

GUIDANCE FOR THE CONTENT OF PREMARKET NOTIFICATIONS FOR METAL EXPANDABLE BILIARY STENTS

This document is intended to provide guidance in the preparation of a regulatory submission. It does not bind the FDA or the regulated industry in any manner.

Food and Drug Administration
Center for Devices and Radiological Health
Office of Device Evaluation
Division of Reproductive, Abdominal, Ear, Nose and Throat and Radiological Devices
Gastroenterology and Renal Devices Branch

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While this guidance document represents a final document, comments and suggestions may be submitted at any time for Agency consideration by writing to:

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U.S DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration
Center for Devices and Radiological Health

Guidance for the Content of Premarket Notifications for Metal Expandable Biliary Stents

This document reflects the current review guidance for biliary stent devices. It is based on 1) current scientific knowledge, 2) clinical experience, 3) previous submissions by manufacturers to the Food and Drug Administration (FDA), and 4) the Safe Medical Devices Act of 1990 and FDA regulations in the Code of Federal Regulations (CFR). As advances are made in science and medicine, and changes occur in implementation of Congressional legislation, these review criteria will be re-evaluated and revised as necessary.

This document is an adjunct to the CFR and other FDA Guidance documents for the preparation and review of 510(k) submissions. It does not supersede those publications, but provides additional clarification on what FDA believes is needed before a device can be cleared for marketing. The submission must provide evidence that the device is substantially equivalent in safety and effectiveness to a predicate device legally marketed in the United States.

In 21 CFR 876.5010(a), a biliary catheter and accessories are described as "a tubular flexible device used for temporary or prolonged drainage of the biliary tract, for splinting of the bile duct during healing, or for preventing stricture of the bile duct. This generic type of device may include a bile collecting bag that is attached to the biliary catheter by a connector and fastened to the patient by a strap."

Since these devices were first classified, metal expandable biliary stents have been found substantial equivalent to biliary catheters and are therefore included under this classification. For the purposes of this document, the term "biliary stent" refers to an expandable biliary catheter, constructed either wholly or partially of metal, along with any accessories used to deploy it. The biliary stent is implanted in the biliary tree and used to provide palliation of malignant strictures.

The primary reference for the information required in a premarket notification (510(k)) for a medical device is found in 21 CFR 807.87. Substantial equivalence to a legally marketed device is to be established with respect to, but not limited to, intended use, design, energy used/delivered, materials, performance, safety, effectiveness, labeling, and other applicable characteristics. To facilitate review of your 510(k) submission, please provide the information listed below. FDA recommends that your 510(k) submission include numbered pages, a table of contents and clearly titled sections.

I. DEVICE NAME

Provide the name of the device, including:

- A. Classification name (i.e., biliary catheter)
- B. Common name (i.e., biliary stent)
- C. Trade or proprietary name
- D. Intended use. As noted above, the only indication for these devices which can be approved under 510(k) is for palliation of malignant strictures in the biliary tree.

II. MANUFACTURER INFORMATION

Provide the following information about your company:

- A. Establishment registration number
- B. Address of manufacturing site
- C. Name, title and telephone and fax number of contact person

III. DEVICE CLASSIFICATION

Provide the CFR classification regulation number for the device and any components or accessories. For example, biliary stents are Class II devices, with a CFR reference of 21 CFR 876.5010.

IV. DEVICE DESCRIPTION

Provide a detailed description of the proposed device. The description should include a labeled diagram, photograph or schematic drawing. The specifications, including the length, width, height, and diameter of each model, should be included. The size ranges should be listed in terms of diameter (mm) and length (mm). Also, provide a detailed description of the deployment system for the device, including any accessories that are provided for this purpose. Indicate

whether the stent is to be placed endoscopically or percutaneously. Finally, explain which components of the device are disposable or reusable.

V. COMPARISON WITH PREDICATE DEVICE

Provide a comparison of the proposed device with the predicate device. The comparison should be presented in a clear and concise format (e.g., tabular). The description of the predicate device should include:

- A. Proprietary and common name, model number and manufacturer
- B. 510(k) reference number or pre-amendment status, if known
- C. Indications for use
- D. Technological characteristics, including design, materials, method of placement, method of deployment, size ranges, etc.
- E. Performance specifications (see section VIII below)

Also provide examples of product literature for the predicate device, including labels, labeling, instructions for use, promotional materials, etc.

VI. CHANGE or MODIFICATION

If the purpose of the 510(k) is to describe a change or modification to an already legally marketed product, the submission should include the following:

- A. Description of change or modification
- B. Rationale for changes
- C. Data to demonstrate that safety and effectiveness are not affected by the changes or modifications

VII. DEVICE MATERIALS AND BIOCOMPATIBILITY

- A. An exact identification of all materials used to fabricate the stent and deployment system, including any colorants (inks, dyes, markings, etc.), plasticizers or additives should be provided. Materials should be

separated according to whether they have direct or indirect body contact and according to the duration of contact.

- B. Biocompatibility data, as recommended by the Office of Device Evaluation (ODE) Blue Book memorandum, #G95-1, "Use of ISO-10993 Biological Evaluation of Medical Devices Part 1: Evaluation and Testing", should be provided.

Biliary stents are considered implanted devices, tissue and bone contacting, extended duration (category C). The deployment catheters are considered implanted devices, tissue and bone contacting, limited duration (category A). If the biliary stent or deployment catheter is made of materials that have been well characterized chemically and physically in the published literature (including any colorants, plasticizers or additives), and have a long history of safety in products with a similar intended use, the FDA will accept adequate justification for not conducting some or all of the following suggested tests. The tests should be performed on the materials of the final, ready-to-use device.

Biliary Stents*:

- Cytotoxicity
- Sensitization (Guinea pig maximization with polar and non-polar extracts)
- Implantation
- Sub-chronic toxicity
- Chronic toxicity**

Deployment System:

- Cytotoxicity
- Sensitization (Guinea pig maximization with polar and non-polar extracts)
- Irritation or Intracutaneous reactivity

* Genotoxicity testing is not required for this device because it is intended for implantation in patients with malignant strictures.

** The device remains in the body for a prolonged duration. A long term implantation study with histopathology may replace implantation and chronic toxicity.

VIII. PERFORMANCE TESTING - BENCH

Bench testing of biliary stents is required to establish substantial equivalence. The following tests are recommended:

- A. Deployment Testing. This test is performed to verify the reproducibility of stent placement using the deployment system. The stent is usually deployed in a tube having similar characteristics (i.e., size, lubricity) to the bile duct and the results should demonstrate ease of deployment and the accuracy of stent placement. Test results should be provided for the largest and smallest diameter stents that are to be marketed.
- B. Expansion Force Testing. This test is performed to measure the force exerted by the stent as it expands. The predicate device should be tested with the same apparatus and the results should be provided for both the proposed and the predicate devices. These test results should be provided for every diameter stent that is to be marketed.
- C. Compression Force Testing. This test is designed to measure the force required to compress the stent once it is expanded. Similar to the expansion force test, the predicate device should be tested with the same apparatus and the results should be provided for the proposed and the predicate devices. These test results should be provided for every diameter stent that is to be marketed.
- D. Dimensional Testing. This test is performed to verify the reproducibility of the stent length and diameter after deployment. These test results should be provided for every diameter stent that is to be marketed.
- E. Corrosion Testing. This test is performed to establish the compatibility of the stent materials with the corrosive environment in the biliary tree. The stent should be in contact with simulated bile for a period of time that is representative of the implantation time of the device. After exposure to the simulated bile, the tensile strength of the stent material should be measured and compared to the untreated stent. Visual inspection of the stent using microscopy should also be performed. Accelerated exposure conditions may be used (e.g., elevated temperatures), however, a rationale should be provided on how the accelerated conditions are representative of the actual clinical use conditions.

- F. Balloon Performance Testing. If the deployment mechanism uses a balloon inflation catheter, balloon burst strength data should be provided. In addition, data should be provided on the times for balloon inflation and deflation. These test results should be compared to the results of the predicate device in the same test apparatus.
- G. Stent Deformation Testing for balloon expandable stents. If the deployment mechanism uses a balloon inflation catheter, data should be provided to demonstrate that the mechanical integrity of the stent is unaffected when the balloon is expanded to its burst point.
- H. Tensile Strength Testing. This test should be performed for any deployment system that includes components that are bonded or welded.

It is recommended that all data be presented in a clear tabular or graphical form. In describing each test protocol include the following: test objective, equipment used, rationale for test conditions, number of devices tested (FDA recommends that at least three devices of each type be evaluated in every test), results and analysis.

IX. PERFORMANCE TESTING - ANIMAL and CLINICAL

If the technology and/or materials of the stent and/or deployment system are significantly different from the predicate device, animal testing may be required. Clinical data may also be required, depending upon the extent of the difference between the proposed and predicate devices. For example, covering the metal stent with a polymeric coating to prevent tissue in-growth would require the submission of clinical data, with long-term (6 month) follow-up. FDA recommends that manufacturers contact us before submitting a 510(k) to discuss these issues, if appropriate. Clinical data will probably be necessary if the indication is for anything other than palliation of malignant strictures in the biliary tree.

X. PERFORMANCE STANDARDS/ SPECIAL CONTROLS

There are no performance standards or special controls for biliary stents at this time.

XI. STERILITY

Guidance on sterility issues is described in ODE Bluebook Memorandum #K90-1, "Sterility Review Guidance (2/12/90)". A copy of this memorandum can be obtained from the Division of Small Manufacturers Assistance (DSMA) at 1 (800) 638-2041. Generally, implanted devices must meet the sterility assurance level (SAL) of 10^{-6} . Please provide the following information:

- A. Sterilization method, if applicable
- B. Validation method and SAL
- C. Description of packaging method
- D. Radiation dose or the maximum levels of residuals of ethylene oxide, ethylene chlorohydrin, and ethylene glycol which remain on the finished sterilized device, whichever is applicable

XII. PROPOSED LABELING

A label includes any identification on the device and on the package in which it is stored and shipped. Additional guidance on labeling in issues is provided by ODE Bluebook Memorandum #G91-1, "Device Labeling Guidance (3/18/91)." A copy of this memorandum can be obtained by contacting DSMA at the telephone number listed above. A draft or sample copy of the labeling should be provided in the submission. The labeling should include the device name, indications for use, U.S. point of contact, corporation name, address and phone number, sterility, expiration date (if applicable), and whether the device is for single or multiple use. Instructions for use should be provided which clearly describes the indications for use, any warnings, precautions or contraindications for the device and clear instructions for proper deployment and positioning of the device. Also provide copies of advertisement and promotional literature, if available.

XIII. 510(k) SUMMARY OR STATEMENT

The Safe Medical Devices Act of 1990 (SMDA) requires all persons submitting a premarket notification to include either:

- A. A summary of the safety and effectiveness information in the premarket notification

or

B. The following statement::

I certify that, in my capacity as (provide title) of (provide name of firm), I will make available all information included in this premarket notification on safety and effectiveness within 30 days of request by any person if the device described in the premarket notification submission is determined to be substantially equivalent. The information I agree to make available will be a duplicate of the premarket notification submission, including any adverse safety and effectiveness information, but excluding all patient identifiers, and trade secret and confidential information, as defined in 21 CFR 20.61.

Safety and effectiveness information refers to information in the premarket notification submission, including adverse safety and effectiveness information that is relevant to an assessment of substantial equivalence. The information could be descriptive information about the new and predicate device(s), or performance or clinical testing information. The 510(k) statement (part B above) must be signed and dated.

XIV. CERTIFICATION OF TRUTHFULNESS AND ACCURACY

Your submission must contain the following statement:

I certify in my capacity as (provide title) for (provide manufacturer's name), I believe, to the best of my knowledge, that all data and information submitted in this premarket notification are truthful and accurate and that no material fact has been omitted.

The above statement must be signed and dated by a representative of the company (not by a regulatory consultant).

XV. INDICATIONS FOR USE

The indications for use should be provided on a separate sheet and should agree exactly with the indications provided in the device labeling.