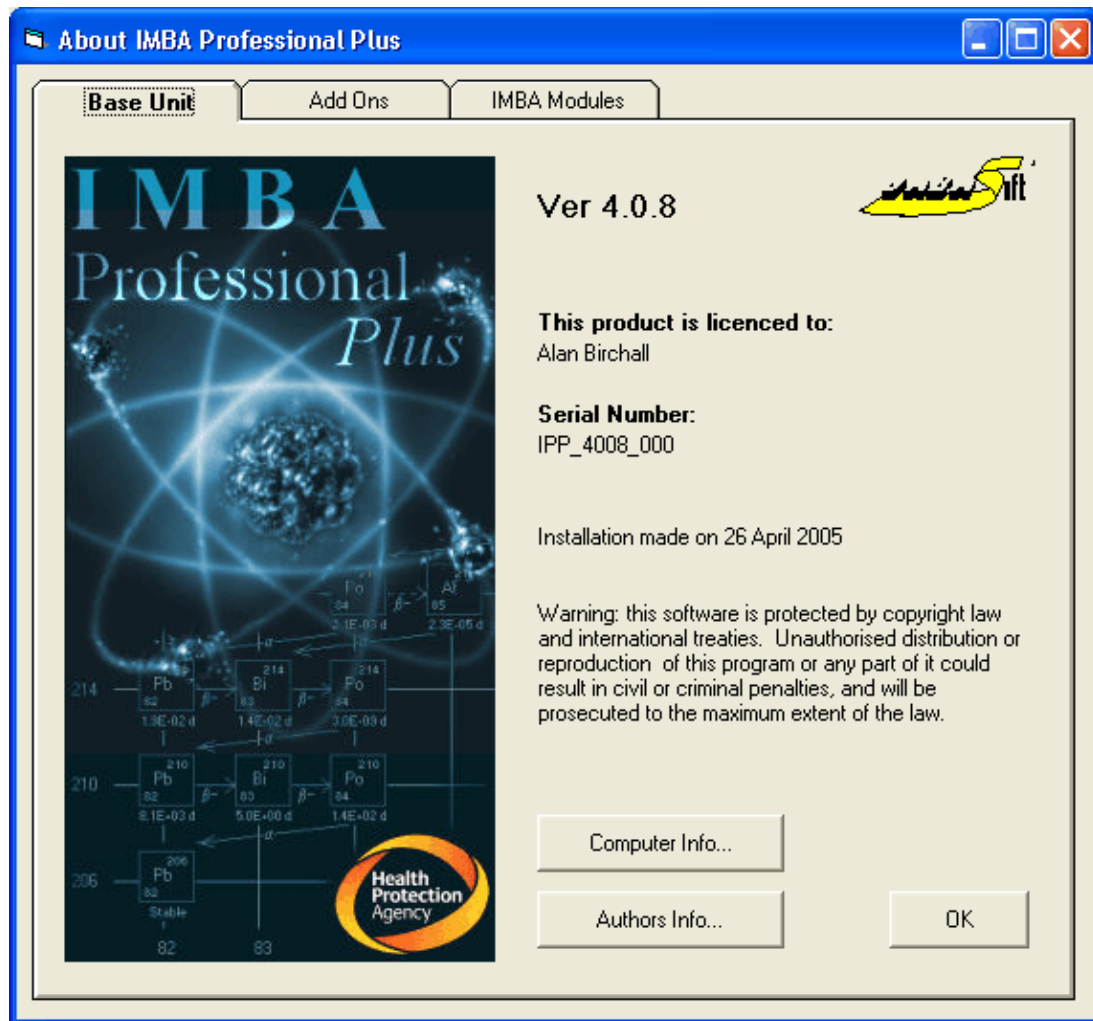


IMBA Professional Plus - Base Unit



IMBA Professional Plus (Version 4.0) is a compilation of features and capabilities developed for [IMBA Expert™ USDOE-Edition](#), [IMBA Expert™ CANDU-Edition](#), and [IMBA Expert™ OCAS-Edition](#), with new features developed by [HPA-RPD](#). The IMBA Professional Plus - Base Unit includes the capability to:

1. assess an intake from bioassay measurement data
2. calculate bioassay quantities at different times from a specific intake
3. calculate equivalent organ doses and effective dose from a single intake.

The base unit is the core of IMBA Professional Plus and enables the user to perform basic internal dosimetry calculations (e.g., calculating doses from a specified intake, estimating an intake from bioassay measurements and calculating bioassay quantities from a given intake). It implements the latest ICRP [biokinetic models](#). Output is both tabular and graphical and special tools enable data transfer between Windows™ applications. For standard calculations, all of the ICRP default values can be selected from built in databases at the touch of a button. For more detailed calculations, the user can enter individual parameter values. Calculations are performed 6-10 times faster than in the previous software (IMBA Expert™/Professional Series). The product has been extensively quality assured and comes with complete documentation.

The [IMBA Professional Plus - Base Unit \(Version 4.0.8\)](#) includes the following 75 radionuclides (listed alphabetically by radioelement):

- **actinium** ($^{227,228}\text{Ac}$);
- **americium** ($^{241,243}\text{Am}$);
- **antimony** ($^{124,125}\text{Sb}$);
- **barium** (^{140}Ba);
- **caesium** ($^{134,137}\text{Cs}$);
- **californium** (^{252}Cf);
- **carbon** (^{14}C) - as particulate or as gaseous or vapor forms of carbon;
- **cerium** ($^{141,144}\text{Ce}$);
- **chromium** (^{51}Cr);
- **cobalt** ($^{57,58,60}\text{Co}$);
- **curium** ($^{242,243,244}\text{Cm}$);
- **europium** ($^{152,154,155,156}\text{Eu}$);
- **hafnium** (^{181}Hf);
- **hydrogen [tritium]** (^3H) - with biokinetic models for tritiated water (HTO) and organically bound tritium (OBT) - as particulate or as gaseous or vapor forms of tritium;
- **iodine** ($^{125,129,131,133,134,135}\text{I}$) - as particulate or as gaseous or vapor forms of iodine;
- **iron** ($^{55,59}\text{Fe}$);
- **lanthanum** (^{140}La);
- **manganese** (^{54}Mn);
- **neptunium** ($^{237,239}\text{Np}$);
- **nickel** (^{63}Ni);
- **niobium** ($^{94,95}\text{Nb}$);
- **phosphorus** ($^{32,33}\text{P}$);
- **plutonium** ($^{238,239,240,241,242}\text{Pu}$);
- **promethium** (^{147}Pm);
- **protactinium** (^{231}Pa);
- **polonium** (^{210}Po);
- **radium** ($^{224,226,228}\text{Ra}$) - assuming same biokinetic model for parent and radioactive progeny - note that ICRP68 assumes independent kinetics for the progeny;
- **ruthenium** ($^{103,106}\text{Ru}$);
- **silver** ($^{110\text{m}}\text{Ag}$);
- **sodium** ($^{22,24}\text{Na}$);
- **strontium** ($^{85,89,90}\text{Sr}$);
- **sulphur** (^{35}S) - as particulate, for both inorganic and organically incorporated sulfur -

a version update will include gaseous and vapor forms of sulphur;

- **terbium** (^{160}Tb);
- **thorium** ($^{228,230,232}\text{Th}$) - assuming same biokinetic model for parent and radioactive progeny - note that ICRP68 assumes independent kinetics for the progeny;
- **tin** (^{113}Sn);
- **uranium** ($^{234,235,236,238}\text{U}$) - assuming same biokinetic model for parent and radioactive progeny - note that ICRP68 assumes independent kinetics for the progeny;
- **yttrium** (^{90}Y);
- **zinc** (^{65}Zn);
- **zirconium** (^{95}Zr).

The [IMBA Professional Plus - Base Unit](#) enables you to do the following:

- Assess an intake from either **inhalation**, **ingestion**, **injection**, or a **transdermal wound**.
- Calculate **bioassay quantities** as a function of time - implemented quantities are:
 1. Whole Body
 2. Lungs
 3. Urine
 4. Faeces
 5. Blood
 6. Thyroid
 7. Liver
 8. User Defined.

The [IMBA Professional Plus - Base Unit](#) includes the following basic features:

- Calculate the best estimate of the **amount of intake** - from a single **exposure event (intake regime)**, based on the user-specified intake scenario.
- Analyse any of the above types of bioassay measurement - for a given indicator radionuclide.
- **Save** all assumptions, parameter values and results to a **single**, nameable **data file** - which can be read in to any version of [IMBA Expert™/Professional Series/Professional Plus](#), running on any compatible PC computer system.
- Specify the **date** and **time-of-day** of each bioassay measurement.
- Track time as either **date + hh:mm** or **fractional d**.
- Specify the **collection period** for **each** urine and faecal sample (in fraction of a day).
- **Import/export** bioassay data between [IMBA Expert™/Professional Series/Professional Plus](#) and a Windows® **spreadsheet**.
- **Exclude unreliable data points** from the fitting process - but not from the data record - and mark these as such in the associated graph of the data.
- Apply the **maximum likelihood** fitting method - to deal with:
 1. data recorded as "less than the limit of detection" (< **LOD**);
 2. explicit error on **each data point**;
 3. lognormal or normal error distributions;

4. up to 200 data points (for each bioassay quantity).
- Obtain the **best estimate** of the amount of intake - repeating the calculation with the same assumptions and data yields an identical result.
 - Calculate the **committed equivalent dose to each organ or tissue** - and the **effective dose** - from an **indicator radionuclide**.
 - Toggle between **ICRP60/68**, ICRP26, or 10 CFR 835 **tissue weighting factors** and **remainder tissue rules**.
 - Create a comprehensive **report file** containing administrative details, all case parameter assumptions, and the calculated results.
 - Define all **absorption parameters** and **aerosol characteristics** - or select the absorption parameters from a built-in **database** of ICRP-recommended values.
 - Define **bioassay retention functions** - or select these from a **database** of ICRP-recommended values.
 - Enter **user specified particle transport rates** (in the respiratory tract) - or use **ICRP defaults** - and perform calculations for both **Reference Worker** (light activity) and **heavy activity**.
 - Apply **built-in ICRP biokinetic models** for each radioelement - or specify **user-defined models**.
 - Display **bioassay data** (with **error bars** and the **fitted bioassay function**) graphically **on-screen** - in multiple windows.
 - Interchangeably display **tables of bioassay data** and **predicted bioassay quantities** with **graphs** of the same quantities.
 - Use **built-in**, highly flexible, **graphical** and **spreadsheet tools** to facilitate **setting up your graphs** and **data entry**.
 - Copy **data to-and-from spreadsheets** and other Windows® applications.
 - Copy **data to-and-from an ASCII file**.
 - The ability to deal with **chelated intakes** - by marking and excluding "treatment enhanced" excretion data from the intake assessment.
 - Apply the **built-in ICRP Publication 38 radiation database** - and view complete decay chains and nuclear data on-screen.
 - Toggle between **pCi** and **Bq** activity units.
 - Calculate **bioassay quantities** over specified time intervals - for design of future monitoring programs.
 - **Save** and **reload** all assumed parameter values and calculated results for a particular case study in a comprehensive **parameter file**.

The [IMBA Professional Plus - Base Unit](#) is accompanied by the following documentation:

- User's Manual (internal interactive HTML and hard-copy report).
- Appendix A - Technical Basis (internal interactive HTML and PDF file).
- Appendix B - Bioassay Quality Assurance (PDF file).
- Appendix C - Dose Quality Assurance (PDF file).
- Appendix D - Example Bioassay Cases (PDF file).

The [IMBA Professional Plus - Base Unit](#) is intended for the user who does not require all of the advanced features provided as modular "Add Ons." For the more advanced user, the various [Add Ons](#) provide additional, highly specialised, fully-integrated features, which greatly enhance the software's functionality.

