shares from exercising control over us. These acts may lengthen the period for a proxy contest or for a person to vote their shares to elect the majority of our Board.

OUR STOCK PRICE IS VOLATILE AND MAY FLUCTUATE DUE TO FACTORS BEYOND OUR CONTROL.

Historically, the market price of our stock has been highly volatile. The following types of announcements could have a significant impact on the price of our common stock: positive or negative results of testing and clinical trials by ourselves or competitors; delays in entering into corporate partnerships; technological innovations or commercial product introductions by ourselves or competitors; changes in government regulations; developments concerning proprietary rights, including patents and litigation matters; public concern relating to the commercial value or safety of any of our products; or general stock market conditions.

Further, the stock market has in recent months experienced and may continue to experience significant price and volume fluctuations. These fluctuations have particularly affected the market prices of equity securities of many biopharmaceutical companies that are not yet profitable. Often, the effect on the price of such securities is unrelated or disproportionate to the operating performance of such companies. These broad market fluctuations may adversely affect the ability of a shareholder to dispose of his or her shares at a price equal to or above the price at which the shares were purchased.

THE SIGNIFICANT NUMBER OF OUR SHARES OF COMMON STOCK ELIGIBLE FOR FUTURE SALE MAY CAUSE THE PRICE OF COMMON STOCK TO FALL.

As of June 30, 2001, we have outstanding 23,073,302 shares of common stock and all are eligible for sale under Rule 144 or are otherwise freely tradable. The timing of the effectiveness of this registration statement is uncertain. In addition:

- Our employees and others hold options to buy a total of 2,873,083 shares of common stock as of June 30, 2001. The shares of common stock to be issued upon exercise of these options have been registered, and therefore may be freely sold when issued.

- There are outstanding warrants to buy 10,352,003 shares of common stock as of June 30, 2001. The shares issuable upon exercise of (4,416,814) warrants are registered. These shares may be freely sold when issued. The holders of warrants covering (3,400,000) shares have incidental registration rights to have the shares issuable upon the exercise of their warrants registered. Once registered, those shares may be freely sold when issued, for so long as the registration statement is effective and current. The remaining warrants have no registration rights.

- We may issue options to purchase up to an additional 58,613 shares of common stock under our stock option plans as of June 30, 2001, which also will be fully saleable when issued.

- We are authorized to sell up to 228,579 shares of common stock under our Employee Stock Purchase Plan to our full-time employees, nearly all of whom are eligible to participate.

- Besides issuing MAMI a warrant for 3,000,000 shares ("Warrant Shares") of our Common Stock, we have also granted certain contractual rights to MAMI to purchase (i) an additional 352,113 shares of our Common Stock at a price of $7.10 per share ("First Purchase Right") and (ii) the right to purchase up to $7,500,000 of our Common Stock based on the average closing sales price for the five days preceding the commitment to purchase. These contractual purchase rights are subject to certain technology milestones being met or waived by MAMI and any required regulatory or shareholder approvals. MAMI may require us to register these shares upon the exercise of such purchase rights. The Warrant Shares and shares of our Common Stock covered by the First Purchase Right are being registered for resale as part of this registration. Once registered, those shares may be freely sold when issued, for so long as the registration statement is effective and current.

Sales of substantial amounts of shares into the public market could lower the market price of our common stock.

WE DO NOT EXPECT TO PAY DIVIDENDS IN THE FORESEEABLE FUTURE.

We have never paid dividends on our shares of common stock and do not intend to pay dividends in the foreseeable future.

FORWARD-LOOKING STATEMENTS

The statements which are not historical facts contained in this discussion are forward-looking statements that involve risks and uncertainties, including, but not limited to, the results of research and development efforts, the results of pre-clinical and clinical testing, the effect of regulation by the FDA and other agencies, the impact of competitive products, product development, commercialization and technological difficulties, and other risks detailed in our Securities and Exchange Commission filings.

BUSINESS

CLINICAL DEVELOPMENT OVERVIEW

We are a biopharmaceutical company developing therapeutic products based on cancer immunotherapy and NeuGene antisense technology for the treatment of life-threatening diseases, with initial applications in cancer and cardiovascular restenosis. Currently approved drugs or other therapies often prove to be ineffective in treating advanced stages of these diseases or produce numerous undesirable side effects. Our core technologies are specifically aimed at overcoming these challenges. We currently have products at various stages of clinical development as summarized below.

PRODUCT	PRE-CLINICAL	PHASE I	PHASE II	PHASE III
Avicine™ (colorectal cancer vaccine)	Completed	Completed	Completed	In progress
Avicine™ (pancreatic cancer vaccine)	Completed	Completed	In progress	
Avicine™ (prostate cancer vaccine)	Completed	Completed	Planned	
Resten-NG™ (Neu-Gene for restenosis)	Completed	Completed	In progress	
Oncomyc-NG™ (Neu-Gene for cancer)	Completed	Completed	Planned	
AVI-4126 (Neu-Gene for Polycystic Kidney Disease)	Completed	Planned	Planned	
AVI-4557	Completed	Planned		

(Neu-Gene for cyp 3A4)		
AVI-4014		
(Neu-Gene for Inflammation)	In progress	Planned
NeuBiotics™		
(Neu-Gene antibiotics)	In progress	

BUSINESS STRATEGY

Our strategy is to:

- reduce risk associated with product development by exploiting two core technology platforms;
- select disease targets with broad or multiple disease applications;
- manage drug discovery, pre-clinical and early stage clinical development in-house; and
- co-develop or license products to strategic partners after completion of Phase II clinical trials to enhance value and share the costs of Phase III trials and commercialization.

CANCER IMMUNOTHERAPY

Cancer is the second leading cause of death in the United States with an incidence of 1,500 deaths per day. There are approximately eight million Americans living with a history of cancer, and 500,000 new cases are diagnosed annually. Lung, prostate, breast and colorectal cancers are the four most common types of cancer, accounting for over 50% of all new diagnoses. In 1999, the market opportunities for drugs to treat each of these cancer types were estimated to be in excess of $1 billion annually.

About half of newly diagnosed cancer patients have localized disease and can be cured with surgery alone. The other half of the patients either have metastatic disease at diagnosis or will

eventually develop metastatic disease. The principal therapy available for the second group of patients traditionally has been chemotherapy. Chemotherapeutic approaches produce considerable toxic and undesirable side effects and historically have done little to influence patient survival.

Immunotherapy with vaccines or antibodies is among the newer strategies being investigated for treating cancer. Historically, vaccines were developed and used to induce an immune response in order to prevent a disease. In contrast, therapeutic vaccines are administered when the patient already has the disease. Treatment of rabies with the rabies vaccine is an example of this approach.

For a therapeutic vaccine to be effective in fighting a disease such as cancer, it is necessary to first identify specific target sites on the tumor cells, called tumor antigens. The more selective the target is to the tumor, the greater the likelihood that the stimulated immune response will be directed at attacking only the cancer cells. The identification of highly specific targets has been one of the greatest challenges in the development of a useful cancer vaccine.

AVICINE THERAPEUTIC CANCER VACCINE

TECHNICAL OVERVIEW

Avicine, our therapeutic cancer vaccine, which is currently in clinical trials, is designed to produce an immune response against a well-characterized target, human chorionic gonadotropin (hCG). hCG is a hormone produced during pregnancy that plays a variety of roles in fostering the development of a fetus. Through extensive research, scientists found that hCG is also present in most cancers. In fact, cancer is believed to be the only significant exception to normal hCG expression during pregnancy. Given the selective production of hCG in cancer, we believe it represents a highly specific target for a therapeutic cancer vaccine.

The use of hCG as a cancer vaccine target may offer the following advantages over other potential tumor antigens:

- hCG is not usually found on normal cells, with the exception of those present during a pregnancy. This means that it is highly selective.
- hCG is widely expressed by and found on many types of cancer, including colon, pancreas, prostate, lung and breast.
- hCG expression has been correlated with tumor aggressiveness. In other words, the higher the level of hCG, the more aggressive the rate of growth or spread of the cancer.
- Antibodies to hCG are believed to block the hormonal functions that hCG plays in pregnancy and cancer, including rapid cell division, formation of blood vessels, invasion of other tissues, and dampening of immune responses.

Since hCG is a natural human protein, people will not mount an immune response to it unless they are actively immunized. Once immunized, the mechanism of action of an anti-hCG vaccine can be viewed as a two-pronged attack. First, it directs an immune response against the tumor, and second, it neutralizes the hormonal benefits provided by hCG.

The hCG component in Avicine is a small peptide from this hormone. The peptide is joined to a carrier, diphtheria toxoid, to enhance the immune response. Diphtheria toxoid was selected since most of the world's population has been vaccinated against it and there is significant experience with it as a vaccine component in man. The combination provides for an existing immune response to the carrier which is believed to be important in stimulating an immune response to the hCG peptide.

Avicine's distinguishing characteristics include:

- Fully characterized synthetic vaccine;
- Capable of being produced inexpensively in large quantities;
- Targets a widely expressed tumor antigen, hCG;
- Ready for Phase III clinical testing in colorectal cancer patients;
- Applicable to most cancer types in multiple clinical settings; and
- Twenty years of research and development and safety data.

AVICINE CLINICAL TRIALS

We have completed three Phase I clinical trials using Avicine in 87 patients with cancer. Overall, these studies showed Avicine to be safe and essentially non-toxic, and to be effective in stimulating an immune response to hCG in most patients. Moreover, apparent survival benefits and some tumor regressions were noted.

PANCREATIC AND PROSTATE CANCER TRIALS: We have completed a pilot Phase II study using Avicine in 10 patients with advanced pancreatic cancer. For the 10 patients treated, the median survival was approximately 33 weeks. Patients with advanced pancreatic cancer are currently treated with chemotherapy and have a median survival of approximately 18 to 25 weeks. Although we believe these results are encouraging, we hesitate to draw any conclusions from such a small study other than to use these results to design additional trials.

Two additional Phase II trials were scheduled. The first Phase II study of 50 patients with pancreatic cancer completed enrollment in 2000. In addition, we plan to initiate a Phase II clinical trial involving 100 patients with prostate cancer in 2001.

COLORECTAL CANCER TRIALS: A multicenter Phase II study of Avicine was conducted in 77 patients with advanced colorectal cancer. The objectives of this trial were to determine whether administration of Avicine would induce an immune response in patients with metastatic colorectal cancer, and to measure safety and efficacy in these patients. Overall, 51 of the 77 patients responded to our vaccine by producing antibodies to hCG. The patients that were antibody responders had a median survival of 42 weeks. Patients that did not respond had a median survival of just 17 weeks.

Further analysis of the multicenter Phase II data showed that patients who produced antibodies to both targets on the hCG peptide had a median survival of 66 weeks. Camptosar®, the current standard of care for treating advanced colorectal cancer patients, produces a median survival of 37-40 weeks. Through additional research efforts, we have learned how to improve production of antibodies to the two hCG targets in most.

Overall, these clinical data suggest that the patients who received Avicine and responded by making hCG antibodies had improved median survival compared to patients treated with chemotherapeutic drugs. Avicine was found to be safe and did not exhibit the toxicity associated with cytotoxic drug treatment. Based on these data, we started a Phase III pivotal trial in 800 patients with metastatic colorectal cancer in 2001. This trial randomizes patients receiving first-line therapy for metastatic colorectal cancer to one of two treatments: combination chemotherapy or combination chemotherapy plus Avicine. The trial will be evaluated by comparing median survival and time-to-disease progression in the two treatments.

AVICINE CLINICAL TRIAL SUMMARY

TRIAL	DESCRIPTION & TYPE	PATIENTS	STATUS
1	Phase I safety study	43 treated	Completed
2	Phase I metastatic cancer	21 treated	Completed
3	Phase Ib metastatic cancer	23 treated	Completed
4	Phase II pancreatic and extension	10 treated	Completed
5	Phase II colorectal	77 treated	Completed
6	Phase II pancreatic	50	In progress
7	Phase II prostate	100	2001
8	Phase III colorectal licensing trial	800	In progress

XACTIN—HUMAN MONOCLONAL ANTIBODIES FOR CANCER

Antibodies are important proteins produced by the immune system and serve as the first line of defense against foreign pathogens. Antibodies bind to these pathogens and help neutralize or eliminate these foreign substances.

Historically, most antibody product candidates were generated in mice and, as a result, contained mouse protein. The presence of mouse protein in these antibodies causes undesirable side effects in patients receiving the products. Various approaches have evolved to engineer mouse antibodies so that they contain mostly human proteins and thus produce fewer side effects in patients. The XenoMouse technology that we licensed from Abgenix, Inc. enables the rapid generation of antibodies with fully human proteins. The XenoMouse has been genetically engineered to replace the genes that a mouse uses to make antibodies with the genes that humans use to make antibodies. XenoMouse-generated antibodies have several potential advantages over traditional therapies, including:

- Faster product development;
- Fewer undesirable side effects; and
- An extended therapeutic effect.

There are now eight therapeutic antibody products marketed in the United States, six of which were approved in the past three years. Moreover, industry analysts estimate that antibodies account for over 20% of all biotechnology products in clinical development today.

From our cancer vaccine clinical trials, we learned which anti-hCG antibodies are important in prolonging patient survival. We have produced human monoclonal antibodies to these hCG targets

using the Abgenix technology. These monoclonal antibodies, called Xactin antibodies, are both potential companion products to Avicine and independent cancer therapeutics and are now in pre-clinical development.

NEUGENE ANTISENSE TECHNOLOGY

TECHNICAL OVERVIEW

Most human diseases arise from the function or dysfunction of genes within the body, either those of pathogens, such as viruses, or of one's own genes. The Human Genome Project has led to the identification of the genes associated with most of the major human diseases and to the determination of the sequence of their genetic codes. Using modern methods of chemical synthesis, compounds can be prepared that recognize target gene sequences in a pathogen or pathogenic process. When these compounds bind tightly to the disease-causing sequence, the genetic process is inhibited, and thus the pathogen or pathogenic process is disabled. This is called antisense technology because the sense of the genetic code is blocked.

Antisense compounds are composed of repeating structures, or subunits, that are linked together forming a polymer, referred to as the antisense backbone. Each subunit carries a genetic letter that pairs with its corresponding letter in the gene target. Although the genetic letters are a feature common to all antisense compounds, the structure of the subunits and the linkage groups that string them together may differ greatly. These differences in the subunits and the linkages define the different types of antisense backbones and their corresponding physical and biological properties. Our NeuGene technology is distinguished from all other antisense technologies by the characteristics of our patented antisense backbone. The subunits which carry the genetic letters on our backbone are synthetic products rather than modified natural materials. In addition, the linkages used to string the subunits together carry no charge in our backbone. We believe these differences provide pharmaceutical advantages that are critical for antisense drug development to meet the challenges of broad clinical utility.

The first antisense compounds had backbones composed of natural genetic materials and linkages. These natural compounds were degraded or broken down by enzymes in the blood and within cells and had difficulty crossing cellular membranes to enter the cells that contained their genetic target. Researchers developed modified backbones which were designed to resist degradation by enzymes and to enter tissues and cells more efficiently. The most common of these types, the phosphorothioate backbones used by ISIS Pharmaceuticals, Inc., Genta Incorporated, and others, use natural DNA subunits linked together by a charged linkage. After extensive investigation, we concluded that these early product candidates lacked the pharmaceutical properties desirable for broad clinical utility. We abandoned development of similar structures in 1988 and started development of a novel backbone chemistry designed to address these drawbacks.

NEUGENE TECHNOLOGY

We have developed and patented a new class of antisense compounds, known as NeuGenes, which have a backbone of synthetic subunits carrying each genetic letter, with each subunit linked together by a patented uncharged linkage group. We believe our principal competitive advantage in the antisense area is the chemical structure of the NeuGene backbone that we developed specifically to have the following pharmaceutical properties:

- STABILITY: Biological stability is principally determined by the degree of resistance to enzymatic degradation. Because the NeuGene backbone is a unique synthetic structure, there are no enzymes found in man to degrade it. Our NeuGene drugs have been shown to be completely stable in our human clinical trials.

- EFFICACY AND SPECIFICITY: Efficacy refers to the efficiency with which antisense compounds block selected gene targets. In direct comparisons with other technologies, our NeuGene compounds exhibited significantly better efficacy in inhibition of targeted genetic sequences and substantially greater specificity.
-

DELIVERY: To reach their targets, antisense compounds must cross tissue and cellular barriers, including cellular and nuclear membranes. Our extensive research in the last three years has shown that NeuGene antisense compounds achieve functional delivery in a variety of animal models and in human clinical trials.

- SAFETY: Our Phase I human clinical trial results indicate that NeuGene antisense agents have an excellent safety profile, even at doses in vast excess of those anticipated for our initial human therapeutic applications.

NEAR-TERM PRODUCT DEVELOPMENT—RESTENOSIS AND CANCER

The first application of our antisense technology is designed to treat diseases involving abnormal cell division, such as cancer and certain cardiovascular and inflammatory diseases, including restenosis, psoriasis, polycystic kidney disease and chronic graft rejection. The NeuGene target for these diseases is the genetic component named c-myc. We have finished pre-clinical development of two NeuGene drugs, Resten-NG and Oncomyc-NG, based on this target. In late 1999, we filed an Investigational New Drug Application, or IND, and initiated a Phase I clinical trial for restenosis and cancer. These Phase I safety studies in 32 patients completed in April 2000 showed these compounds to be safe and essentially non-toxic.

In our upcoming Phase II clinical trial, Resten-NG will be used to block c-myc expression in restenosis, a frequent complication that follows balloon angioplasty for coronary artery disease. Restenosis, the blockage of the arteries following balloon angioplasty, affects 100,000 to 200,000 people per year in the United States and its occurrence is unpredictable. We believe Resten-NG, with its combination of potency and lack of toxicity, may be useful as a preventative measure in the more than one million balloon angioplasty procedures performed worldwide each year.

Pre-clinical studies with Resten-NG indicated that it was both more potent and less toxic than other antisense agents currently in clinical development for other indications. Our trials also indicated significant preservation of vessel passageways and prevention of arterial wall thickening following catheter delivery of Resten-NG. We commenced Phase II human clinical trials, which will involve 150 patients, in cardiovascular restenosis in June 2000.

We are finishing pre-clinical development of our second NeuGene drug, Oncomyc-NG, for cancer indications. We plan to initiate Phase I/II trials for our first cancer indication later this year.

The broad applicability of our antisense platform has allowed us to initiate pre-clinical development of NeuGene drugs for viral, bacterial, and inflammatory diseases, as outlined in the following table.

NEUGENE ANTISENSE DEVELOPMENT PROGRAM

ANTISENSE TARGET	CLINICAL INDICATION
c-myc	Restenosis, cancer, psoriasis, chronic graft rejection
Cytochrome P450	Metabolic redirection of cancer drugs
NF kappa B	Chrone's Disease, chronic inflammation, autoimmune disorders, arthritis, septic shock, asthma
Bacterial ribosomes	NeuBiotics for infectious diseases
Hepatitis B, C viruses	Hepatitis

COLLABORATIVE AGREEMENTS

We believe that our vaccine and antisense technologies are broadly applicable for the potential development of pharmaceutical products in many therapeutic areas. To exploit our core technologies as fully as possible, our strategy is to enter into collaborative development agreements with major pharmaceutical companies for all cancer applications with our vaccine, and agreements directed at specific molecular targets for our NEU-GENE antisense technology. It is anticipated that NEU-GENE antisense collaborative research agreements may provide us with some funding for internal programs aimed at discovering and developing antisense compounds to inhibit the production of additional individual molecular targets. Partners in antisense may be granted options to obtain licenses to co-develop and to market drug candidates resulting from their collaborative research programs. We intend to retain manufacturing rights to our antisense products. There can be no assurance, however, that we will be able to enter into collaborative research agreements with large pharmaceutical companies on terms and conditions satisfactory to us.

SUPERGEN ALLIANCE

In April 2000, we entered into an alliance with SuperGen, Inc. for shared development and marketing rights for Avicine. Under the terms of the agreement, SuperGen and AVI will share equally clinical development and Food and Drug Administration, or FDA, registration costs going forward and share profit equally from product sales in the United States. We will be responsible for the manufacturing of Avicine and SuperGen will be responsible for marketing and sales. In May 2000, we received a $20 million equity investment from SuperGen and could receive additional payments of up to $80 million based upon achievement of commercialization milestones.

ABGENIX ALLIANCE

We currently have an alliance with Abgenix, Inc. for the development of human monoclonal antibodies for cancer. We have licensed the use of Abgenix XenoMouse technology for the production of human monoclonal antibodies against hCG. Our Avicine clinical trials have defined the hCG targets that are important in prolonging patient survival. We have developed human monoclonal antibodies to these targets and two of them are now in pre-clinical trials. Abgenix is to receive payments based on achievement of clinical development milestones and a royalty on sales if our antibodies are commercialized.

NEUGENE ALLIANCES

We anticipate that NeuGene antisense collaborative research agreements may provide us with funding for internal programs aimed at discovering and developing antisense compounds to inhibit the production of additional molecular targets. Partners in antisense may be granted options to obtain

licenses to co-develop and to market drug candidates resulting from their collaborative research programs. We currently have a research alliance with XTL Biopharmaceuticals Ltd. for pre-clinical development of Hepatitis B and C antisense drugs. If this program moves into clinical development stages, XTL and we will negotiate a joint venture development and marketing agreement with XTL under basic terms previously set forth.

EXELIXIS AGREEMENT

In April 2000, we entered into an alliance with Exelixis Inc. for functional genomics and antisense drug development. Under the terms of the agreement, Exelixis will apply its expertise in genetic model systems to discover, validate and screen novel targets suitable for inhibition by antisense therapeutics. We will design and synthesize NeuGene morpholinos for use as drugs and conduct preclinical and clinical studies on antisense drug candidates arising from the collaboration. The two companies will jointly own, and Exelixis has an option to co-develop with us, certain antisense products that arise from the alliance.

MEDTRONIC AGREEMENT

In May 2001, we entered into a licensing arrangement with Medtronic wherein Medtronic received exclusive rights for certain antisense compounds, for use in conjunction with Medtronic devices, to combat vascular disease, including restenosis. Under the agreement, we received a $10 million equity investment from Medtronic, and could receive other milestone payments, option elections, and warrant exercises.

We plan to market the initial products for which we obtain regulatory approval, through co-development and marketing arrangements with strategic partners such as Medtronic or other licensing arrangements with larger pharmaceutical companies. Implementation of this strategy will depend on many factors, including the market potential of any products we develop and our financial resources. We do not expect to establish a direct sales capability for therapeutic compounds for at least the next several years. The timing of our entry into marketing arrangements or other licensing arrangements will depend on successful product development and regulatory approval within the regulatory framework established by the Federal Food, Drug and Cosmetics Act. Although the implementation of initial aspects of our marketing strategy may be undertaken before this process is completed, the development and approval process typically is not completed in less than three to five years after the filing of an IND application and our marketing strategy therefore may not be implemented for several years.

MANUFACTURING

For our vaccine, we have identified potential Good Manufacturing Practices, or GMP, manufacturers who could meet large scale, low-cost manufacturing requirements for future Phase III trials and market introduction. We also believe we have developed proprietary manufacturing techniques that will allow large-scale, low-cost synthesis and purification of NeuGenes. Because our NeuGene compounds are based upon a flexible backbone chemistry, we believe that NeuGene synthesis will be more cost-effective than competing technologies. We have established sufficient manufacturing capacity to meet immediate research and development and pre-clinical requirements.

We currently intend to retain manufacturing rights for all products incorporating our patented antisense technology, whether sold directly by us or through collaborative agreements with industry partners. Our current production capacity is insufficient for the requirements of human clinical studies. We have, however, commenced construction of a GMP facility which will have capacity to meet our Phase I and Phase II NEU-GENE clinical trial requirements for the foreseeable future. We have also contracted with a GMP facility to produce our near term antisense therapeutic candidates for current

pre-clinical and clinical trial studies. We are currently upgrading our in-house manufacturing capability to meet GMP standards for Phase I and II human clinical trials.

In March 1993, we moved to our present laboratory facilities. This facility and the laboratory procedures followed by us have not been formally inspected by the FDA and will have to be approved as products move from the research phase through the clinical testing phase and into commercialization. We will be required to comply with FDA requirements for GMP in connection with human clinical trials and commercial production. See "Drug Approval Process and Other Governmental Regulations."

PATENTS AND PROPRIETARY RIGHTS

We have developed or acquired a comprehensive body of intellectual rights. The proprietary nature of, and protection for, our product candidates, processes and know-how are important to our business. We plan to prosecute and aggressively defend our patents and proprietary technology. Our policy is to patent the technology, inventions, and improvements that are considered important to the development of our business. We also depend upon trade secrets, know-how, and continuing technological innovation to develop and maintain our competitive position.

We own 46 patents covering various aspects of our current technology platforms and future development technologies. We have 64 additional pending patent applications relating to our Avicine, NeuGene, and other technologies. We intend to protect our proprietary technology with additional filings as appropriate.

We have also acquired certain product/technology licenses from The Ohio State University and Dr. Vernon Stevens. These properties include exclusive royalty-bearing licenses covering the composition, manufacturing and use of Avicine in all fields of use, including treating and preventing cancer, with the exception of fertility regulation. Our proprietary rights also include the unrestricted use of vaccine technology for non-hormonal cancer applications. We enjoy the right to commercialize any new intellectual property relating to our licensed subject matter including access and use of all new experimental data resulting from Dr. Stevens' research. Our licenses have been granted for a period of 30 years or 10 years from the expiration of the last issued patent, whichever comes later. Under these licensing agreements, we have the right to sublicense our products and technology throughout the world. For such rights, we are obligated to pay the licensors minimum annual royalties of $60,000 through the third quarter of 2001 and $55,000 thereafter. Subject to such minimums, the royalties are 5% of net sales of products from licensed technology in the United States and Canada; 2% of net sales in countries of the "European Economic Community"; and 25% of any royalties received by us for sublicenses in the United States, the "European Economic Community" or in Korea, subject to certain maximums.

There can be no assurance that any patents we apply for will be granted or that patents held by us will be valid or sufficiently broad to protect our technology or provide a significant competitive advantage. Additionally, we cannot provide assurance that practice of our patents or proprietary technology will not infringe third-party patents.

DRUG APPROVAL PROCESS AND OTHER GOVERNMENT REGULATION

The United States system of new drug approvals is the most rigorous in the world. According to the Pharmaceutical Research and Manufacturers of America, it costs an average of $500 million and takes an average of almost 15 years from the discovery of a compound to bring a single new pharmaceutical to market. For every 5,000 to 10,000 chemically synthesized molecules screened, only 250 are ever issued an Investigational New Drug Application, or IND, and tested in humans. Of those, the FDA will approve only one for commercialization. Yet, in recent years, societal and governmental pressures have created the expectation that biotech and pharmaceutical companies will reduce the costs

for drug discovery and development without sacrificing safety, efficacy and innovation. The need to significantly improve or provide alternative strategies for successful pharmaceutical discovery, research and development remains a major health care industry challenge.

DRUG DISCOVERY: In the initial stages of drug discovery before a compound reaches the laboratory, tens of thousands of potential compounds are randomly screened for activity against an assay assumed to be predictive for particular disease targets. This drug discovery process can take several years. Once a company locates a screening lead, or starting point for drug development, isolation and structural determination may begin. The development process results in numerous chemical modifications to the screening lead in an attempt to improve its drug properties. After a compound emerges from the above process, the next steps are to conduct further preliminary studies on the mechanism of action, further in vitro (test tube) screening against particular disease targets and, finally, some in vivo (animal) screening. If the compound passes these barriers, the toxic effects of the compound are analyzed by performing preliminary exploratory animal toxicology. If the results are positive, the compound emerges from the basic research mode and moves into the pre-clinical phase.

PRE-CLINICAL TESTING: During the pre-clinical testing stage, laboratory and animal studies are conducted to show biological activity of the compound against the targeted disease, and the compound is evaluated for safety. These tests typically take approximately three and one-half years to complete.

INVESTIGATIONAL NEW DRUG APPLICATION: During the pre-clinical testing, an IND is filed with the FDA to begin human testing of the drug. The IND becomes effective if not rejected by the FDA within 30 days. The IND must indicate the results of previous experiments, how, where and by whom the new studies will be conducted, the chemical structure of the compound, the method by which it is believed to work in the human body, any toxic effects of the compound found in the animal studies and how the compound is manufactured. In addition, an Institutional Review Board, comprised of physicians at the hospital or clinic where the proposed studies will be conducted, must review and approve the IND. Progress reports detailing the results of the clinical trials must be submitted at least annually to the FDA.

PHASE I CLINICAL TRIALS: After an IND becomes effective, Phase I human clinical trials can begin. These tests, involving usually between 20 and 80 patients or healthy volunteers, typically take approximately one year to complete. The Phase I clinical studies also determine how a drug is absorbed, distributed, metabolized and excreted by the body, and the duration of its action. Phase I trials are not normally conducted for anticancer product candidates.

PHASE II CLINICAL TRIALS: In Phase II clinical trials, controlled studies are conducted on approximately 100 to 300 volunteer patients with the targeted disease. The preliminary purpose of these tests is to evaluate the effectiveness of the drug on the volunteer patients as well as to determine if there are any side effects. These studies generally take approximately two years, and may be conducted concurrently with Phase I clinical trials. In addition, Phase I/II clinical trials may be conducted to evaluate not only the efficacy of the drug on the patient population, but also its safety.

PHASE III CLINICAL TRIALS: This phase typically lasts about three years and usually involves 1,000 to 3,000 patients. During the Phase III clinical trials, physicians monitor the patients to determine efficacy and to observe and report any reactions that may result from long-term use of the drug.

NEW DRUG APPLICATION: After the completion of all three clinical trial phases, if the data indicate that the drug is safe and effective, a New Drug Application, or NDA, is filed with the FDA. The NDA must contain all of the information on the drug gathered to that date, including data from the clinical trials. NDAs are often over 100,000 pages in length. The average NDA review time for new pharmaceuticals approved in 1997 was 16.2 months, down from 23 months in 1996.

MARKETING APPROVAL: If the FDA approves the NDA, the drug becomes available for physicians to prescribe. Periodic reports must be submitted to the FDA, including descriptions of any adverse reactions reported. The FDA may request additional studies (Phase IV) to evaluate long-term effects.

PHASE IV CLINICAL TRIALS AND POST-MARKETING STUDIES: In addition to studies requested by the FDA after approval, these trials and studies are conducted to explore new indications. The purpose of these trials and studies and related publications is to broaden the application and use of the drug and its acceptance in the medical community.

COMPETITION

Companies in the cancer vaccine development area include Progenics Pharmaceutical, Inc., Corixa Corporation, Biomira Inc., E. Merck and Bristol Meyers-Squibb. Several companies are pursuing the development of antisense technology, including Glaxo, Boehringer Ingelheim, Genta, and ISIS Pharmaceuticals. All of these companies have products in development stages, and, in some cases, are in human trials with antisense compounds generally similar to our NEU-GENE compounds.

While we believe that none of these companies is likely to introduce an additional antisense compound into the broad commercial market in the immediate future, many pharmaceutical and biotechnology companies, including most of those listed above, have financial and technical resources greater than those currently available to us and have more established collaborative relationships with industry partners than we do. We believe that the combination of pharmaceutical properties of our NeuGene compounds for restenosis and cancer affords us competitive advantages when compared with the antisense compounds of competitors.

We can also expect to compete with other companies exploiting alternative technologies that address the same therapeutic needs as do our technologies. The biopharmaceutical market is subject to rapid technological change, and it can be expected that competing technologies will emerge and will present a competitive challenge to us.

EMPLOYEES

As of June 30, 2001, we had 77 employees, 24 of whom hold advanced degrees. Sixty-nine employees are engaged directly in research and development activities, and eight are in administration. None of our employees is covered by collective bargaining agreements, and we consider relations with our employees to be good.

PROPERTIES

We occupy 30,900 square feet of leased laboratory and office space at 4575 S.W. Research Way, Suite 200, Corvallis, Oregon 97333. The lease on our space expires in December 2007. Our executive office is located in 2,400 square feet of leased space at One S.W. Columbia, Suite 1105, Portland, Oregon 97258. This lease expires July 2004. We believe that our facilities are suitable and adequate for our present operational requirements for the foreseeable future.

LEGAL PROCEEDINGS

We are not aware of any legal proceedings against us that, individually or in the aggregate, would have a material adverse effect on our business, results of operations or financial condition.

USE OF PROCEEDS

We are not selling any of the shares being offered by this prospectus and will not receive any proceeds from the sale of the shares offered by the selling shareholders.

OUR SELLING SHAREHOLDERS

The following table provides certain information with respect to the Shares held by each Selling Shareholder as of August 28, 2001. Except as otherwise noted, all of the Common Shares owned by each Selling Shareholder are registered for sale pursuant to this Prospectus. The Selling Shareholders, however, are not under any obligation to sell all or any portion of their Shares, nor are the Selling Shareholders obligated to sell any of their Shares immediately under this Prospectus. To our knowledge, none of the Selling Shareholders has had within the past three years any material relationship with us except as noted above or in our SEC filings incorporated by reference into this prospectus. The shares offered hereby shall be deemed to include shares offered by any pledgee, donee, transferee or other successor in interest of any of the Selling Shareholders listed below, provided that this prospectus is amended or supplemented if required by applicable law.

Selling Shareholder	Number of Common Shares Beneficially Owned Before Offering(1)	Shares Offered in this Registration(4)	Shares Owned After Offering(1)	
			Number	Percent
Medtronic Asset Management, Inc. ("MAMI")	4,760,564(2)	4,760,564		
Boston Healthcare Associates, Inc. ("Boston Healthcare")	76,120(3)	35,211	40,909(3)	—
	4,836,684(3)	4,795,775	40,909(3)	0.0018%(3)

(1) Beneficial ownership is determined in accordance with the rules of the Securities and Exchange Commission and generally includes voting or investment power with respect to securities. Shares of Common Stock subject to options and warrants currently exercisable or convertible, or exercisable or convertible within 60 days of June 30, 2001, are deemed beneficially owned and outstanding for computing the percentage of the person holding such securities, but are not considered outstanding for computing the percentage of any other person.

(2) Includes 3,000,000 shares of our Common Stock issuable under a warrant held by MAMI and 352,113 shares issuable under our Investment Agreement with MAMI.

(3) Includes 40,909 shares of our common stock held by Boston Healthcare which are registered for sale on a Registration Statement on Form S-3, as amended and filed with the Securities and Exchange Commission on September 15, 2000 (Commission Registration No. 333-45888). These shares may be sold by Boston Healthcare prior to the completion of this offering.

PLAN OF DISTRIBUTION

When used in this prospectus, "Selling Shareholder" includes pledgees, donees, transferees, and other successors in interest selling shares received from the named Selling Shareholder after the date of this prospectus.

The Selling Shareholders may distribute the common stock from time to time in one or more transactions at a fixed price or prices, which may be changed from time to time:

- at market prices prevailing at the times of sale,
- at prices related to those prevailing market prices, or
- at negotiated prices.

We will not receive any proceeds from the sale of the common stock.

The Selling Shareholders may sell the common stock:

- through one or more underwriters or dealers for public offering and sale,
- directly to investors,
- in an exchange distribution in accordance with the rules of such exchange, or
- through agents.

The distribution of the common stock may also be effected in one or more of the following methods:

- ordinary brokers' transactions, which may include long or short sales,
- transactions involving cross or block trades, or otherwise on the Nasdaq National Market,
- purchases by brokers, dealers or underwriters as principal and resale by those purchasers for their own accounts pursuant to this prospectus,
- "at the market" to or through market makers or into an existing market for the common stock,
- in other ways not involving market makers or established trading markets, including direct sales to purchasers or sales effected through agents,
- through transactions in options, swaps or other derivatives (whether exchange-listed or otherwise), loans or pledges of the Common Shares,
- pursuant to Rule 144 under the Securities Act,
- offers and sales made directly by the Selling Shareholders, or other bona fide owner of the Common Shares, so long as an applicable exemption from state broker-dealer registration requirements is available in the jurisdiction of the sale, or
- any combination of the foregoing, or by any other legally available means.

In addition, the Selling Shareholders or their successors in interest may enter into hedging transactions with broker-dealers who may engage in short sales of common stock in the course of hedging the positions they assume with the Selling Shareholders. The Selling Shareholders or their successors in interest may also enter into option or other transactions with broker-dealers that require the delivery by those broker-dealers of the common stock, which common stock may be resold thereafter pursuant to this prospectus. In connection with any sales, the Selling Shareholders and any brokers or dealers participating in such sales may be deemed to be underwriters within the meaning of the Securities Act of 1933 in connection with these sales, and any discounts and commissions received

by them and any profit realized by them on the resale of the common stock may be deemed to be underwriting discounts and commissions under the Securities Act.

Any broker-dealer participating in such transactions as agent may receive commissions from the Selling Shareholders and/or purchasers of the shares offered hereby (and, if it acts as agent for the purchaser of those shares, from that purchaser). Usual and customary brokerage fees will be paid by the Selling Shareholders. Broker-dealers may agree with the Selling Shareholders to sell a specified number of shares at a stipulated price per share, and, to the extent the broker-dealer is unable to do so acting as agent for a Selling Shareholders, to purchase as principal any unsold shares at the price required to fulfill the broker-dealer commitment to the Selling Shareholders. Broker-dealers who acquire shares as principal may thereafter resell the shares from time to time in transactions (which may involve cross and block transactions and which may involve sales to and through other broker-dealers, including transactions of the nature described above) in the over-the-counter market, in negotiated transactions or otherwise at market prices prevailing at the time of sale or at negotiated prices, and in connection with the resales may pay to or receive from the purchasers of those shares commissions computed as described above.

We have advised the Selling Shareholders that Regulation M promulgated under the Securities Exchange Act, may apply to their sales in the market, have furnished the Selling Shareholders with a copy of this regulation and have informed the Selling Shareholders of the need for delivery of copies of this prospectus. The Selling Shareholders may indemnify any broker-dealer that participates in transactions involving the sale of the shares against liabilities, including liabilities arising under the Securities Act. Any commissions paid or any discounts or concessions allowed to any such broker-dealers, and any profits received on the resale of those shares, may be deemed to be underwriting discounts and commissions under the Securities Act if any such broker-dealers purchase shares as principal.

We have agreed to indemnify the Selling Shareholders against certain liabilities, including liabilities under the Securities Act.

We have agreed to and are paying the costs and fees of registering the Common Shares of the Selling Shareholders to meet our obligations under agreements with Boston Healthcare and Medtronic Asset Management, Inc., respectively. The Selling Shareholders will pay any brokerage commissions, discounts or other expenses relating to the sale of the common stock.

Any securities covered by this prospectus which qualify for sale pursuant to Rule 144 under the Securities Act may be sold under that rule rather than pursuant to this prospectus.

There can be no assurance that the Selling Shareholders will sell any or all of the shares of common stock offered by them hereunder.

DESCRIPTION OF SECURITIES

Our authorized capital consists of 50,000,000 shares of common stock, par value $0.0001 per share, and 2,000,000 shares of preferred stock, par value $0.0001 per share.

COMMON STOCK

We are authorized to issue 50,000,000 shares of common stock. As of June 30, 2001, 23,073,302 shares of common stock were outstanding and were held of record by approximately 640 shareholders. Holders of common stock are entitled to one vote for each share at all meetings of our shareholders. Subject to preferences of preferred stockholders, common stockholders are entitled to receive ratably dividends declared by our board. Common stockholders have no preemptive, subscription, redemption or conversion rights. If we are liquidated or dissolved, common stockholders would share equally in our assets remaining after the payment of all our liabilities and the liquidation preference of any preferred stockholders.

PREFERRED STOCK

Our Board of Directors is authorized to issue up to 2,000,000 shares of undesignated preferred stock. No shares of preferred stock have been issued. Our Board has the authority to issue preferred stock in one or more series and to fix the rights, preferences, privileges and restrictions of the preferred stock, as well as fix the number of shares, without any further vote or action by the shareholders. Our Board, without shareholder approval, may issue preferred stock with voting and conversion rights superior to the voting rights of the common shares. The preferred stock may also decrease the amount of earnings and assets distributed to common stockholders. Issuance of preferred stock may delay or prevent a change in control.

WARRANTS

UNDERWRITERS' WARRANTS. We issued stock purchase warrants that entitle the underwriters of an offering conducted in August 2000 to purchase 300,000 shares of our common stock at a price of $8.70 per share. These warrants are exercisable from July 26, 2001 until July 26, 2005. We have granted the underwriters certain registration rights which, if exercised, will enable them to sell the shares received upon exercise of their warrants without restriction.

REPRESENTATIVES' WARRANTS. We issued 200,000 warrants to the representatives of the underwriters of our initial public offering to purchase 400,000 shares of our common stock. The representatives' warrants entitle the holders to acquire up to 200,000 units, each unit consisting of a share of common stock and a warrant to purchase a share of common stock for $10.80 per unit, and are exercisable until June 3, 2002. Each warrant initially entitles the holder to purchase one share of common stock at a price of $13.50. As of June 30, 2000, there were 142,500 representatives' warrants outstanding.

NASDAQ WARRANTS. We have outstanding warrants to purchase 2,300,000 shares of our common stock that were issued in our initial public offering and are traded on the Nasdaq National Market under the symbol "AVIIW." These warrants are exercisable until June 3, 2002. We may redeem them at a price of $0.25 per warrant if the closing bid price of our common stock has been at least 200% of the warrant exercise price for 20 consecutive trading days. The initial exercise price of these warrants is $13.50.

ITC MERGER WARRANTS. We have outstanding warrants to purchase 2,116,814 shares of our common stock that were issued in connection with our acquisition of ImmunoTherapy Corporation. These warrants are exercisable until July 15, 2003. We may redeem them at a price of $0.25 per warrant if the closing bid price of our common stock has been at least 200% of the exercise price for

20 consecutive trading days and the warrants have been exercisable. These warrants are traded on the Nasdaq National Market under the symbol "AVIIZ." The initial exercise price of these warrants is $13.50.

MEDTRONIC WARRANT; OTHER MEDTRONIC PURCHASE RIGHTS. We have outstanding a warrant to purchase 3,000,000 shares of our common stock that was issued to Medtronic Asset Management, Inc.("MAMI") ("MAMI Warrant") in connection with the various technology relationships entered into with Medtronic, Inc. This warrant is exercisable until June 20, 2006. We may cancel the warrant upon 190 days notice if the closing bid price of our common stock has been above $20.00 for 20 consecutive trading days, subject to MAMI exercising the warrant during that period. The exercise price of this warrant is $10.00 per share. Under an Investment Agreement with MAMI, MAMI also has the right to purchase an additional $10,000,000 of our Common Stock upon certain technology milestones being met or waived and subject to any required governmental or shareholder approval. 352,113 shares of our Common Stock are subject to purchase at a price of $7.10 per share ($2.5 million) and the balance ($7.5 million) at the average closing sales price for the Common Stock for the five (5) days prior to the achievement or waiver of the applicable milestones.

OTHER WARRANTS. In December 1999, we issued 628,573 warrants to purchase common stock at $4.025 per share in a private placement to five institutional investors and the placement agent. A total of 557,144 are exercisable until December 20, 2004 and 71,429 are exercisable after December 20, 2000 and until December 20, 2004. We have also issued additional warrants to purchase 21,667 shares of our common stock. These warrants are currently exercisable and do not have a termination date. We have issued a warrant to SuperGen, Inc. to purchase up to 1,665,478 shares of our common stock at $35.625 per share. This warrant becomes exercisable on the earlier of the date the U.S. Food and Drug Administration accepts a new drug application for which products of our products or the date on which the closing price for our common stock exceeds the exercise price. The warrant will expire on April 13, 2010 unless the warrant becomes exercisable.

STOCK OPTIONS

A total of 3,200,000 shares of our common stock are reserved for issuance under our 1992 Stock Incentive Plan. As of June 30, 2001, we had outstanding 2,701,159 options to purchase shares under the 1992 Stock Incentive Plan.

In 1998, we assumed the obligations under the 1997 Stock Option Plan of ImmunoTherapy Corporation. As of June 30, 2001, 171,924 options to purchase shares of our common stock were outstanding under the 1997 plan.

EMPLOYEE STOCK PURCHASE PLAN

A total of 250,000 shares of our common stock have been reserved for issuance under our 2000 Employee Stock Purchase Plan. As of June 30,2001, 21,421 shares had been issued under the plan with 228,579 shares available for issuance under the plan.

RIGHTS OF CERTAIN SHAREHOLDERS TO ADDITIONAL STOCK OR REDEMPTION OF SHARES

Holders of up to 1,857,147 shares of our common stock have the right to receive additional shares of our common stock without additional payment to us if we sell shares of our common stock, or engage in similar financing transactions, at a price of less than $3.50 per share prior to December 16, 2002. If the holdings of our stock by the group that has this right will exceed 20 percent of our outstanding common stock due to the issuance of new shares, we must redeem a sufficient number of the new shares to be issued at a price equal to $3.85 per share so that the holdings of this group do not exceed 20 percent.

REGISTRATION RIGHTS

We are required to file a registration statement under the Securities Act covering the 2,116,814 shares of our common stock underlying the warrants that were issued in connection with our acquisition of ImmunoTherapy Corporation prior to the date those warrants become exercisable, or September 15, 2000. Upon the filing of that registration statement and after September 14, 2000, a person will be able to sell any shares received upon the exercise of the warrants without restriction. Under a Registration Rights Agreement, dated June 22, 2000, between us and MAMI, we are also required to file a registration statement under the Securities Act from time to time covering the 1,408,451 shares of common stock issued to MAMI in June 2001, plus any additional shares sold to MAMI under the Investment Agreement dated May 22, 2001 between us and MAMI and the 3,000,000 shares of common stock covered by the MAMI Warrant, if MAMI exercises the warrant (collectively, the "MAMI shares") and to offer certain piggyback registration rights to MAMI on such shares. MAMI elected to exercise its piggyback registration rights as to the MAMI shares included in this offering.

OREGON CONTROL SHARES AND BUSINESS COMBINATION STATUTES

We are subject to the Oregon Control Share Act. The Control Share Act generally provides that a person who acquires voting stock of an Oregon corporation in a transaction that results in the acquiring person holding more than 20.0%, 33.3% or 50.0% of the total voting power of the corporation cannot vote the shares it acquires in the control share acquisition unless voting rights are accorded to the control shares by (1) a majority of each voting group entitled to vote and (2) the holders of a majority of the outstanding voting shares, excluding the control shares held by the acquiring person and shares held by our officers and inside directors. The terms acquiring person are broadly defined to include persons acting as a group. The acquiring person may, but is not required to, submit to us a statement setting forth certain information about the acquiring person and its plans with respect to us. The statement may also request that we call a special meeting of shareholders to determine whether voting rights will be accorded to the control shares. If the acquiring person does not request a special meeting of shareholders, the issue of voting rights of control shares will be considered at the next annual meeting or special meeting of shareholders. If the acquiring person's control shares are accorded voting rights and represent a majority or more of all voting power, shareholders who do not vote in favor of voting rights for the control shares will have the right to receive the appraised "fair value" of their shares which may not be less than the highest price per share by the acquiring person for the control shares. The MAMI shares are not subject to these provisions.

We are subject to certain provisions of the Oregon Business Corporation Act that govern business combinations between corporations and interested shareholders. The Business Combination Act generally provides that if a person or entity acquires 15% or more of the voting stock of an Oregon corporation, the corporation and the interested shareholder, or any affiliated entity of the interested shareholder, may not engage in certain business combination transactions for three years following the date the person became an interested shareholder. Business combination transactions for this purpose include (1) a merger or plan of share exchange, (2) any sale, lease, mortgage or other disposition of 10% or more of the assets of the corporation, and (3) certain transactions that result in the issuance of capital stock of the corporation to the interested shareholder. These restrictions do not apply if (1) the interested shareholder, as a result of the transaction in which such person became an interested shareholder, owns at least 85% of the outstanding voting stock of the corporation, disregarding shares owned by directors who are officers and certain employee benefit plans, (2) the Board of Directors approves the share acquisition or business combination before the interested shareholder acquires 15% or more of the corporation's outstanding voting stock or (3) the Board of Directors and the holders of at least two-thirds of the outstanding voting stock of the corporation, disregarding shares owned by the

interested shareholders, approve the transaction after the interested shareholder acquires 15% or more of the corporation's voting stock. The MAMI shares are not subject to these provisions.

TRANSFER AGENT

Our transfer agent and registrar is Mellon Investor Services, LLC.

LEGAL MATTERS

Hurley, Lynch & Re, PC, 747 SW Industrial Way, Bend, OR 97702, our attorneys, have opined that the Common Shares are duly and validly issued, fully paid and nonassessable.

EXPERTS

The audited financial statements incorporated by reference in this prospectus and elsewhere in the registration statement have been audited by Arthur Andersen LLP, independent public accountants, as indicated in their report with respect thereto, and are included herein in reliance upon the authority of said firm as experts in accounting and auditing in giving said report.

PART II
INFORMATION NOT REQUIRED IN PROSPECTUS

ITEM 14. OTHER EXPENSES OF ISSUANCE AND DISTRIBUTION.*

SEC Registration Fee	$	11,078
Nasdaq Listing Fee		2,000
Accountant's Fees and Expenses		5,000
Legal Fees and Expenses		5,000
Miscellaneous		—
Total	$	23,078

* Represents expenses related to the distribution by the Selling Shareholders pursuant to the Prospectus prepared in accordance with the requirements of Form S-3. These expenses will be borne by the Company on behalf of the Selling Shareholders. All amounts are estimates except for the SEC registration fee and the Nasdaq listing fees.

ITEM 15. INDEMNIFICATION OF DIRECTORS AND OFFICERS.

The Company's Articles of Incorporation provide for indemnification of the officers and directors of the Company to the fullest extent permitted by law. The Oregon Business Corporation Act, permits a corporation to limit, under certain circumstances, a director's liability for monetary damages in actions brought by the corporation or its stockholders. As an Oregon corporation, the Company is subject to the OBCA and the exculpation from liability and indemnification provision contained therein. Pursuant to Section 60.047(2)(d) of the OBCA, Article II of the Company's Fifth Restated Articles of Incorporation (the "Articles") eliminates the liability of the Company's directors to the Company or its stockholders for monetary damages, except for any liability related to breach of the duty of loyalty, actions not in good faith and certain other liabilities.

Section 60.387, ET SEQ., of the OBCA allows corporations to indemnify their directors and officers against liability where the director or officer has acted in good faith and with a reasonable belief that actions taken were in the best interests of the corporation or at least not adverse to the corporation's best interests and, if in a criminal proceeding, the individual had not reasonable cause to believe the conduct in question was unlawful. Under the OBCA, corporations may not indemnify against liability in connection with a claim by or in the right of the corporation but may indemnify against the reasonable expenses associated with such claims. Corporations may not indemnify against breached of the duty of loyalty. The OBCA mandates indemnification against all reasonable expenses incurred in the successful defense of any claim made or threatened whether or not such claims was by or in the right of the corporation. Finally, a court may order indemnification if it determines that the director or officer is fairly and reasonably entitled to indemnification in view of all the relevant circumstances whether or not the director or officer met the good faith and reasonable belief standards or conduct set out in the statute.

The OBCA also provides that the statutory indemnification provisions are not deemed exclusive of any other rights to which directors or officers may be entitled under a corporation's articles of incorporation or bylaws, any agreement, general or specific action of the board of directors, vote of stockholders or otherwise.

The Company's Articles also provide for the elimination of liability of directors for monetary damages to the full extent permitted by the Oregon Business Corporations Act.

The Company has entered into indemnification agreements with its directors and certain of its officers.

ITEM 16. EXHIBITS.

Number	Exhibits
4.1	Investment Agreement, dated May 22, 2001, between Medtronic Asset Management, Inc. and AVI BioPharma, Inc.(1)

4.2	Registration Rights Agreement, dated June 20, 2001, between Medtronic Asset Management, Inc. and AVI BioPharma, Inc.(1)
4.3	Warrant for AVI BioPharma, Inc. Common Stock, dated June 20, 2001, and issued to Medtronic Asset Management, Inc.(1)
4.4	License and Development Agreement dated June 20, 2001 between Medtronic, Inc. and AVI BioPharma, Inc. (1)
4.5	Supply Agreement dated June 20, 2001 between Medtronic, Inc. and AVI BioPharma, Inc. (1)
5.1	Opinion of Hurley, Lynch & Re, P.C.
23.1	Consent of Arthur Andersen LLP, independent public accountants
23.2	Consent of Hurley, Lynch Re, P.C. (included in Exhibit 5.1)
24.1	Power of Attorney

(1) Incorporated by reference to Exhibits to Registrant's Quarterly Report on Form 10-Q for the fiscal quarter ended June 30, 2001, and filed with the Securities and Exchange Commission August 14, 2001.

ITEM 17. UNDERTAKINGS.

The undersigned registrant hereby undertakes:

(1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement to include any material information with respect to the plan of distribution not previously disclosed in the registration statement or any material changes to such information in this registration statement.

(2) That, for the purpose of determining any liability under the Securities Act, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

(3) To remove from registration by means of a post-effective amendment any of the securities being registered which remains unsold at the termination of the offering.

(4) That, for purposes of determining any liability under the Securities Act, each filing of the registrant's annual report pursuant to Section 13(a) or Section 15(d) of the Exchange Act that is incorporated by reference in this registration statement shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities shall be deemed to be in the initial bona fide offering thereof.

Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Act and is, therefore, unenforceable. In the event that a claim for indemnification is against public policy as expressed in the Act and is, therefore, unenforceable. In the event that a claim for indemnification is against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question of whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the registrant has duly caused this Registration Statement on Form S-3 to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Portland, State of Oregon, on August 28, 2001.

AVI BIOPHARMA, INC.

By: /s/ DENIS R. BURGER

Denis R. Burger
Chief Executive Officer

Pursuant to the requirements of the Securities Act of 1933, this Registration Statement has been signed by the following persons in the capacities on the date indicated.

Name	Title
/s/ *Denis R. Burger* Denis R. Burger	Chairman of the Board and Ph.D. Chief Executive Officer (Principal Executive Officer)
/s/ *Alan P. Timmins* Alan P. Timmins	President, Chief Operating Officer and Director
/s/ *Mark M. Webber* Mark M. Webber	Chief Financial Officer and Chief Information Officer (Principal Financial and Accounting Officer)
* Patrick L. Iversen, Ph.D.	Senior Vice President of Research and Development and Director
* Dwight D. Weller, Ph.D.	Senior Vice President of Chemistry and Manufacturing and Director
* Nick Bunick	Director
* Bruce L.A. Carter, Ph.D.	Director
* John W. Fara, Ph.D.	Director

* James B. Hicks, Ph.D.	Director
* Joseph Rubinfeld, Ph.D.	Director

*By: /s/ *Alan P. Timmins*
Alan P. Timmins
as Attorney-in-fact

INDEX TO EXHIBITS

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EXHIBIT 5.1
HURLEY, LYNCH & RE, PC LETTERHEAD
August 28, 2001

Board of Directors AVI BioPharma, Inc.
One S.W. Columbia Street, Suite 1105
Portland, OR 97258

Gentlemen:

In connection with the registration of 4,795,775 shares of common stock, $.0001 par value (the "Common Stock"), of AVI BioPharma, Inc., an Oregon corporation (the "Company"), under the Registration Statement on Form S-3 to be filed with the Securities and Exchange Commission on August 28, 2001, and the proposed offer and sale of the Common Stock pursuant to the Registration Statement, we have examined such corporate records, certificates of public officials and officers of the Company and other documents as we have considered necessary or proper for the purpose of this opinion.

Based on the foregoing and having regard to legal issues which we deem relevant, it is our opinion that the shares of Common Stock are validly issued, fully paid and nonassessable.

We hereby consent to the filing of this opinion as an exhibit to the above-mentioned registration statement.

Very truly yours,
/s/
HURLEY, LYNCH & RE, PC

QuickLinks

EXHIBIT 5.1 HURLEY, LYNCH & RE, PC LETTERHEAD August 28, 2001

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EXHIBIT 23.1

CONSENT OF INDEPENDENT PUBLIC ACCOUNTANTS

As independent public accountants, we hereby consent to the incorporation by reference in the Registration Statement on Form S-3 of our report dated February 7, 2001, included in the Company's Form 10-K for the year ended December 31, 2000 and to all references to our firm included in this registration statement.

/s/
ARTHUR ANDERSEN LLP
Portland, Oregon
August 28, 2001

QuickLinks

EXHIBIT 23.1
CONSENT OF INDEPENDENT PUBLIC ACCOUNTANTS

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EXHIBIT 24.1

POWER OF ATTORNEY

The person whose signature appears below constitutes and appoints Alan P. Timmins as his or her true and lawful attorney-in-fact and agent with full power of substitution and resubstitution, for him or her, in his or her name, place and stead, in any and all capacities to sign and file with the Securities and Exchange Commission a Registration Statement on Form S-3 covering the registration and sale of 35,211 shares of AVI BioPharma, Inc's common stock ("Common Stock") held by Boston Healthcare Associates, Inc. and 4,760,564 shares of Common Stock held or acquirable by Medtronic Asset Management, Inc. ("2001 Form S-3") and amendments to such 2001 Form S-3, as required to comply with the registration requirements of such shares under the Securities Exchange Act of 1933, as amended from time to time, or as deemed necessary by such attorney-in-fact, granting unto such attorneys-in-fact and agents, full power and authority to do and perform each and every act and thing requisite and necessary to be done, as fully to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or their substitutes may lawfully do or cause to be done by virtue thereof.

This power of attorney shall remain in full force and effect and may be relied upon by such attorneys-in-fact and agents unless the undersigned files a revocation thereof with the Securities and Exchange Commission.

DATED effective August 23, 2001.

/s/ *Denis R. Burger*

DENIS R. BURGER, Ph.D.
Chairman of the Board and Chief Executive Officer

POWER OF ATTORNEY

The person whose signature appears below constitutes and appoints Alan P. Timmins as his or her true and lawful attorney-in-fact and agent with full power of substitution and resubstitution, for him or her, in his or her name, place and stead, in any and all capacities to sign and file with the Securities and Exchange Commission a Registration Statement on Form S-3 covering the registration and sale of 35,211 shares of AVI BioPharma, Inc's common stock ("Common Stock") held by Boston Healthcare Associates, Inc. and 4,760,564 shares of Common Stock held or acquirable by Medtronic Asset Management, Inc. ("2001 Form S-3") and amendments to such 2001 Form S-3, as required to comply with the registration requirements of such shares under the Securities Exchange Act of 1933, as amended from time to time, or as deemed necessary by such attorney-in-fact, granting unto such attorneys-in-fact and agents, full power and authority to do and perform each and every act and thing requisite and necessary to be done, as fully to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or their substitutes may lawfully do or cause to be done by virtue thereof.

This power of attorney shall remain in full force and effect and may be relied upon by such attorneys-in-fact and agents unless the undersigned files a revocation thereof with the Securities and Exchange Commission.

DATED effective August 23, 2001.

/s/ *Mark W. Webber*

MARK W. WEBBER.
Chief Financial Officer

POWER OF ATTORNEY

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DATED effective August 23, 2001.

/s/ *Patrick L. Iversen*

PATRICK L. IVERSEN
Sr. Vice President of Research and Development, Director

POWER OF ATTORNEY

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DATED effective August 23, 2001.

/s/ *Dwight D. Weller*

DWIGHT D. WELLER
Sr. Vice President of Chemistry and Manufacturing, Director

POWER OF ATTORNEY

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DATED effective August 23, 2001.

/s/ *Nick Bunick*

NICK BUNICK
Director

POWER OF ATTORNEY

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DATED effective August 23, 2001.

/s/ *Bruce L.A. Carter*

BRUCE L.A. CARTER
Director

POWER OF ATTORNEY

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DATED effective August 23, 2001.

/s/ *John W. Fara*

JOHN W. FARA
Director

POWER OF ATTORNEY

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DATED effective August 23, 2001.

/s/ *James B. Hicks*

JAMES B. HICKS
Director

POWER OF ATTORNEY

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DATED effective August 23, 2001.

/s/ *Joseph Rubinfeld*

JOSEPH RUBINFELD
Director